

ASSISTANCE AGREEMENT

1. Award No. 2010*1058114*000		2. Modification No. Base		3. Effective Date 14 July 2010		4. Page 1 of 18	
5. Awarded To University of Maryland		6. Sponsoring Office Office of the Chief Scientist		7. Period of Performance 14 July 2010 through 13 July 2012			
8. Type of Agreement Grant <input checked="" type="checkbox"/> Cooperative Agreement <input type="checkbox"/> Other <input type="checkbox"/>		9. Authority 31 USC 6304 and 10 USC 2358		10. Purchase Request or Funding Document No. (b)(3)			
11. Remittance Address See Article 4		12. Total Grant Amount Govt. Share \$240,000 Cost Share \$ 0 Total \$240,000		13. Funds Obligated: This action: \$240,000 Total: \$240,000			
14. Principal Investigator Dr. Alan Migdall (301)975-2331		15. Program Manager (b)(3)		16. Administrator: (b)(3)			
17. Submit Payment Requests To Vendor Payments Attn: Mail Room Address [] Washington, DC 20505		18. Paying Office Same as Block 17		19. Submit Reports To As Directed by the Technical Point of Contact (b)(3)			
20. Accounting and Appropriation Data Amount Obligated: \$240,000							
21. Research Title and/or Description of Project: A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution							
For the Recipient				For the United States of America			
22. Signature of Person Authorized to Sign Jill Frankenfield, Contract Manager				(b)(3)			
23. Name and Title <i>Jill A. Frankenfield</i>		24. Date Signed <i>7/15/10</i>		27. Date Signed <i>7-15-10</i>			

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ARTICLE 1 SCOPE OF THE AGREEMENT

The Recipient shall perform a coordinated research and development program in accordance with the Recipient's technical portion of the proposal entitled "A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution."

First Year (14 July 2010 - 13 July 2011)
 Government's Share \$120,000
 Recipients Share (cash or in-kind) \$ 0
 Total First Year Agreement \$120,000

Second Year (14 July 2011 - 13 July 2012)
 Government's Share \$120,000
 Recipients Share (cash or in-kind) \$ 0
 Total Second Year Agreement \$120,000

Total Government Share of Agreement \$240,000

Option Year (14 July 2012 - 13 July 2013) (UNEXERCISED)
 Government's Share \$119,999
 Recipients Share (cash or in-kind) \$ 0
 Total Option Year Agreement \$119,999

Grand Total Government Share of Agreement \$359,999

ARTICLE 2 DEFINITIONS

Parties -- For the purposes of this Agreement, the parties are University of Maryland and the United States of America, hereinafter called the Government or the Agency, represented by the Central Intelligence Agency.

Agreement -- The articles of this assistance agreement, Research Terms and Conditions (available at <http://www.nsf.gov/pubs/policydocs/rtc/termssidebyside.pdf>) and its attachments.

Recipient -- An organization or other entity receiving a grant or cooperative agreement. For purposes of this Agreement, the Recipient is the University of Maryland.

Performance Year -- Each consecutive twelve-month period from the effective date of this agreement throughout the term of the agreement.

ARTICLE 3 ADMINISTRATIVE REQUIREMENTS

A. This Agreement will be administered in accordance with, and recipients shall comply with, the Research Terms and Conditions (available at <http://www.nsf.gov/pubs/policydocs/rtc/termssidebyside.pdf>) the requirements of the following OMB Circulars which are incorporated herein by reference:

- OMB Circular A-21 now codified at 2 CFR part 220, "Cost Principles for Educational Institutions"

- OMB Circular A-110, Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations now codified at 2 CFR part 215

- OMB Circular A-122, "Cost Principles for Non-Profit Organizations", now codified at 2 CFR part 230

- OMB Circular A-133, "Audits of State, Local Governments, and Nonprofit Institutions" (27 June 03); (revised 26 June 07) and

- The Provisions of CIA Broad Agency Announcement No. ICPDF-2010-0001, entitled "2010 Intelligence Community Postdoctoral Research Fellowship Program."

B. Should there be any inconsistency between the special conditions contained in the Articles of this agreement and the Research Terms and Conditions, the Articles of the agreement shall control. Should there be any inconsistency between the Research Terms and Conditions and any special conditions contained in the CIA Broad Agency Announcement, guides, brochures, etc., cited or included by reference in the agreement, the matter should be referred to the CIA Grants Officer for guidance.

ARTICLE 4 ADMINISTRATIVE RESPONSIBILITIES

Central Intelligence Agency Grants Office

Attn: [redacted]

Address: Contracting Team
ARC

[redacted]
Washington, DC 20505

Phone: [redacted]

Fax: [redacted]

Email: [redacted]

(b)(3)

(b)(3)

(b)(3)

Technical Point of Contact

Central Intelligence Agency Program Officer

ATTN: [redacted]

Address: Washington, DC 20505

Phone: [redacted]

Fax: [redacted]

Email: [redacted]

(b)(3)

(b)(3)

Government Payment Office

Invoices shall be submitted using the Agency's Web Invoicing System (WINS). If the Grantee is not registered in WINS, the Grantee shall call the Vendor Service Center on [redacted] within two weeks of grant award to register. Items needed to facilitate registration include: a valid grant number and the name, phone number, and e-mail address for the Grantee's point of contact. The Grantee may make inquiries regarding invoices to the payment office on [redacted]

(b)(3)

(b)(3)

If the Grantee is unable to submit a payment request in electronic form, or the Agency is unable to receive a payment request in electronic form, the Grantee

shall submit the payment request using a method mutually agreed to by the Grantee, the Grants Officer, and the payment office.

Invention Reporting

Grants Office

Address: Contracting Team
ARC
[Redacted]
Washington, DC 20505

Phone:

Fax:

Email:

[Redacted]

(b)(3)

(b)(3)

Recipient's Principal Investigator

P.I. Name: Dr. Alan Migdall
Department: Joint Quantum Institute
Address: National Institute of Standards and Technology
University of Maryland
100 Bureau Dr, MS 8441
Gaithersburg, MD 20899-8441
Phone: (301) 975-2331
Fax: (301) 869-5700
Email: migdall@nist.gov

Recipient's Authorized Organizational Representative

AOR Name: Jill A. Frankenfield
Title: Contract Manager, Office of Research Administration & Advancement
Address: 3112 Lee Building
University of Maryland
College Park, MD 20742-4111
Phone: (301) 405-4577
Fax: (301) 314-9569
Email: jfranken@umd.edu

ARTICLE 5 TERM OF THE AGREEMENT

The project has been approved on scientific/technical merit for 24 months. The period of performance is 14 July 2010 - 13 July 2012.

ARTICLE 6 KEY PERSONNEL

The key personnel listed below must be employed with University of Maryland at the time of award and shall be maintained, to the maximum extent possible, throughout this agreement. Should changes be necessary, University of Maryland shall notify the Agency Grants Office (identified in Block 6 of the face page) in writing of the proposed substitute(s) within 30 days of the change in order to obtain approval of the substitution from the CIA Program Manager.

KEY PERSONNEL:

Principal Investigator: Dr. Alan Migdall
Fellow (when identified): TBD

ARTICLE 7 FISCAL MANAGEMENT

7.1 Restrictions of the Use of Government Funds

Government funds provided under this Agreement must be allocated by the Recipient exclusively for the execution and operation of the Agreement Scope. Government funds shall not be utilized to support the Recipient's operations or administration unrelated to this Agreement.

7.2. Obligation

In no case shall the Government's financial obligation exceed the amount obligated on this Agreement or by amendment to this Agreement. The Government's share for full performance of this award is \$240,000. Of this amount, \$240,000 is allotted and available for payment. This grant is fully funded. The Government is not obligated to reimburse the Recipient for expenditures in excess of the amount of funding obligated and allotted by the Government.

7.3 Incremental Funding Actions

Unless otherwise specified in the agreement, each successive increment of a continuing grant will be funded at the level specified in Article 1 without a formal request from the recipient provided an annual report has been received from the Principal Investigator.

Incremental funding is contingent on:

- i. availability of funds;
- ii. satisfactory scientific/technical progress; and
- iii. compliance with any special conditions of the agreement.

7.4 Advance Payment

To request advance payments, recipients shall submit a request for advance payment. The original and two copies of each request shall be submitted to:

B. CIA Grants Office, Block 6

7.5 Program Income

All program income earned during the project period shall be added to funds committed to the project by the Government and the Recipient and used to further eligible program objectives.

7.6 Closeout Adjustments

The Government may make a downward adjustment to the Government funding amount after completion of the effort under an agreement, when appropriate in accordance with OMB Circular A-110.

ARTICLE 8 REVISION TO FINANCIAL PLANS

A. The financial plan, or approved budget, is the financial expression of the effort to be performed under this agreement as approved during the award process. This agreement and its terms and conditions reflect the approved financial plan. Some changes to the plan require prior approval, as described below.

B. Recipients are authorized to:

Carry forward unobligated balances to subsequent funding periods (with the exception of the final funding period)

C. The CIA Grants Officer's prior written approval is required for actions which:

1. Change the scope or objective of a project. The Principal Investigator must consult with the Program manager and receive written approval from the Grants Officer before deviating from the research objectives defined in the grant proposal or any sub-award, transfer or contracting out of substantive program performance under this agreement.
2. Change key personnel. Support for the project may not continue without the active direction of the Principal Investigator and/or Postdoctoral Fellows approved for, and identified in, this Assistance Agreement. If the approved Principal Investigator/Postdoctoral Fellow severs his or her connection with the recipient institution or otherwise relinquishes active direction of the project, either permanently or for a significant length of time (three months or more), the recipient institution must either:
 - (i) Appoint a replacement Principal Investigator/Postdoctoral Fellow with the approval of the Program Manager, or
 - (ii) Relinquish the Assistance Agreement, in which case the Agreement shall be terminated.
3. change the recipient institution's cost share amount reflected in the approved budget
4. use human subjects or vertebrate animals
5. require no cost extensions exceeding 12 months
6. Unless otherwise directed by the Grant Officer, any unexpended balance of funds which remains at the end of any funding period, except the final funding period of the grant, shall be carried over to the next funding period, and may be used to defray costs of any funding period of the grant. This includes allowing the carry over of funds to the second and subsequent years of a multiple year grant. This provision also applies to subcontractors performing substantive work under the grant.

7. SPECIAL CONDITIONS

N/A

8. OPTION

N/A

ARTICLE 9 INVENTIONS

(a) The clause entitled "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms," (37 CFR 401) is hereby incorporated by reference and the clauses in paragraph 401.14 are modified as follows: replace the word "contractor" with "Recipient"; replace the words "agency," "Federal Agency" and "funding Federal Agency" with "government"; replace the word "contract" with "agreement"; delete paragraphs (g)(2), (g)(3) and the words "to be performed by a small business firm or domestic nonprofit organization" from paragraph (g)(1); paragraph (1), Communications, point of contact on matters relating to this clause will be the CIA Grants Officer

(b) The Recipient shall file Invention (Patent) Reports as of the close of the performance year and at the end of the term for this Agreement. Annual reports are due 60 days after the end of each year of performance and final reports are due 60 days after the expiration of the final performance period. Negative reports are also required. The Recipient shall submit the original and one copy to the Grants Officer.

(c) Final payment cannot be made nor can the agreement be closed out until the recipient delivers to the Government all disclosures of subject inventions required by this agreement, an acceptable final report pursuant to article 12 entitled "Annual and Final Technical Reports," and all confirmatory instruments.

A. All rights and title to data and technical data, as defined in 48 CFR 27.401, generated under this agreement shall vest in the Recipient.

B. The Recipient hereby grants to the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to use, duplicate, or disclose for governmental purposes any data, technology and inventions, whether patented or not, made or developed under this Agreement.

C. The Recipient reserves the right to protect by copyright original works developed under this agreement. All such copyrights will be in the name of the Recipient. The Recipient hereby grants the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, for governmental purposes, any copyrighted materials developed under this agreement, and to authorize others to do so.

D. The Recipient is responsible for affixing appropriate markings indicating the rights of the Government on all data and technical data delivered under the agreement. The Government shall be deemed to have unlimited rights in all data and technical data delivered without markings.

ARTICLE 10 ANNUAL PERFORMANCE REPORTS

10.1 Annual Performance Report

A. Annual reports are required for efforts of more than one year. This report will provide a concise and factual discussion of the significant accomplishments and progress during the year covered by the report. Each of the topics described below shall be addressed for the effort being performed:

(1) A comparison of actual accomplishments with the goals and objectives established for the period, the findings of the investigator, or both.

(2) Reasons why established goals were not met, if appropriate.

(3) Other pertinent information including, when appropriate, analysis and explanation of cost overruns.

B. In addition, for research awards, each of the following topics (4) through (7) shall be addressed as appropriate to the research effort being performed:

(4) A cumulative chronological list of written publications in technical journals. Include those in press as well as manuscripts in preparation and planned for later submission. Indicate likely journals, authors, and titles.

(5) A list of professional personnel associated with the research effort. List any advanced degrees awarded, including dates, recipient, type of degree, and thesis title.

(6) Interactions (Related Activities):

i. Papers presented at meetings, conferences, seminars, etc.

ii. Consultative and advisory functions to other laboratories and agencies on research supported under the agreement. Provide factual information about the subject matter, institutions, dates, and the names of individuals involved.

(7) New discoveries, inventions, or patent disclosures and specific applications stemming from the research effort.

The Postdoctoral Fellow is also required to present the status of the research grant at the annual IC Postdoctoral Research Fellowship Program Colloquium.

10.2 Final Technical Report

A. A Final Technical Report is due at the completion of the agreement. This report will provide a comprehensive, cumulative, and substantive summary of the progress and significant accomplishments achieved during the total period of the effort covered by the agreement. Each of the topics described in section 2.1 above shall be addressed as appropriate for the effort performed. Publications may be bound and attached as appendices.

B. When the results of a research effort have not previously been reported in scientific or technical publications, the Final Technical Report must provide sufficient detailed discussions of findings and accomplishments obtained in pursuit of the planned research objectives.

10.3 Report Submittal

The Recipient shall submit annual and final technical reports in the original and two copies to the Agency's program officer within 90 days after completion

of the period covered by the report. The Recipient shall provide a copy of the transmittal letter to the Grants Officer.

10.4 Format

A. Cover and title page. Standard Form (SF) 298, Report Documentation Page, shall be used. Item 13 of the form should contain a 100 to 200 word abstract summarizing technical progress during the reporting period. Style should be third person singular using past tense. Jargon, special symbols or notations, subscripts, mathematical symbols or foreign alphabet letters are not permitted. All pages should be of good quality for copying purposes.

B. Recipient's format is acceptable.

ARTICLE 11 INFORMAL TECHNICAL REPORTS

11.1 Reports

This report shall be prepared only if requested by the Government program officer. It shall be submitted in letter format and is usually not longer than three pages in length. Its primary purpose is to inform the project engineer/program manager about significant events, accomplishments, and anticipated problems that may affect the conduct of the planned effort. It should summarize the progress of the effort being performed, new discoveries, inventions or patent disclosures, anticipated changes in commitments of key personnel and in the planned approach; acquisition or fabrication of major or special research equipment; and the titles of manuscripts planned for publication. The Recipient shall send the Agency program officer one copy signed by the principal investigator within 15 days after the request.

A brief quarterly report may be required after each three month period. (The annual report replaces the report for the last quarter of the year). Each quarterly report should describe the progress of the research project relative to the milestones that were defined in the proposal.

11.2 Government Visits

The Government may visit the Recipient to discuss project status and results. It is anticipated that Government involvement in this grant will be limited to general oversight.

ARTICLE 12 SCIENTIFIC REPORTS

1. For research agreements, this report shall be used for rapidly disseminating highly significant research results or for scientific reports that are too long or that contains useful compilations of data, tables, and computations not normally accepted by technical journals. It is not appropriate for a student's thesis. Before preparing a Scientific Report, obtain written permission from the Program Manager who will then furnish detailed instructions for formatting, reproducing, and distributing the report. Send the Agency program manager two copies.

2. On its cover, a scientific report shall prominently display the following disclaimer: "The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies or endorsements, either expressed or implied, of the U.S. Government."

ARTICLE 13 REPORTING FINANCIAL INFORMATION

Recipients shall submit financial reporting information in accordance with the following.

13.1 Interim Financial Reports

A. The Recipient shall submit an interim Federal Financial Report (FFR 425) within 30 days following the end of each quarter. The original and a copy of the report should be submitted to the Grants Officer list identified in Block 16 of the cover page. Recipients are required to update, certify and submit the FFR to the Agency by the due date even if funds have not been drawn during the reporting period.

B. Both cash management and financial status information should be reported on the same form for single award reporting.

13.2 Final Federal Financial Report

The recipient shall submit the final FFR no later than 90 days following the completion of the agreement. The original and a copy of the report shall be submitted to the Grants Administration Office identified in block 16 of the cover page.

13.3 Unexpended Balances

Unless otherwise directed by the Grant Officer, any unexpended balance of funds which remains at the end of any funding period, except the final funding period of the grant, shall be carried over to the next funding period, and may be used to defray costs of any funding period of the grant. This includes allowing the carry over of funds to the second and subsequent years of a multiple year grant, but it does not apply to options, which require current year funding. This provision also applies to subcontractors performing substantive work under the grant.

ARTICLE 14 PUBLIC DISCLOSURE OF SCIENTIFIC AND TECHNICAL INFORMATION

A. The Recipient may make formal public disclosure of the scientific and technical information from this supported work (e.g., release articles for appropriate professional publications or present papers at scientific meetings or symposia) and will take the following steps;

(1) A copy of the article, paper, report, etc., shall be provided to the Government 45 days prior to submission for publication.

(2) Reference shall be attributed to a grant issued by the Intelligence Community Postdoctoral Research Fellowship Program, or as may otherwise be prescribed by the Grants Officer.

B. The Recipient may utilize the scientific and technical information resulting from this support in consulting or discussing this and related information with other qualified individuals or groups of individuals, where appropriate, for furthering this research and/or development effort. The provision of A(2) shall apply to such exchanges of information.

ARTICLE 15 Non-Publicity

The Recipient shall not use or allow to be used any aspect of this solicitation and/or agreement for publicity. Publicity means, but is not limited to, advertising (e.g. trade magazines, newspapers, Internet, radio, television etc.), communications with the media, marketing, or a reference for new business. It is further understood that this obligation shall not expire upon completion or termination of this agreement, but will continue indefinitely. The Recipient may request a waiver or release from the foregoing but shall not deviate there from unless authorized to do so in writing by the Grants Officer. Recipients are not required to obtain waivers when informing offices within this Agency of agreements it has performed or is in the process of performing.

ARTICLE 16 HUMAN SUBJECTS

Approval is required by CIA prior to any work beginning involving human subject use. All proposals that involve the use of human subjects must include documentation of their ability to follow Federal guidelines for the protection of human subjects. This includes, but is not limited to, protocol approval mechanisms, approved Institutional Review Boards (IRB), and Federal Wide Assurances. These requirements are based on expected human use issues sometime during the entire length of the proposed effort. The recipient shall provide their IRB approval of specific research, the blank informed user consent form, and the protocol and related documents as requested for secondary approval by CIA.

ARTICLE 17 ANIMAL SUBJECTS

Approval is required by CIA prior to work beginning involving animal subject use. Proposals selected for funding that will use vertebrate animals in the research must comply with the Animal Welfare Act [7 U.S.C. 2131 et seq.] and the regulations promulgated there under by the Secretary of Agriculture [9 CFR 1.1- 4.11] pertaining to the humane care, handling, and treatment of vertebrate animals held or used for research, teaching or other activities supported by Federal awards. The recipient is expected to ensure that the guidelines described in the National Academy of Science (NAS) Publication, "Guide for the Care and Use of Laboratory Animals" (1996) are followed and to comply with the Public Health Service Policy and Government Principles Regarding the Care and Use of Animals (included as Appendix D to the NAS Guide).

ARTICLE 18 MODIFICATIONS

Any party to this Agreement who wishes to modify the Agreement shall confer in good faith with the other signatory parties to determine the desirability of the proposed modification. Modifications shall not be effective until a written

modification is signed by the Agreement signatories (or their successors). Administrative modifications may be unilaterally executed by the CIA Grants Officer.

ARTICLE 19 SUSPENSION AND TERMINATION PROCEDURES

19.1

The Government reserves the right to suspend or terminate this agreement for cause. If the Recipient fails to comply with the terms and conditions of this agreement, the CIA Grants Officer will provide written notice of breach or deficiency to the Recipient and will provide the Recipient an opportunity to explain or correct the breach or deficiency within 30 days from receipt of notice. If grounds for termination for cause still exist, the Government may terminate or suspend performance. If suspension is invoked, the Government may withhold further payments, or prohibit the Recipient from incurring additional obligation of funds until corrective action is taken. If this agreement is terminated after the Recipient has received Government funding, the closeout procedures in OMB Circular A-110 apply.

The agreement may be suspended or terminated in whole or in part in any of the following situations by:

- A. the Agency when the recipient has materially failed to comply with the terms and conditions of the award;
- B. the Agency when it has other reasonable cause; including departure of the Principal Investigator.
- C. the Agency and the recipient by mutual agreement (if the Agency and the recipient cannot reach an agreement, the Agency reserves the right to unilaterally terminate the award); or
- D. the recipient on written notice to the Agency setting forth the reasons for such action, the effective date, and, in the case of partial termination, the portion to be terminated or suspended (with the understanding that if the Agency determines that the unexpired portion will not accomplish the purposes of the agreement, it may suspend or terminate the entire agreement.)
- E. Notwithstanding the above, for security or safety reasons or in the case of a serious breach that could lead to irreparable damage, the Agency Grants Officer may order immediate suspension of work, in whole or in part.

19.2 Informal Resolution of Grant Administration Disputes

A. Consistent with the Recommendation on Grant Disputes by the Administrative Conference of the U.S., and with the intent of the provisions of Alternative Dispute Resolution, the CIA provides the informal resolution processes described below concerning disputes or disagreements that may arise over a Grants Officer's post-award decisions under a CIA agreement.

B. Scope of Post-Award Disputes Covered

The disputes below are covered under this process:

- i. cost disallowances pursuant to a Grants Officer's decision (e.g., specific disallowances under an individual grant or as a result of an audit report);
- ii. termination orders; and
- iii. the final settlement amount under a termination.

C. Procedures

- i. The recipient should submit a certified letter to the Agency's Procurement Executive via the Grants Officer noting the recipient's disagreement or dispute and identifying the Agency's Grants Officer's decision in question, giving reasons for the request for review and providing any other material pertinent to the request.
- ii. The letter to the Procurement Executive must be postmarked no later than 30 days after the date of the letter notifying the recipient of the decision in question. The time for filing a request for review is strictly enforced and no extensions for the purpose of preparing it will be granted.
- iii. The request for review need not follow a prescribed format; however, it must contain a full statement of the recipient's position with respect to the disputed matter and the facts and reasons in support of the recipient's position. Requests will be reviewed if the recipient submits new information (which was unavailable at the time of the original decision); if an error in fact or application of Agency policy is noted in the original decision; or improper procedures were followed in the original decision.
- iv. The Procurement Executive, will review or designate one or more individuals to review the matter. One reviewing official will be at least at a management level equivalent to the official who made the decision that is being reviewed. In no case, will the review be undertaken by any individual involved with the decision or involved in recommending and/or monitoring the scientific and engineering aspects of the project or responsible for negotiating and/or administering its business aspects.
- v. The designated individual(s) will review and consider all relevant information available. A report which identifies the conclusion and recommendation will be completed within 30 days and forwarded to the Procurement Executive or his/her designee for a final and unappealable written decision for the agency. The Procurement Executive or his/her designee will communicate the decision in writing to the recipient.

ARTICLE 20 RESEARCH MISCONDUCT

All research awards issued by the CIA are subject to the Federal Policy on Research Misconduct published in the Federal Register on December 6, 2000 (65 FR 76260). The following definitions will be used when applying this policy:

- i. Research misconduct means the fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. Research misconduct does not include honest error or difference of opinion.

- ii. Fabrication is making up data or results and recording or reporting them.
- iii. Falsification means manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.
- iv. Plagiarism is the appropriation of another person's ideas, processes, results or words without giving appropriate credit.
- v. Research means all basic, applied, and demonstration research in all fields of science, engineering, mathematics, education, linguistics, medicine, psychology, social sciences, statistics, and research involving human subjects or animals.
- vi. Research institutions includes all organizations using Federal funds for research, including, for example, colleges and universities, intramural Federal research laboratories, Federally funded research and development centers, national user facilities, industrial laboratories, or other research institutes.
- vii. Research record is the record of data or results that embody the facts resulting from scientific inquiry, and includes, but is not limited to, research proposals, laboratory records, both physical and electronics, progress reports, abstracts, theses, oral presentations, internal reports, and journal articles.

Any allegation of research misconduct should be reported to the CIA Grants Officer

ARTICLE 21 REPORTING CLASSIFIABLE INFORMATION

(a) This award is intended for unclassified, publicly releasable research. The recipient will not be granted access to classified information. The awarding agency does not expect that the results of the research project will involve classified information.

(b) If, however, in conducting the activities supported under this award, the principal investigator (PI) is concerned that any of the research results involve potentially classifiable information that may warrant Government restrictions on the dissemination of the results, the PI should promptly notify the awarding agency's program manager.

ARTICLE 22 ENVIRONMENTAL STANDARDS

The Recipient agrees to the following environment standards;

A. Comply with applicable provisions of the Clean Air Act (42 U.S.C 7401, et seq.) and Clean Water Act (33 V.S.C. 1251, et seq.), as implemented by Executive Order 11738 (3 CFR, 1971- 1 975 Comp., p799] and Environmental Protection Agency (EPA) rules at 40 CFR part 15. In accordance with the EPA rules, the Recipient further agrees that it will:

- Not use any facility on EPA's List of Violating Facilities in performing any award that is nonexempt under 40 CFR 15.5, as long as the facility remains on the list.

- Notify the awarding agency if it intends to use a facility in performing this award that is on the List of Violating Facilities or that the Recipient knows has been recommended to be placed on the List of Violating Facilities.

B. Identify to the awarding agency any impact this award may have on the quality of the human environment, and provide help the agency may need to comply with the National Environmental Policy Act (NEPA, at 42 V.S.C. 4321, et seq.) and to prepare Environmental Impact Statements or other required environmental documentation. In such cases, the Recipient agrees to take no action that will have an adverse environmental impact (e.g. physical disturbance of a site such as breaking of ground) until the agency provides written Approval.

ARTICLE 23 NONDISCRIMINATION

By signing this agreement or accepting funds under the agreement, the Recipient assures that it will comply with applicable provisions of the following, national policies prohibiting discrimination:

A. On the basis of race, color, or national origin, in Title VI of the Civil Rights Act of 1964 (42 V.S.C. 2000d, et seq.).

B. On the basis of sex or blindness, in Title IX of the Education Amendments of 1972 (20 V.S.C. 1681, et seq.)

C. On the basis of age, in the Age Discrimination Act of 1975 (42 V.S.C. 6101, et seq.), as implemented by the Department of Health and Human Services regulations at 45 CFR part 90.

D. On the basis of disability, in the Americans with Disabilities Act.

ARTICLE 24 CERTIFICATIONS

The following Certifications, which have been executed by the Recipient prior to award of this agreement, are hereby incorporated by reference:

A. Certification regarding Debarment, Suspension, and Other Responsibility Matters.

B. Certification regarding Drug-Free Workplace Requirements.

C. Certification regarding Lobbying.

ARTICLE 25 LIABILITY

The Agency cannot assume any liability for accidents, illnesses or claims arising out of any work supported by an award or for unauthorized use of patented or copyrighted materials. The grantee institution is advised to take such steps as may be deemed necessary to insure or protect itself, its employees, and its property.

ARTICLE 26 SPONSORSHIP BY AN AGENCY WITHIN THE INTELLIGENCE COMMUNITY

This grant is sponsored by the Central Intelligence Agency, an Agency within the Intelligence Committee. To ensure compliance with Executive Order 12333, dated 4 December 1981, (revised 30 July 08) the individual signing this instrument on behalf of the academic institution is authorized by the institution to contract with an Agency within the Intelligence Community.

ARTICLE 27 PRIOR APPROVALS

As appropriate, prior approval of the following deviations from budget and program plans are required:

(1) The Grantee must consult the Program Manager in Block 15 of the Award/Modification document through the AGO at the Administrative Office in Block 16 or the Grant Procurement Office in Block 6 of the Award/Modification document before deviating from the research objectives defined in the grant proposal or any sub-award, transfer or contracting out of substantive program performance under this award.

(2) Support for the project may not continue without the active direction of the Principal Investigator approved for, and identified in, this Grant. If the approved Principal Investigator severs his or her connection with the Grantee or otherwise relinquishes active direction of the project, either permanently or for a significant length of time (three months or more), the Grantee must either:

(i) Appoint a replacement Principal Investigator with the approval of the Program Manager in Block 15 through the Grant Procurement Office in Block 6 of the Award/Modification document, or

(ii) Relinquish the Grant, in which case the Grant shall be terminated

(3) Extension for the expiration period of this Grant - The AGO at the Administrative Office in Block 16 of the Award/Modification document has authority to approve a no-funds extension request meeting all of the following parameters:

- (i) a one-time basis only; and
- (ii) for a period not to exceed 90 days; and
- (iii) where \$50,000.00 or less of obligated funds remain to be expended.

In other cases, where a request is outside one or more of the parameters, a no-funds extension can only be approved with the concurrence of the Program Manager in Block 15 of the Award/Modification document. For any no-funds extension to be effective, a written grant modification must be issued and signed by the AGO at the Administrative Office in Block 16 under the circumstances above or the Sponsoring Office in Block 6 of the Award/Modification document.

ARTICLE 28 DATA RIGHTS

A. All rights and title to data and technical data, as defined in 48 CFR 27.401, generated under this agreement shall vest in the Recipient.

B. The Recipient hereby grants to the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to use, duplicate, or disclose

for governmental purposes any data, technology and inventions, whether patented or not, made or developed under this Agreement.

C. The Recipient reserves the right to protect by copyright original works developed under this agreement. All such copyrights will be in the name of the Recipient. The Recipient hereby grants the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, for governmental purposes, any copyrighted materials developed under this agreement, and to authorize others to do so.

D. The Recipient is responsible for affixing appropriate markings indicating the rights of the Government on all data and technical data delivered under the agreement. The Government shall be deemed to have unlimited rights in all data and technical data delivered without markings.

ARTICLE 29 USING TECHNICAL INFORMATION RESOURCES

To the extent practical, the recipient will use the technical information resources of the Defense Technical Information Center (DTIC) and other Government or private facilities to investigate recent and on-going research and avoid needless duplication of scientific and engineering effort.

ASSISTANCE AGREEMENT			
1. Award No. 2010*1058114*000		2. Modification No. 001	
3. Effective Date 12 January 2011		4. Page 1 of 3	
5. Awarded To University of Maryland		6. Sponsoring Office Office of the Chief Scientist	
7. Period of Performance 14 July 2010 through 13 July 2012			
8. Type of Agreement Grant <input checked="" type="checkbox"/> Cooperative Agreement <input type="checkbox"/> Other <input type="checkbox"/>		9. Authority 31 USC 6304 and 10 USC 2358	
10. Purchase Request or Funding Document No. N/A			
11. Remittance Address See Article 4		12. Total Grant Amount Govt. Share \$240,000 Cost Share \$ 0 Total \$240,000	
13. Funds Obligated: This action: \$0.00 Total: \$240,000			
14. Principal Investigator Dr. Alan Migdall (301)975-2331		15. Program Manager <div style="border: 1px solid black; height: 40px; width: 100%;"></div>	
16. Administrator: <div style="border: 1px solid black; height: 40px; width: 100%;"></div>		(b)(3)	
17. Submit Payment Requests To Vendor Payments Attn: Mail Room Address <div style="border: 1px solid black; width: 100px; height: 15px;"></div> Washington, DC 20505		18. Paying Office Same as Block 17	
19. Submit Reports To As Directed by the Technical Point of Contact		(b)(3)	
20. Accounting and Appropriation Data N/A			
21. Research Title and/or Description of Project: A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution			
For the Recipient		For the United States of America	
22. Signature of Person Authorized to Sign <i>Jill A. Frankenfield</i>		(b)(3)	
23. Name and Title Jill Frankenfield, Contract Manager		24. Date Signed 1/28/11 <i>JA</i>	
25. Name of Officer <div style="border: 1px solid black; width: 100px; height: 15px;"></div> Grants Officer		27. Date Signed 1/13/11 (b)(3)	

2010*1058114*000
University of Maryland
Modification 1
Page 2 of 3

- A. The purpose of this modification is to revise Article 4: Administrative Responsibilities, to reflect a change in procedure for submitting invoices.
B. Accordingly, the following Article(s) are revised/restated as follows:

*Changes reflected in BOLD.

ARTICLE 4 ADMINISTRATIVE RESPONSIBILITIES

Central Intelligence Agency Grants Office

Attn:
Address: Contracting Team
ARC

Washington, DC 20505
Phone:
Fax:
Email:

(b)(3)

(b)(3)

(b)(3)

Technical Point of Contact

Central Intelligence Agency Program Officer
ATTN:
Address: Washington, DC 20505
Phone:
Fax:
Email:

(b)(3)

(b)(3)

Government Payment Office

Invoices shall be submitted using the Internet Payment Platform (IPP). If the Grantee is not registered in IPP, the Grantee shall call the Vendor Service Center on within two weeks of grant award to register. Items needed to facilitate registration include: a valid grant number and the name, phone number, and e-mail address for the Grantee's point of contact. The Grantee may make inquiries regarding invoices to the payment office on

(b)(3)

(b)(3)

If the Grantee is unable to submit a payment request in electronic form, or the Agency is unable to receive a payment request in electronic form, the Grantee shall submit the payment request using a method mutually agreed to by the Grantee, the Grants Officer, and the payment office.

Invention Reporting

Grants Office
Address: Contracting Team
ARC

Washington, DC 20505
Phone:

(b)(3)

(b)(3)

2010*1058114*000
University of Maryland
Modification 1
Page 3 of 3

Fax:
Email:

(b)(3)

Recipient's Principal Investigator

P.I. Name: Dr. Alan Migdall
Department: Joint Quantum Institute
Address: National Institute of Standards and Technology
University of Maryland
100 Bureau Dr, MS 8441
Gaithersburg, MD 20899-8441
Phone: (301) 975-2331
Fax: (301) 869-5700
Email: migdall@nist.gov

Recipient's Authorized Organizational Representative

AOR Name: Jill A. Frankenfield
Title: Contract Manager, Office of Research Administration & Advancement
Address: 3112 Lee Building
University of Maryland
College Park, MD 20742-4111
Phone: (301) 405-4577
Fax: (301) 314-9569
Email: jfranken@umd.edu

C. Except as provided herein, all other Articles remain UNCHANGED and in full force and effect.

ASSISTANCE AGREEMENT			
1. Award No. 2010*1058114*000	2. Modification No. 002	3. Effective Date 05 July 2012	4. Page 1 of 15
5. Awarded to University of Maryland		6. Sponsoring Office Office of Integrated Missions	7. Period of Performance 12 July 2010 through 30 June 2013
8. Type of Agreement Grant <input checked="" type="checkbox"/> Cooperative Agreement <input type="checkbox"/> Other <input type="checkbox"/>	9. Authority 31 USC 6304 and 10 USC 2358	10. Purchase Request or Funding Document No. N/A	
11. Remittance Address See Article 4		12. Total Grant Amount Govt. Share: \$240,000 Cost Share: \$0 Total: \$240,000	13. Funds Obligated: This action: \$0 Total: \$240,000
14. Principal Investigator Dr. Alan Migdall (301) 975-2331	15. Program Manager <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	16. Administrator <div style="border: 1px solid black; height: 20px; width: 100%;"></div> (b)(3)	
17. Submit Payment Requests to Vendor Payments Attn: Mail Room Address: <div style="border: 1px solid black; height: 15px; width: 100%;"></div> Washington, DC 20505	18. Paying Office Same as Block 17	19. Submit Reports As Directed by the Technical Point of Contact (b)(3)	
20. Accounting and Appropriation Data Amount Obligated: \$240,000			
21. Research Title and/or Description of Project A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution			
22. For the Recipient <div style="border: 1px solid black; height: 40px; width: 100%;"></div>		(b)(3)	
24. Signature of Person Authorized to Sign <i>Jill A. Frankenfield</i>		<div style="border: 1px solid black; height: 40px; width: 100%;"></div>	
26. Name and Title Jill Frankenfield, Contract Manager	27. Date Signed 8/16/12	29. Date Signed 8/7/2012 Grants Officer (b)(3)	

University of Maryland
2010*1058114*000
Mod 002
Page 1 of 1

For questions regarding this modification please contact [REDACTED]

(b)(3)

Summary of Changes

The purpose of this modification is to extend the POP at no additional cost to the Government and make administrative changes. As a result, the following changes are made:

1. Change Block 6 "Sponsoring Office" on grant cover page from Office of Chief Scientist to Office of Integrated Missions
2. Change Block 7 "Period of Performance" on Grant cover page from 12 July 2010 through 11 July 2012 by 11 months to 12 July 2010 through 30 June 2013.
3. Change Block 15 "Program Manager" from [REDACTED] (b)(3)
4. Change Block 16 "Administrator" from [REDACTED] (b)(3)
5. Change Article 1 to:
 - a. Extend the "Second Year" from 12 July 2010 through 11 July 2012 by 11 months to 12 July 2010 through 30 June 2013.
 - b. Change the "Option Year" from 14 July 2012 through 13 July 2013 by 11 months to 01 July 2013 through 30 June 2014.
6. Change Article 4 as follows:
 - a. Grants Officer from [REDACTED] (b)(3)
 - b. Technical Point of Contact from [REDACTED] (b)(3)
 - c. Invention reporting from [REDACTED] (b)(3)
7. Change Article 5 Term of Agreement from 24 months by 11 months to 35 months and revise the POP from 12 July 2010 through 11 July 2012 by 11 months to 12 July 2010 through 30 June 2013.
8. Change Article 8 Revision to Financial Plans "Options" from a POP of 12 July 2010 through 11 July 2013 by 11 months to 01 July 2013 through 30 June 2014.

All other articles remain unchanged and in full force and effect.

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ARTICLE 29: USING TECHNICAL INFORMATION RESOURCES

ARTICLE 1: SCOPE OF THE AGREEMENT

The Recipient shall perform a coordinated research and development program in accordance with the Recipient's technical portion of the proposal entitled "A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution".

First Year (12 July 2010 – 11 July 2011)

Government's Share	\$120,000
Recipients Share (cash or in-kind)	\$ 0
Total First Year Agreement	\$120,000

Second Year (12 July 2011 – 30 June 2013)

Government's Share	\$120,000
Recipients Share (cash or in-kind)	\$ 0
Total Second Year Agreement	\$120,000

Total Government Share of Agreement \$240,000

Option Year (01 July 2013 – 30 June 2014) (UNEXERCISED)

Government's Share	\$119,999
Recipients Share (cash or in-kind)	\$ 0
Total Option Year Agreement	\$119,999

Grand Total Government Share of Agreement \$240,000

ARTICLE 2: DEFINITIONS

Parties -- For the purposes of this Agreement, the parties are University of Maryland and the United States of America, hereinafter called the Government or the Agency, represented by the Central Intelligence Agency.

Agreement -- The articles of this assistance agreement, Research Terms and Conditions (available at <http://www.nsf.gov/pubs/policydocs/rtc/termssidebyside.pdf>) and its attachments.

Recipient -- An organization or other entity receiving a grant or cooperative agreement. For purposes of this Agreement, the Recipient is University of Maryland.

Performance Year -- Each consecutive twelve-month period from the effective date of this agreement throughout the term of the agreement.

ARTICLE 3: ADMINISTRATIVE REQUIREMENTS

- A. This Agreement will be administered in accordance with, and recipients shall comply with, the Research Terms and Conditions (available at <http://www.nsf.gov/pubs/policydocs/rtc/termssidebyside.pdf>) the requirements of the following OMB Circulars which are incorporated herein by reference:
- OMB Circular A-21 now codified at 2 CFR part 220, "Cost Principles for Educational Institutions"
 - OMB Circular A-110, Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations now codified at 2 CFR part 215
 - OMB Circular A-122, "Cost Principles for Non-Profit Organizations", now codified at 2 CFR part 230
 - OMB Circular A-133, "Audits of State, Local Governments, and Nonprofit Institutions" (27 June 03); (revised 26 June 07) and

- e. The Provisions of CIA Broad Agency Announcement No. ICPDP-2010-0001, entitled "2010 Intelligence Community Postdoctoral Research Fellowship Program."

- B. Should there be any inconsistency between the special conditions contained in the Articles of this agreement and the Research Terms and Conditions, the Articles of the agreement shall control. Should there be any inconsistency between the Research Terms and Conditions and any special conditions contained in the CIA Broad Agency Announcement, guides, brochures, etc., cited or included by reference in the agreement, the matter should be referred to the CIA Grants Officer for guidance.

ARTICLE 4: ADMINISTRATIVE RESPONSIBILITIES

Central Intelligence Agency Grants Office

Attn: [redacted]
Address: Contracting Team
ARC
[redacted]
Washington, DC 20505
Phone: [redacted]
Fax: [redacted]
Email: [redacted]

(b)(3)

(b)(3)

(b)(3)

Technical Point of Contact

Central Intelligence Agency Program Officer
ATTN: [redacted]
Address: Washington, DC 20505
Phone: [redacted]
Fax: [redacted]
Email: [redacted]

(b)(3)

(b)(3)

Government Payment Office

Invoices shall be submitted using the Internet Payment Platform (IPP). If the Grantee is not registered in IPP, the Grantee shall call the Vendor Service Center on [redacted] within two weeks of grant award to register. Items needed to facilitate registration include: a valid grant number and the name, phone number, and e-mail address for the Grantee's point of contact. The Grantee may make inquiries regarding invoices to the payment office or [redacted]

(b)(3)

(b)(3)

If the Grantee is unable to submit a payment request in electronic form, or the Agency is unable to receive a payment request in electronic form, the Grantee shall submit the payment request using a method mutually agreed to by the Grantee, the Grants Officer, and the payment office.

Invention Reporting

(b)(3)

Grants Office
Address: Contracting Team
ARC
[redacted]
Washington, DC 20505
Phone: [redacted]
Fax: [redacted]
Email: [redacted]

(b)(3)

Recipient's Principal Investigator

P.I. Name: Dr. Alan Migdall
Department: Joint Quantum Institute
Address: National Institute of Standards and Technology
University of Maryland
100 Bureau Dr, MS 8441
Gaithersburg, MD 20899-8441
Phone: (301) 975-2331
Fax: (301) 869-5700
Email: migdall@nist.gov

Recipient's Authorized Organizational Representative

AOR Name: Jill A. Frankenfield
Title: Contract Manager, Office of Research Administration & Advancement
Address: 3112 Lee Building
University of Maryland
College Park, MD 20742-4111
Phone: (301) 405-4577
Fax: (301) 314-9569
Email: jfranken@umd.edu

ARTICLE 5: TERM OF THE AGREEMENT

The project has been approved on scientific/technical merit for 36 months. The period of performance is 12 July 2010 – 30 June 2013.

ARTICLE 6: KEY PERSONNEL

The key personnel listed below must be employed with University of Maryland at the time of award and shall be maintained, to the maximum extent possible, throughout this agreement. Should changes be necessary, University of Maryland shall notify the Agency Grants Office (identified in Block 6 of the face page) in writing of the proposed substitute(s) within 30 days of the change in order to obtain approval of the substitution from the CIA Program Manager.

KEY PERSONNEL:

Principal Investigator: Dr. Alan Migdall
Fellow (when identified):

ARTICLE 7: FISCAL MANAGEMENT

7.1 Restrictions of the Use of Government Funds

Government funds provided under this Agreement must be allocated by the Recipient exclusively for the execution and operation of the Agreement Scope. Government funds shall not be utilized to support the Recipient's operations or administration unrelated to this Agreement.

7.2. Obligation

In no case shall the Government's financial obligation exceed the amount obligated on this Agreement or by amendment to this Agreement. The Government's share for full performance of this award is \$240,000. Of this amount, \$240,000 is allotted and available for payment. This grant is fully funded. The Government is not obligated to reimburse the Recipient for expenditures in excess of the amount of funding obligated and allotted by the Government.

7.3 Incremental Funding Actions

Unless otherwise specified in the agreement, each successive increment of a continuing grant will be funded at the level specified in Article 1 without a formal request from the recipient provided an annual report has been received from the Principal Investigator.

Incremental funding is contingent on:

- A. Availability of funds;
- B. Satisfactory scientific/technical progress; and
- C. Compliance with any special conditions of the agreement.

7.4 Advance Payment

To request advance payments, recipients shall submit a request for advance payment. The original and two copies of each request shall be submitted to:

CIA Grants Office, Block 6

7.5 Program Income

All program income earned during the project period shall be added to funds committed to the project by the Government and the Recipient and used to further eligible program objectives.

7.6 Closeout Adjustments

The Government may make a downward adjustment to the Government funding amount after completion of the effort under an agreement, when appropriate in accordance with OMB Circular A-110.

ARTICLE 8: REVISION TO FINANCIAL PLANS

A. The financial plan, or approved budget, is the financial expression of the effort to be performed under this agreement as approved during the award process. This agreement and its terms and conditions reflect the approved financial plan. Some changes to the plan require prior approval, as described below.

B. Recipients are authorized to:

Carry forward unobligated balances to subsequent funding periods (with the exception of the final funding period)

C. The CIA Grants Officer's prior written approval is required for actions which:

- a. Change the scope or objective of a project. The Principal Investigator must consult with the Program manager and receive written approval from the Grants Officer before deviating from the research objectives defined in the grant proposal or any sub-award, transfer or contracting out of substantive program performance under this agreement.
- b. Change key personnel. Support for the project may not continue without the active direction of the Principal Investigator and/or Postdoctoral Fellows approved for, and identified in, this Assistance Agreement. If the approved Principal Investigator/Postdoctoral Fellow severs his or her connection with the recipient institution or otherwise relinquishes active direction of the project, either permanently or for a significant length of time (three months or more), the recipient institution must either:
 - i. Appoint a replacement Principal Investigator/Postdoctoral Fellow with the approval of the Program Manager, or

- ii. Relinquish the Assistance Agreement, in which case the Agreement shall be terminated.
 - iii. Change the recipient institution's cost share amount reflected in the approved budget
 - iv. Use human subjects or vertebrate animals
 - v. Require no cost extensions exceeding 12 months
- D. Unless otherwise directed by the Grant Officer, any unexpended balance of funds which remains at the end of any funding period, except the final funding period of the grant, shall be carried over to the next funding period, and may be used to defray costs of any funding period of the grant. This includes allowing the carryover of funds to the second and subsequent years of a multiple year grant. This provision also applies to subcontractors performing substantive work under the grant.

E. SPECIAL CONDITIONS: N/A

F. OPTION

The Government may extend the term of this grant by issuing a unilateral modification.

Option Year (01 July 2013 – 30 June 2014)(UNEXERCISED)

Government's Share	\$119,999
Recipients Share (cash or in-kind) \$	0
Total Option Year Agreement	\$119,999

ARTICLE 9: INVENTIONS

- A. The clause entitled "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms," (37 CFR 401) is hereby incorporated by reference and the clauses in paragraph 401.14 are modified as follows: replace the word "contractor" with "Recipient"; replace the words "agency," "Federal Agency" and "funding Federal Agency" with "government"; replace the word "contract" with "agreement"; delete paragraphs (g)(2), (g)(3) and the words "to be performed by a small business firm or domestic nonprofit organization" from paragraph (g)(l); paragraph (1), Communications, point of contact on matters relating to this clause will be the CIA Grants Officer
- B. The Recipient shall file Invention (Patent) Reports as of the close of the performance year and at the end of the term for this Agreement. Annual reports are due 60 days after the end of each year of performance and final reports are due 60 days after the expiration of the final performance period. Negative reports are also required. The Recipient shall submit the original and one copy to the Grants Officer.
- C. Final payment cannot be made nor can the agreement be closed out until the recipient delivers to the Government all disclosures of subject inventions required by this agreement, an acceptable final report pursuant to article 12 entitled "Annual and Final Technical Reports," and all confirmatory instruments.
- D. All rights and title to data and technical data, as defined in 48 CFR 27.401, generated under this agreement shall vest in the Recipient.
- E. The Recipient hereby grants to the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to use, duplicate, or disclose for governmental purposes any data, technology and inventions, whether patented or not, made or developed under this Agreement.
- F. The Recipient reserves the right to protect by copyright original works developed under this agreement. All such copyrights will be in the name of the Recipient. The Recipient hereby grants the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, for governmental purposes, any copyrighted materials developed under this agreement, and to authorize others to do so.

- G. The Recipient is responsible for affixing appropriate markings indicating the rights of the Government on all data and technical data delivered under the agreement. The Government shall be deemed to have unlimited rights in all data and technical data delivered without markings.

ARTICLE 10: ANNUAL PERFORMANCE REPORTS

10.1 Annual Performance Report

- A. Annual reports are required for efforts of more than one year. This report will provide a concise and factual discussion of the significant accomplishments and progress during the year covered by the report. Each of the topics described below shall be addressed for the effort being performed:
- a. A comparison of actual accomplishments with the goals and objectives established for the period, the findings of the investigator, or both.
 - b. Reasons why established goals were not met, if appropriate.
 - c. Other pertinent information including, when appropriate, analysis and explanation of cost overruns.
- B. In addition, for research awards, each of the following topics (a) through (d) shall be addressed as appropriate to the research effort being performed:
- a. A cumulative chronological list of written publications in technical journals. Include those in press as well as manuscripts in preparation and planned for later submission. Indicate likely journals, authors, and titles.
 - b. A list of professional personnel associated with the research effort. List any advanced degrees awarded, including dates, recipient, type of degree, and thesis title.
 - c. Interactions (Related Activities):
 - i. Papers presented at meetings, conferences, seminars, etc.
 - ii. Consultative and advisory functions to other laboratories and agencies on research supported under the agreement. Provide factual information about the subject matter, institutions, dates, and the names of individuals involved.
 - d. New discoveries, inventions, or patent disclosures and specific applications stemming from the research effort.

The Postdoctoral Fellow is also required to present the status of the research grant at the annual IC Postdoctoral Research Fellowship Program Colloquium.

10.2 Final Technical Report

- A. A Final Technical Report is due at the completion of the agreement. This report will provide a comprehensive, cumulative, and substantive summary of the progress and significant accomplishments achieved during the total period of the effort covered by the agreement. Each of the topics described in section 2.1 above shall be addressed as appropriate for the effort performed. Publications may be bound and attached as appendices.
- B. When the results of a research effort have not previously been reported in scientific or technical publications, the Final Technical Report must provide sufficient detailed discussions of findings and accomplishments obtained in pursuit of the planned research objectives.

10.3 Report Submittal

The Recipient shall submit annual and final technical reports in the original and two copies to the Agency's program officer within 90 days after completion of the period covered by the report. The Recipient shall provide a copy of the transmittal letter to the Grants Officer.

10.4 Format

- A. Cover and title page. Standard Form (SF) 298, Report Documentation Page, shall be used. Item 13 of the form should contain a 100 to 200 word abstract summarizing technical progress during the reporting period. Style should be third person singular using past tense. Jargon, special symbols or notations, subscripts, mathematical symbols or foreign alphabet letters are not permitted. All pages should be of good quality for copying purposes.
- B. Recipient's format is acceptable.

ARTICLE 11: INFORMAL TECHNICAL REPORTS

11.1 Reports

This report shall be prepared only if requested by the Government program officer. It shall be submitted in letter format and is usually not longer than three pages in length. Its primary purpose is to inform the project engineer/program manager about significant events, accomplishments, and anticipated problems that may affect the conduct of the planned effort. It should summarize the progress of the effort being performed, new discoveries, inventions or patent disclosures, anticipated changes in commitments of key personnel and in the planned approach; acquisition or fabrication of major or special research equipment; and the titles of manuscripts planned for publication. The Recipient shall send the Agency program officer one copy signed by the principal investigator within 15 days after the request.

A brief quarterly report may be required after each three month period. (The annual report replaces the report for the last quarter of the year). Each quarterly report should describe the progress of the research project relative to the milestones that were defined in the proposal.

11.2 Government Visits

The Government may visit the Recipient to discuss project status and results. It is anticipated that Government involvement in this grant will be limited to general oversight.

ARTICLE 12: SCIENTIFIC REPORTS

- A. For research agreements, this report shall be used for rapidly disseminating highly significant research results or for scientific reports that are too long or that contains useful compilations of data, tables, and computations not normally accepted by technical journals. It is not appropriate for a student's thesis. Before preparing a Scientific Report, obtain written permission from the Program Manager who will then furnish detailed instructions for formatting, reproducing, and distributing the report. Send the Agency program manager two copies.
- B. On its cover, a scientific report shall prominently display the following disclaimer: "The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies or endorsements, either expressed or implied, of the U.S. Government."

ARTICLE 13: REPORTING FINANCIAL INFORMATION

Recipients shall submit financial reporting information in accordance with the following.

13.1 Interim Financial Reports

- A. The Recipient shall submit an interim Federal Financial Report (FFR 425) within 30 days following the end of each quarter. The original and a copy of the report should be submitted to the Grants Officer list identified in Block 16 of the cover page. Recipients are required to update, certify and submit the FFR to the Agency by the due date even if funds have not been drawn during the reporting period.

- B. Both cash management and financial status information should be reported on the same form for single award reporting.

13.2 Final Federal Financial Report

The recipient shall submit the final FFR no later than 90 days following the completion of the agreement. The original and a copy of the report shall be submitted to the Grants Administration Office identified in block 16 of the cover page.

13.3 Unexpended Balances

Unless otherwise directed by the Grant Officer, any unexpended balance of funds which remains at the end of any funding period, except the final funding period of the grant, shall be carried over to the next funding period, and may be used to defray costs of any funding period of the grant. This includes allowing the carry over of funds to the second and subsequent years of a multiple year grant, but it does not apply to options, which require current year funding. This provision also applies to subcontractors performing substantive work under the grant.

ARTICLE 14: PUBLIC DISCLOSURE OF SCIENTIFIC AND TECHNICAL INFORMATION

- A. The Recipient may make formal public disclosure of the scientific and technical information from this supported work (e.g., release articles for appropriate professional publications or present papers at scientific meetings or symposia) and will take the following steps;
- a. A copy of the article, paper, report, etc., shall be provided to the Government 45 days prior to submission for publication.
 - b. Reference shall be attributed to a grant issued by the Intelligence Community Postdoctoral Research Fellowship Program, or as may otherwise be prescribed by the Grants Officer.
- B. The Recipient may utilize the scientific and technical information resulting from this support in consulting or discussing this and related information with other qualified individuals or groups of individuals, where appropriate, for furthering this research and/or development effort. The provision of A(2) shall apply to such exchanges of information.

ARTICLE 15: Non-Publicity

The Recipient shall not use or allow to be used any aspect of this solicitation and/or agreement for publicity. Publicity means, but is not limited to, advertising (e.g. trade magazines, newspapers, Internet, radio, television etc.), communications with the media, marketing, or a reference for new business. It is further understood that this obligation shall not expire upon completion or termination of this agreement, but will continue indefinitely. The Recipient may request a waiver or release from the foregoing but shall not deviate there from unless authorized to do so in writing by the Grants Officer. Recipients are not required to obtain waivers when informing offices within this Agency of agreements it has performed or is in the process of performing.

ARTICLE 16: HUMAN SUBJECTS

Approval is required by CIA prior to any work beginning involving human subject use. All proposals that involve the use of human subjects must include documentation of their ability to follow Federal guidelines for the protection of human subjects. This includes, but is not limited to, protocol approval mechanisms, approved Institutional Review Boards (IRB), and Federal Wide Assurances. These requirements are based on expected human use issues sometime during the entire length of the proposed effort. The recipient shall provide their IRB approval of specific research, the blank informed user consent form, and the protocol and related documents as requested for secondary approval by CIA.

ARTICLE 17: ANIMAL SUBJECTS

Approval is required by CIA prior to work beginning involving animal subject use. Proposals selected for funding that will use vertebrate animals in the research must comply with the Animal Welfare Act [7 U.S.C. 2131 et seq.] and the regulations promulgated there under by the Secretary of Agriculture [9 CFR 1.1- 4.11] pertaining to the humane care, handling, and treatment of vertebrate animals held or used for research, teaching or other activities supported by Federal awards. The recipient is expected to ensure that the guidelines described in the National Academy of Science (NAS) Publication, *"Guide for the Care and Use of Laboratory Animals"* (1996) are followed and to comply with the *Public Health Service Policy and Government Principles Regarding the Care and Use of Animals* (included as Appendix D to the NAS Guide).

ARTICLE 18: MODIFICATIONS

Any party to this Agreement who wishes to modify the Agreement shall confer in good faith with the other signatory parties to determine the desirability of the proposed modification. Modifications shall not be effective until a written modification is signed by the Agreement signatories (or their successors). Administrative modifications may be unilaterally executed by the CIA Grants Officer.

ARTICLE 19: SUSPENSION AND TERMINATION PROCEDURES

19.1

The Government reserves the right to suspend or terminate this agreement for cause. If the Recipient fails to comply with the terms and conditions of this agreement, the CIA Grants Officer will provide written notice of breach or deficiency to the Recipient and will provide the Recipient an opportunity to explain or correct the breach or deficiency within 30 days from receipt of notice. If grounds for termination for cause still exist, the Government may terminate or suspend performance. If suspension is invoked, the Government may withhold further payments, or prohibit the Recipient from incurring additional obligation of funds until corrective action is taken. If this agreement is terminated after the Recipient has received Government funding, the closeout procedures in OMB Circular A-110 apply.

The agreement may be suspended or terminated in whole or in part in any of the following situations by:

- A. The Agency when the recipient has materially failed to comply with the terms and conditions of the award;
- B. The Agency when it has other reasonable cause; including departure of the Principal Investigator.
- C. The Agency and the recipient by mutual agreement (if the Agency and the recipient cannot reach an agreement, the Agency reserves the right to unilaterally terminated the award); or
- D. The recipient on written notice to the Agency setting forth the reasons for such action, the effective date, and, in the case of partial termination, the portion to be terminated or suspended (with the understanding that if the Agency determines that the unterminated portion will not accomplish the purposes of the agreement, it may suspend or terminate the entire agreement.)
- E. Notwithstanding the above, for security or safety reasons or in the case of a serious breach that could lead to irreparable damage, the Agency Grants Officer may order immediate suspension of work, in whole or in part.

19.2 Informal Resolution of Grant Administration Disputes

- A. Consistent with the Recommendation on Grant Disputes by the Administrative Conference of the U.S., and with the intent of the provisions of Alternative Dispute Resolution, the CIA provides the informal resolution processes described below concerning disputes or disagreements that may arise over a Grants Officer's post-award decisions under a CIA agreement.

B. Scope of Post-Award Disputes Covered

The disputes below are covered under this process:

- a. Cost disallowances pursuant to a Grants Officer's decision (e.g., specific disallowances under an individual grant or as a result of an audit report);
- b. Termination orders; and
- c. The final settlement amount under a termination.

C. Procedures

- a. The recipient should submit a certified letter to the Agency's Procurement Executive via the Grants Officer noting the recipient's disagreement or dispute and identifying the Agency's Grants Officer's decision in question, giving reasons for the request for review and providing any other material pertinent to the request.
- b. The letter to the Procurement Executive must be postmarked no later than 30 days after the date of the letter notifying the recipient of the decision in question. The time for filing a request for review is strictly enforced and no extensions for the purpose of preparing it will be granted.
- c. The request for review need not follow a prescribed format; however, it must contain a full statement of the recipient's position with respect to the disputed matter and the facts and reasons in support of the recipient's position. Requests will be reviewed if the recipient submits new information (which was unavailable at the time of the original decision); if an error in fact or application of Agency policy is noted in the original decision; or improper procedures were followed in the original decision.
- d. The Procurement Executive, will review or designate one or more individuals to review the matter. One reviewing official will be at least at a management level equivalent to the official who made the decision that is being reviewed. In no case, will the review be undertaken by any individual involved with the decision or involved in recommending and/or monitoring the scientific and engineering aspects of the project or responsible for negotiating and/or administering its business aspects.
- e. The designated individual(s) will review and consider all relevant information available. A report which identifies the conclusion and recommendation will be completed within 30 days and forwarded to the Procurement Executive or his/her designee for a final and unappealable written decision for the agency. The Procurement Executive or his/her designee will communicate the decision in writing to the recipient.

ARTICLE 20: RESEARCH MISCONDUCT

All research awards issued by the CIA are subject to the Federal Policy on Research Misconduct published in the Federal Register on December 6, 2000 (65 FR 76260). The following definitions will be used when applying this policy:

- A. Research misconduct means the fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. Research misconduct does not include honest error or difference of opinion.
- B. Fabrication is making up data or results and recording or reporting them.
- C. Falsification means manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.
- D. Plagiarism is the appropriation of another person's ideas, processes, results or words without giving appropriate credit.

- E. Research means all basic, applied, and demonstration research in all fields of science, engineering, mathematics, education, linguistics, medicine, psychology, social sciences, statistics, and research involving human subjects or animals.
- F. Research institutions includes all organizations using Federal funds for research, including, for example, colleges and universities, intramural Federal research laboratories, Federally funded research and development centers, national user facilities, industrial laboratories, or other research institutes.
- G. Research record is the record of data or results that embody the facts resulting from scientific inquiry, and includes, but is not limited to, research proposals, laboratory records, both physical and electronics, progress reports, abstracts, theses, oral presentations, internal reports, and journal articles.

Any allegation of research misconduct should be reported to the CIA Grants Officer

ARTICLE 21: REPORTING CLASSIFIABLE INFORMATION

- A. This award is intended for unclassified, publicly releasable research. The recipient will not be granted access to classified information. The awarding agency does not expect that the results of the research project will involve classified information.
- B. If, however, in conducting the activities supported under this award, the principal investigator (PI) is concerned that any of the research results involve potentially classifiable information that may warrant Government restrictions on the dissemination of the results, the PI should promptly notify the awarding agency's program manager.

ARTICLE 22: ENVIRONMENTAL STANDARDS

The Recipient agrees to the following environment standards;

- A. Comply with applicable provisions of the Clean Air Act (42 U.S.C 7401, et seq.) and Clean Water Act (33 V.S.C. 1251, et seq.), as implemented by Executive Order 11738 (3 CFR, 1971- 1 975 Comp., p799] and Environmental Protection Agency (EPA) rules at 40 CFR part 15. In accordance with the EPA rules, the Recipient further agrees that it will:
 - a. Not use any facility on EPA's List of Violating Facilities in performing any award that is nonexempt under 40 CFR 15.5, as long as the facility remains on the list.
 - b. Notify the awarding agency if it intends to use a facility in performing this award that is on the List of Violating Facilities or that the Recipient knows has been recommended to be placed on the List of Violating Facilities.
- B. Identify to the awarding agency any impact this award may have on the quality of the human environment, and provide help the agency may need to comply with the National Environmental Policy Act (NEPA, at 42 V.S.C. 4321, et seq.) and to prepare Environmental Impact Statements or other required environmental documentation. In such cases, the Recipient agrees to take no action that will have an adverse environmental impact (e.g. physical disturbance of a site such as breaking of ground) until the agency provides written Approval.

ARTICLE 23: NONDISCRIMINATION

By signing this agreement or accepting funds under the agreement, the Recipient assures that it will comply with applicable provisions of the following, national policies prohibiting discrimination:

- A. On the basis of race, color, or national origin, in Title VI of the Civil Rights Act of 1964 (42 V.S.C. 2000d, et seq.).

- B. On the basis of sex or blindness, in Title IX of the Education Amendments of 1972 (20 V.S.C. 1681, et seq.)
- C. On the basis of age, in the Age Discrimination Act of 1975 (42 V.S.C. 6101, et seq.), as implemented by the Department of Health and Human Services regulations at 45 CFR part 90.
- D. On the basis of disability, in the Americans with Disabilities Act.

ARTICLE 24: CERTIFICATIONS

The following Certifications, which have been executed by the Recipient prior to award of this agreement, are hereby incorporated by reference:

- A. Certification regarding Debarment, Suspension, and Other Responsibility Matters.
- B. Certification regarding Drug-Free Workplace Requirements.
- C. Certification regarding Lobbying.

ARTICLE 25: LIABILITY

The Agency cannot assume any liability for accidents, illnesses or claims arising out of any work supported by an award or for unauthorized use of patented or copyrighted materials. The grantee institution is advised to take such steps as may be deemed necessary to insure or protect itself, its employees, and its property.

ARTICLE 26: SPONSORSHIP BY AN AGENCY WITHIN THE INTELLIGENCE COMMUNITY

This grant is sponsored by the Central Intelligence Agency, an Agency within the Intelligence Committee. To ensure compliance with Executive Order 12333, dated 4 December 1981, (revised 30 July 08) the individual signing this instrument on behalf of the academic institution is authorized by the institution to contract with an Agency within the Intelligence Community.

ARTICLE 27: PRIOR APPROVALS

As appropriate, prior approval of the following deviations from budget and program plans are required:

- A. The Grantee must consult the Program Manager in Block 15 of the Award/Modification document through the AGO at the Administrative Office in Block 16 or the Grant Procurement Office in Block 6 of the Award/Modification document before deviating from the research objectives defined in the grant proposal or any sub-award, transfer or contracting out of substantive program performance under this award.
- B. Support for the project may not continue without the active direction of the Principal Investigator approved for, and identified in, this Grant. If the approved Principal Investigator severs his or her connection with the Grantee or otherwise relinquishes active direction of the project, either permanently or for a significant length of time (three months or more), the Grantee must either:
 - a. Appoint a replacement Principal Investigator with the approval of the Program Manager in Block 15 through the Grant Procurement Office in Block 6 of the Award/Modification document, or
 - b. Relinquish the Grant, in which case the Grant shall be terminated
 - c. Extension for the expiration period of this Grant – The AGO at the Administrative Office in Block 16 of the Award/Modification document has authority to approve a no-funds extension request meeting all of the following parameters:

- i. a one-time basis only; and
- ii. for a period not to exceed 90 days; and
- iii. where \$50,000.00 or less of obligated funds remain to be expended.

In other cases, where a request is outside one or more of the parameters, a no-funds extension can only be approved with the concurrence of the Program Manager in Block 15 of the Award/Modification document. For any no-funds extension to be effective, a written grant modification must be issued and signed by the AGO at the Administrative Office in Block 16 under the circumstances above or the Sponsoring Office in Block 6 of the Award/Modification document.

ARTICLE 28: DATA RIGHTS

- A. All rights and title to data and technical data, as defined in 48 CFR 27.401, generated under this agreement shall vest in the Recipient.
- B. The Recipient hereby grants to the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to use, duplicate, or disclose for governmental purposes any data, technology and inventions, whether patented or not, made or developed under this Agreement.
- C. The Recipient reserves the right to protect by copyright original works developed under this agreement. All such copyrights will be in the name of the Recipient. The Recipient hereby grants the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, for governmental purposes, any copyrighted materials developed under this agreement, and to authorize others to do so.
- D. The Recipient is responsible for affixing appropriate markings indicating the rights of the Government on all data and technical data delivered under the agreement. The Government shall be deemed to have unlimited rights in all data and technical data delivered without markings.

ARTICLE 29: USING TECHNICAL INFORMATION RESOURCES

To the extent practical, the recipient will use the technical information resources of the Defense Technical Information Center (DTIC) and other Government or private facilities to investigate recent and on-going research and avoid needless duplication of scientific and engineering effort.

ASSISTANCE AGREEMENT			
1. Award No. 2010*1058114*000	2. Modification No. 002-003	3. Effective Date 05 July 2012	4. Page 1 of 15
5. Awarded to University of Maryland		6. Sponsoring Office Office of Integrated Missions	7. Period of Performance 12 July 2010 through 30 June 2013
8. Type of Agreement Grant <input checked="" type="checkbox"/> Cooperative Agreement <input type="checkbox"/> Other <input type="checkbox"/>	9. Authority 31 USC 6304 and 10 USC 2358	10. Purchase Request or Funding Document No. N/A	
11. Remittance Address See Article 4		12. Total Grant Amount Govt. Share: \$240,000 Cost Share: \$0 Total: \$240,000	13. Funds Obligated: This action: \$0 Total: \$240,000
14. Principal Investigator Dr. Alan Migdall (301) 975-2331	15. Program Manager <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	16. Administrator <div style="border: 1px solid black; height: 20px; width: 100%;"></div> (b)(3)	
17. Submit Payment Requests to Vendor Payments Attn: Mail Room Address: <div style="border: 1px solid black; height: 15px; width: 100%;"></div> Washington, DC 20505	18. Paying Office Same as Block 17	19. Submit Reports As Directed by the Technical Point of Contact (b)(3)	
20. Accounting and Appropriation Data Amount Obligated: \$240,000			
21. Research Title and/or Description of Project A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution			
22. For the Recipient <div style="border: 1px solid black; height: 40px; width: 100%;"></div>		23. Signature of Person Authorized to Sign <div style="border: 1px solid black; height: 40px; width: 100%;"></div> (b)(3)	
24. Signature of Person Authorized to Sign <i>Jill A. Frankenfield</i>	25. Date Signed 8/16/12		
26. Name and Title Jill Frankenfield, Contract Manager	27. Date Signed 8/16/12	28. Grants Officer <div style="border: 1px solid black; height: 20px; width: 100%;"></div> Grants Officer	
		29. Date Signed 8/7/2012 (b)(3)	

University of Maryland
2010*1058114*000
Mod 002
Page 1 of 1

For questions regarding this modification please contact [REDACTED]

(b)(3)

Summary of Changes

The purpose of this modification is to extend the POP at no additional cost to the Government and make administrative changes. As a result, the following changes are made:

1. Change Block 6 "Sponsoring Office" on grant cover page from Office of Chief Scientist to Office of Integrated Missions
2. Change Block 7 "Period of Performance" on Grant cover page from 12 July 2010 through 11 July 2012 by 11 months to 12 July 2010 through 30 June 2013.
3. Change Block 15 "Program Manager" from [REDACTED] (b)(3)
[REDACTED] (b)(3)
4. Change Block 16 "Administrator" from [REDACTED] (b)(3)
5. Change Article 1 to:
 - a. Extend the "Second Year" from 12 July 2010 through 11 July 2012 by 11 months to 12 July 2010 through 30 June 2013.
 - b. Change the "Option Year" from 14 July 2012 through 13 July 2013 by 11 months to 01 July 2013 through 30 June 2014.
6. Change Article 4 as follows:
 - a. Grants Officer from [REDACTED] (b)(3)
[REDACTED] (b)(3)
 - b. Technical Point of Contact from [REDACTED] (b)(3)
[REDACTED] (b)(3)
 - c. Invention reporting from [REDACTED] (b)(3)
7. Change Article 5 Term of Agreement from 24 months by 11 months to 35 months and revise the POP from 12 July 2010 through 11 July 2012 by 11 months to 12 July 2010 through 30 June 2013.
8. Change Article 8 Revision to Financial Plans "Options" from a POP of 12 July 2010 through 11 July 2013 by 11 months to 01 July 2013 through 30 June 2014.

All other articles remain unchanged and in full force and effect.

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ARTICLE 26: SPONSORSHIP BY AN AGENCY WITHIN THE INTELLIGENCE COMMUNITY
ARTICLE 27: PRIOR APPROVALS
ARTICLE 28: DATA RIGHTS
ARTICLE 29: USING TECHNICAL INFORMATION RESOURCES

ARTICLE 1: SCOPE OF THE AGREEMENT

The Recipient shall perform a coordinated research and development program in accordance with the Recipient's technical portion of the proposal entitled "A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution".

First Year (12 July 2010 – 11 July 2011)

Government's Share	\$120,000
Recipients Share (cash or in-kind)	\$ 0
Total First Year Agreement	\$120,000

Second Year (12 July 2011 – 30 June 2013)

Government's Share	\$120,000
Recipients Share (cash or in-kind)	\$ 0
Total Second Year Agreement	\$120,000

Total Government Share of Agreement \$240,000

Option Year (01 July 2013 – 30 June 2014) (UNEXERCISED)

Government's Share	\$119,999
Recipients Share (cash or in-kind)	\$ 0
Total Option Year Agreement	\$119,999

Grand Total Government Share of Agreement \$240,000

ARTICLE 2: DEFINITIONS

Parties -- For the purposes of this Agreement, the parties are University of Maryland and the United States of America, hereinafter called the Government or the Agency, represented by the Central Intelligence Agency.

Agreement -- The articles of this assistance agreement, Research Terms and Conditions (available at <http://www.nsf.gov/pubs/policydocs/rtc/termssidebyside.pdf>) and its attachments.

Recipient -- An organization or other entity receiving a grant or cooperative agreement. For purposes of this Agreement, the Recipient is University of Maryland.

Performance Year -- Each consecutive twelve-month period from the effective date of this agreement throughout the term of the agreement.

ARTICLE 3: ADMINISTRATIVE REQUIREMENTS

- A. This Agreement will be administered in accordance with, and recipients shall comply with, the Research Terms and Conditions (available at <http://www.nsf.gov/pubs/policydocs/rtc/termssidebyside.pdf>) the requirements of the following OMB Circulars which are incorporated herein by reference:
- OMB Circular A-21 now codified at 2 CFR part 220, "Cost Principles for Educational Institutions"
 - OMB Circular A-110, Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations now codified at 2 CFR part 215
 - OMB Circular A-122, "Cost Principles for Non-Profit Organizations", now codified at 2 CFR part 230
 - OMB Circular A-133, "Audits of State, Local Governments, and Nonprofit Institutions" (27 June 03); (revised 28 June 07) and

- e. The Provisions of CIA Broad Agency Announcement No. ICPDP-2010-0001, entitled "2010 Intelligence Community Postdoctoral Research Fellowship Program."

- B. Should there be any inconsistency between the special conditions contained in the Articles of this agreement and the Research Terms and Conditions, the Articles of the agreement shall control. Should there be any inconsistency between the Research Terms and Conditions and any special conditions contained in the CIA Broad Agency Announcement, guides, brochures, etc., cited or included by reference in the agreement, the matter should be referred to the CIA Grants Officer for guidance.

ARTICLE 4: ADMINISTRATIVE RESPONSIBILITIES

(b)(3)

Central Intelligence Agency Grants Office

Attn:
 Address: Contracting Team
 ARC

 Washington, DC 20505

(b)(3)

Phone:
 Fax:
 Email:

(b)(3)

Technical Point of Contact

(b)(3)

Central Intelligence Agency Program Officer
 ATTN:
 Address: Washington, DC 20505
 Phone:
 Fax:
 Email:

(b)(3)

Government Payment Office

Invoices shall be submitted using the Internet Payment Platform (IPP). If the Grantee is not registered in IPP, the Grantee shall call the Vendor Service Center on within two weeks of grant award to register. Items needed to facilitate registration include: a valid grant number and the name, phone number, and e-mail address for the Grantee's point of contact. The Grantee may make inquiries regarding invoices to the payment office on

(b)(3)

(b)(3)

If the Grantee is unable to submit a payment request in electronic form, or the Agency is unable to receive a payment request in electronic form, the Grantee shall submit the payment request using a method mutually agreed to by the Grantee, the Grants Officer, and the payment office.

Invention Reporting

(b)(3)

Grants Office
 Address: Contracting Team
 ARC

 Washington, DC 20505
 Phone:
 Fax:
 Email:

(b)(3)

Recipient's Principal Investigator

P.I. Name: Dr. Alan Migdall
Department: Joint Quantum Institute
Address: National Institute of Standards and Technology
 University of Maryland
 100 Bureau Dr, MS 8441
 Gaithersburg, MD 20899-8441
Phone: (301) 975-2331
Fax: (301) 869-5700
Email: migdall@nist.gov

Recipient's Authorized Organizational Representative

AOR Name: Jill A. Frankenfield
Title: Contract Manager, Office of Research Administration & Advancement
Address: 3112 Lee Building
 University of Maryland
 College Park, MD 20742-4111
Phone: (301) 405-4577
Fax: (301) 314-9569
Email: jfranken@umd.edu

ARTICLE 5: TERM OF THE AGREEMENT

The project has been approved on scientific/technical merit for 36 months. The period of performance is 12 July 2010 – 30 June 2013.

ARTICLE 6: KEY PERSONNEL

The key personnel listed below must be employed with University of Maryland at the time of award and shall be maintained, to the maximum extent possible, throughout this agreement. Should changes be necessary, University of Maryland shall notify the Agency Grants Office (identified in Block 6 of the face page) in writing of the proposed substitute(s) within 30 days of the change in order to obtain approval of the substitution from the CIA Program Manager.

KEY PERSONNEL:

Principal Investigator: Dr. Alan Migdall
Fellow (when identified):

ARTICLE 7: FISCAL MANAGEMENT**7.1 Restrictions of the Use of Government Funds**

Government funds provided under this Agreement must be allocated by the Recipient exclusively for the execution and operation of the Agreement Scope. Government funds shall not be utilized to support the Recipient's operations or administration unrelated to this Agreement.

7.2. Obligation

In no case shall the Government's financial obligation exceed the amount obligated on this Agreement or by amendment to this Agreement. The Government's share for full performance of this award is \$240,000. Of this amount, \$240,000 is allotted and available for payment. This grant is fully funded. The Government is not obligated to reimburse the Recipient for expenditures in excess of the amount of funding obligated and allotted by the Government.

7.3 Incremental Funding Actions

Unless otherwise specified in the agreement, each successive increment of a continuing grant will be funded at the level specified in Article 1 without a formal request from the recipient provided an annual report has been received from the Principal Investigator.

Incremental funding is contingent on:

- A. Availability of funds;
- B. Satisfactory scientific/technical progress; and
- C. Compliance with any special conditions of the agreement.

7.4 Advance Payment

To request advance payments, recipients shall submit a request for advance payment. The original and two copies of each request shall be submitted to:

CIA Grants Office, Block 6

7.5 Program Income

All program income earned during the project period shall be added to funds committed to the project by the Government and the Recipient and used to further eligible program objectives.

7.6 Closeout Adjustments

The Government may make a downward adjustment to the Government funding amount after completion of the effort under an agreement, when appropriate in accordance with OMB Circular A-110.

ARTICLE 8: REVISION TO FINANCIAL PLANS

- A. The financial plan, or approved budget, is the financial expression of the effort to be performed under this agreement as approved during the award process. This agreement and its terms and conditions reflect the approved financial plan. Some changes to the plan require prior approval, as described below.

- B. Recipients are authorized to:

Carry forward unobligated balances to subsequent funding periods (with the exception of the final funding period)

- C. The CIA Grants Officer's prior written approval is required for actions which:
 - a. Change the scope or objective of a project. The Principal Investigator must consult with the Program manager and receive written approval from the Grants Officer before deviating from the research objectives defined in the grant proposal or any sub-award, transfer or contracting out of substantive program performance under this agreement.
 - b. Change key personnel. Support for the project may not continue without the active direction of the Principal Investigator and/or Postdoctoral Fellows approved for, and identified in, this Assistance Agreement. If the approved Principal Investigator/Postdoctoral Fellow severs his or her connection with the recipient institution or otherwise relinquishes active direction of the project, either permanently or for a significant length of time (three months or more), the recipient institution must either:
 - i. Appoint a replacement Principal Investigator/Postdoctoral Fellow with the approval of the Program Manager, or

- ii. Relinquish the Assistance Agreement, in which case the Agreement shall be terminated.
 - iii. Change the recipient institution's cost share amount reflected in the approved budget
 - iv. Use human subjects or vertebrate animals
 - v. Require no cost extensions exceeding 12 months
- D. Unless otherwise directed by the Grant Officer, any unexpended balance of funds which remains at the end of any funding period, except the final funding period of the grant, shall be carried over to the next funding period, and may be used to defray costs of any funding period of the grant. This includes allowing the carryover of funds to the second and subsequent years of a multiple year grant. This provision also applies to subcontractors performing substantive work under the grant.
- E. SPECIAL CONDITIONS: N/A
- F. OPTION

The Government may extend the term of this grant by issuing a unilateral modification:

Option Year (01 July 2013 – 30 June 2014)(UNEXERCISED)

Government's Share	\$119,999
Recipients Share (cash or in-kind) \$ 0	
Total Option Year Agreement	\$119,999

ARTICLE 9: INVENTIONS

- A. The clause entitled "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms," (37 CFR 401) is hereby incorporated by reference and the clauses in paragraph 401.14 are modified as follows: replace the word "contractor" with "Recipient"; replace the words "agency," "Federal Agency" and "funding Federal Agency" with "government"; replace the word "contract" with "agreement"; delete paragraphs (g)(2), (g)(3) and the words "to be performed by a small business firm or domestic nonprofit organization" from paragraph (g)(1); paragraph (1), Communications, point of contact on matters relating to this clause will be the CIA Grants Officer
- B. The Recipient shall file Invention (Patent) Reports as of the close of the performance year and at the end of the term for this Agreement. Annual reports are due 60 days after the end of each year of performance and final reports are due 60 days after the expiration of the final performance period. Negative reports are also required. The Recipient shall submit the original and one copy to the Grants Officer.
- C. Final payment cannot be made nor can the agreement be closed out until the recipient delivers to the Government all disclosures of subject inventions required by this agreement, an acceptable final report pursuant to article 12 entitled "Annual and Final Technical Reports," and all confirmatory instruments.
- D. All rights and title to data and technical data, as defined in 48 CFR 27.401, generated under this agreement shall vest in the Recipient.
- E. The Recipient hereby grants to the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to use, duplicate, or disclose for governmental purposes any data, technology and inventions, whether patented or not, made or developed under this Agreement.
- F. The Recipient reserves the right to protect by copyright original works developed under this agreement. All such copyrights will be in the name of the Recipient. The Recipient hereby grants the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, for governmental purposes, any copyrighted materials developed under this agreement, and to authorize others to do so.

- G. The Recipient is responsible for affixing appropriate markings indicating the rights of the Government on all data and technical data delivered under the agreement. The Government shall be deemed to have unlimited rights in all data and technical data delivered without markings.

ARTICLE 10: ANNUAL PERFORMANCE REPORTS

10.1 Annual Performance Report

- A. Annual reports are required for efforts of more than one year. This report will provide a concise and factual discussion of the significant accomplishments and progress during the year covered by the report. Each of the topics described below shall be addressed for the effort being performed:
- a. A comparison of actual accomplishments with the goals and objectives established for the period, the findings of the investigator, or both.
 - b. Reasons why established goals were not met, if appropriate.
 - c. Other pertinent information including, when appropriate, analysis and explanation of cost overruns.
- B. In addition, for research awards, each of the following topics (a) through (d) shall be addressed as appropriate to the research effort being performed:
- a. A cumulative chronological list of written publications in technical journals. Include those in press as well as manuscripts in preparation and planned for later submission. Indicate likely journals, authors, and titles.
 - b. A list of professional personnel associated with the research effort. List any advanced degrees awarded, including dates, recipient, type of degree, and thesis title.
 - c. Interactions (Related Activities):
 - i. Papers presented at meetings, conferences, seminars, etc.
 - ii. Consultative and advisory functions to other laboratories and agencies on research supported under the agreement. Provide factual information about the subject matter, institutions, dates, and the names of individuals involved.
 - d. New discoveries, inventions, or patent disclosures and specific applications stemming from the research effort.

The Postdoctoral Fellow is also required to present the status of the research grant at the annual IC Postdoctoral Research Fellowship Program Colloquium.

10.2 Final Technical Report

- A. A Final Technical Report is due at the completion of the agreement. This report will provide a comprehensive, cumulative, and substantive summary of the progress and significant accomplishments achieved during the total period of the effort covered by the agreement. Each of the topics described in section 2.1 above shall be addressed as appropriate for the effort performed. Publications may be bound and attached as appendices.
- B. When the results of a research effort have not previously been reported in scientific or technical publications, the Final Technical Report must provide sufficient detailed discussions of findings and accomplishments obtained in pursuit of the planned research objectives.

10.3 Report Submittal

The Recipient shall submit annual and final technical reports in the original and two copies to the Agency's program officer within 90 days after completion of the period covered by the report. The Recipient shall provide a copy of the transmittal letter to the Grants Officer.

10.4 Format

- A. Cover and title page. Standard Form (SF) 298, Report Documentation Page, shall be used. Item 13 of the form should contain a 100 to 200 word abstract summarizing technical progress during the reporting period. Style should be third person singular using past tense. Jargon, special symbols or notations, subscripts, mathematical symbols or foreign alphabet letters are not permitted. All pages should be of good quality for copying purposes.
- B. Recipient's format is acceptable.

ARTICLE 11: INFORMAL TECHNICAL REPORTS

11.1 Reports

This report shall be prepared only if requested by the Government program officer. It shall be submitted in letter format and is usually not longer than three pages in length. Its primary purpose is to inform the project engineer/program manager about significant events, accomplishments, and anticipated problems that may affect the conduct of the planned effort. It should summarize the progress of the effort being performed, new discoveries, inventions or patent disclosures, anticipated changes in commitments of key personnel and in the planned approach; acquisition or fabrication of major or special research equipment; and the titles of manuscripts planned for publication. The Recipient shall send the Agency program officer one copy signed by the principal investigator within 15 days after the request.

A brief quarterly report may be required after each three month period. (The annual report replaces the report for the last quarter of the year). Each quarterly report should describe the progress of the research project relative to the milestones that were defined in the proposal.

11.2 Government Visits

The Government may visit the Recipient to discuss project status and results. It is anticipated that Government involvement in this grant will be limited to general oversight.

ARTICLE 12: SCIENTIFIC REPORTS

- A. For research agreements, this report shall be used for rapidly disseminating highly significant research results or for scientific reports that are too long or that contains useful compilations of data, tables, and computations not normally accepted by technical journals. It is not appropriate for a student's thesis. Before preparing a Scientific Report, obtain written permission from the Program Manager who will then furnish detailed instructions for formatting, reproducing, and distributing the report. Send the Agency program manager two copies.
- B. On its cover, a scientific report shall prominently display the following disclaimer: "The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies or endorsements, either expressed or implied, of the U.S. Government."

ARTICLE 13: REPORTING FINANCIAL INFORMATION

Recipients shall submit financial reporting information in accordance with the following.

13.1 Interim Financial Reports

- A. The Recipient shall submit an interim Federal Financial Report (FFR 425) within 30 days following the end of each quarter. The original and a copy of the report should be submitted to the Grants Officer list identified in Block 16 of the cover page. Recipients are required to update, certify and submit the FFR to the Agency by the due date even if funds have not been drawn during the reporting period.

- B. Both cash management and financial status information should be reported on the same form for single award reporting.

13.2 Final Federal Financial Report

The recipient shall submit the final FFR no later than 90 days following the completion of the agreement. The original and a copy of the report shall be submitted to the Grants Administration Office identified in block 16 of the cover page.

13.3 Unexpended Balances

Unless otherwise directed by the Grant Officer, any unexpended balance of funds which remains at the end of any funding period, except the final funding period of the grant, shall be carried over to the next funding period, and may be used to defray costs of any funding period of the grant. This includes allowing the carry over of funds to the second and subsequent years of a multiple year grant, but it does not apply to options, which require current year funding. This provision also applies to subcontractors performing substantive work under the grant.

ARTICLE 14: PUBLIC DISCLOSURE OF SCIENTIFIC AND TECHNICAL INFORMATION

- A. The Recipient may make formal public disclosure of the scientific and technical information from this supported work (e.g., release articles for appropriate professional publications or present papers at scientific meetings or symposia) and will take the following steps;
 - a. A copy of the article, paper, report, etc., shall be provided to the Government 45 days prior to submission for publication.
 - b. Reference shall be attributed to a grant issued by the Intelligence Community Postdoctoral Research Fellowship Program, or as may otherwise be prescribed by the Grants Officer.
- B. The Recipient may utilize the scientific and technical information resulting from this support in consulting or discussing this and related information with other qualified individuals or groups of individuals, where appropriate, for furthering this research and/or development effort. The provision of A(2) shall apply to such exchanges of information.

ARTICLE 15: Non-Publicity

The Recipient shall not use or allow to be used any aspect of this solicitation and/or agreement for publicity. Publicity means, but is not limited to, advertising (e.g. trade magazines, newspapers, Internet, radio, television etc.), communications with the media, marketing, or a reference for new business. It is further understood that this obligation shall not expire upon completion or termination of this agreement, but will continue indefinitely. The Recipient may request a waiver or release from the foregoing but shall not deviate there from unless authorized to do so in writing by the Grants Officer. Recipients are not required to obtain waivers when informing offices within this Agency of agreements it has performed or is in the process of performing.

ARTICLE 16: HUMAN SUBJECTS

Approval is required by CIA prior to any work beginning involving human subject use. All proposals that involve the use of human subjects must include documentation of their ability to follow Federal guidelines for the protection of human subjects. This includes, but is not limited to, protocol approval mechanisms, approved Institutional Review Boards (IRB), and Federal Wide Assurances. These requirements are based on expected human use issues sometime during the entire length of the proposed effort. The recipient shall provide their IRB approval of specific research, the blank informed user consent form, and the protocol and related documents as requested for secondary approval by CIA.

ARTICLE 17: ANIMAL SUBJECTS

Approval is required by CIA prior to work beginning involving animal subject use. Proposals selected for funding that will use vertebrate animals in the research must comply with the Animal Welfare Act [7 U.S.C. 2131 et seq.] and the regulations promulgated there under by the Secretary of Agriculture [9 CFR 1.1- 4.11] pertaining to the humane care, handling, and treatment of vertebrate animals held or used for research, teaching or other activities supported by Federal awards. The recipient is expected to ensure that the guidelines described in the National Academy of Science (NAS) Publication, "*Guide for the Care and Use of Laboratory Animals*" (1996) are followed and to comply with the *Public Health Service Policy and Government Principles Regarding the Care and Use of Animals* (included as Appendix D to the NAS Guide).

ARTICLE 18: MODIFICATIONS

Any party to this Agreement who wishes to modify the Agreement shall confer in good faith with the other signatory parties to determine the desirability of the proposed modification. Modifications shall not be effective until a written modification is signed by the Agreement signatories (or their successors). Administrative modifications may be unilaterally executed by the CIA Grants Officer.

ARTICLE 19: SUSPENSION AND TERMINATION PROCEDURES

19.1

The Government reserves the right to suspend or terminate this agreement for cause. If the Recipient fails to comply with the terms and conditions of this agreement, the CIA Grants Officer will provide written notice of breach or deficiency to the Recipient and will provide the Recipient an opportunity to explain or correct the breach or deficiency within 30 days from receipt of notice. If grounds for termination for cause still exist, the Government may terminate or suspend performance. If suspension is invoked, the Government may withhold further payments, or prohibit the Recipient from incurring additional obligation of funds until corrective action is taken. If this agreement is terminated after the Recipient has received Government funding, the closeout procedures in OMB Circular A-110 apply.

The agreement may be suspended or terminated in whole or in part in any of the following situations by:

- A. The Agency when the recipient has materially failed to comply with the terms and conditions of the award;
- B. The Agency when it has other reasonable cause; including departure of the Principal Investigator.
- C. The Agency and the recipient by mutual agreement (if the Agency and the recipient cannot reach an agreement, the Agency reserves the right to unilaterally terminate the award); or
- D. The recipient on written notice to the Agency setting forth the reasons for such action, the effective date, and, in the case of partial termination, the portion to be terminated or suspended (with the understanding that if the Agency determines that the unterminated portion will not accomplish the purposes of the agreement, it may suspend or terminate the entire agreement.)
- E. Notwithstanding the above, for security or safety reasons or in the case of a serious breach that could lead to irreparable damage, the Agency Grants Officer may order immediate suspension of work, in whole or in part.

19.2 Informal Resolution of Grant Administration Disputes

- A. Consistent with the Recommendation on Grant Disputes by the Administrative Conference of the U.S., and with the intent of the provisions of Alternative Dispute Resolution, the CIA provides the informal resolution processes described below concerning disputes or disagreements that may arise over a Grants Officer's post-award decisions under a CIA agreement.

B. Scope of Post-Award Disputes Covered

The disputes below are covered under this process:

- a. Cost disallowances pursuant to a Grants Officer's decision (e.g., specific disallowances under an individual grant or as a result of an audit report);
- b. Termination orders; and
- c. The final settlement amount under a termination.

C. Procedures

- a. The recipient should submit a certified letter to the Agency's Procurement Executive via the Grants Officer noting the recipient's disagreement or dispute and identifying the Agency's Grants Officer's decision in question, giving reasons for the request for review and providing any other material pertinent to the request.
- b. The letter to the Procurement Executive must be postmarked no later than 30 days after the date of the letter notifying the recipient of the decision in question. The time for filing a request for review is strictly enforced and no extensions for the purpose of preparing it will be granted.
- c. The request for review need not follow a prescribed format; however, it must contain a full statement of the recipient's position with respect to the disputed matter and the facts and reasons in support of the recipient's position. Requests will be reviewed if the recipient submits new information (which was unavailable at the time of the original decision); if an error in fact or application of Agency policy is noted in the original decision; or improper procedures were followed in the original decision.
- d. The Procurement Executive, will review or designate one or more individuals to review the matter. One reviewing official will be at least at a management level equivalent to the official who made the decision that is being reviewed. In no case, will the review be undertaken by any individual involved with the decision or involved in recommending and/or monitoring the scientific and engineering aspects of the project or responsible for negotiating and/or administering its business aspects.
- e. The designated individual(s) will review and consider all relevant information available. A report which identifies the conclusion and recommendation will be completed within 30 days and forwarded to the Procurement Executive or his/her designee for a final and unappealable written decision for the agency. The Procurement Executive or his/her designee will communicate the decision in writing to the recipient.

ARTICLE 20: RESEARCH MISCONDUCT

All research awards issued by the CIA are subject to the Federal Policy on Research Misconduct published in the Federal Register on December 6, 2000 (65 FR 76260). The following definitions will be used when applying this policy:

- A. Research misconduct means the fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. Research misconduct does not include honest error or difference of opinion.
- B. Fabrication is making up data or results and recording or reporting them.
- C. Falsification means manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.
- D. Plagiarism is the appropriation of another person's ideas, processes, results or words without giving appropriate credit.

- E. Research means all basic, applied, and demonstration research in all fields of science, engineering, mathematics, education, linguistics, medicine, psychology, social sciences, statistics, and research involving human subjects or animals.
- F. Research institutions includes all organizations using Federal funds for research, including, for example, colleges and universities, intramural Federal research laboratories, Federally funded research and development centers, national user facilities, industrial laboratories, or other research institutes.
- G. Research record is the record of data or results that embody the facts resulting from scientific inquiry, and includes, but is not limited to, research proposals, laboratory records, both physical and electronics, progress reports, abstracts, theses, oral presentations, internal reports, and journal articles.

Any allegation of research misconduct should be reported to the CIA Grants Officer

ARTICLE 21: REPORTING CLASSIFIABLE INFORMATION

- A. This award is intended for unclassified, publicly releasable research. The recipient will not be granted access to classified information. The awarding agency does not expect that the results of the research project will involve classified information.
- B. If, however, in conducting the activities supported under this award, the principal investigator (PI) is concerned that any of the research results involve potentially classifiable information that may warrant Government restrictions on the dissemination of the results, the PI should promptly notify the awarding agency's program manager.

ARTICLE 22: ENVIRONMENTAL STANDARDS

The Recipient agrees to the following environment standards;

- A. Comply with applicable provisions of the Clean Air Act (42 U.S.C 7401, et seq.) and Clean Water Act (33 V.S.C. 1251, et seq.), as implemented by Executive Order 11738 (3 CFR, 1971- 1 975 Comp., p799) and Environmental Protection Agency (EPA) rules at 40 CFR part 15. In accordance with the EPA rules, the Recipient further agrees that it will:
 - a. Not use any facility on EPA's List of Violating Facilities in performing any award that is nonexempt under 40 CFR 15.5, as long as the facility remains on the list.
 - b. Notify the awarding agency if it intends to use a facility in performing this award that is on the List of Violating Facilities or that the Recipient knows has been recommended to be placed on the List of Violating Facilities.
- B. Identify to the awarding agency any impact this award may have on the quality of the human environment, and provide help the agency may need to comply with the National Environmental Policy Act (NEPA, at 42 V.S.C. 4321, et seq.) and to prepare Environmental Impact Statements or other required environmental documentation. In such cases, the Recipient agrees to take no action that will have an adverse environmental impact (e.g. physical disturbance of a site such as breaking of ground) until the agency provides written Approval.

ARTICLE 23: NONDISCRIMINATION

By signing this agreement or accepting funds under the agreement, the Recipient assures that it will comply with applicable provisions of the following, national policies prohibiting discrimination:

- A. On the basis of race, color, or national origin, in Title VI of the Civil Rights Act of 1964 (42 V.S.C. 2000d, et seq.).

- B. On the basis of sex or blindness, in Title IX of the Education Amendments of 1972 (20 V.S.C. 1681, et seq.)
- C. On the basis of age, in the Age Discrimination Act of 1975 (42 V.S.C. 6101, et seq.), as implemented by the Department of Health and Human Services regulations at 45 CFR part 90.
- D. On the basis of disability, in the Americans with Disabilities Act.

ARTICLE 24: CERTIFICATIONS

The following Certifications, which have been executed by the Recipient prior to award of this agreement, are hereby incorporated by reference:

- A. Certification regarding Debarment, Suspension, and Other Responsibility Matters.
- B. Certification regarding Drug-Free Workplace Requirements.
- C. Certification regarding Lobbying.

ARTICLE 25: LIABILITY

The Agency cannot assume any liability for accidents, illnesses or claims arising out of any work supported by an award or for unauthorized use of patented or copyrighted materials. The grantee institution is advised to take such steps as may be deemed necessary to insure or protect itself, its employees, and its property.

ARTICLE 26: SPONSORSHIP BY AN AGENCY WITHIN THE INTELLIGENCE COMMUNITY

This grant is sponsored by the Central Intelligence Agency, an Agency within the Intelligence Committee. To ensure compliance with Executive Order 12333, dated 4 December 1981, (revised 30 July 08) the individual signing this instrument on behalf of the academic institution is authorized by the institution to contract with an Agency within the Intelligence Community.

ARTICLE 27: PRIOR APPROVALS

As appropriate, prior approval of the following deviations from budget and program plans are required:

- A. The Grantee must consult the Program Manager in Block 15 of the Award/Modification document through the AGO at the Administrative Office in Block 16 or the Grant Procurement Office in Block 6 of the Award/Modification document before deviating from the research objectives defined in the grant proposal or any sub-award, transfer or contracting out of substantive program performance under this award.
- B. Support for the project may not continue without the active direction of the Principal Investigator approved for, and identified in, this Grant. If the approved Principal Investigator severs his or her connection with the Grantee or otherwise relinquishes active direction of the project, either permanently or for a significant length of time (three months or more), the Grantee must either:
 - a. Appoint a replacement Principal Investigator with the approval of the Program Manager in Block 15 through the Grant Procurement Office in Block 6 of the Award/Modification document, or
 - b. Relinquish the Grant, in which case the Grant shall be terminated
 - c. Extension for the expiration period of this Grant – The AGO at the Administrative Office in Block 16 of the Award/Modification document has authority to approve a no-funds extension request meeting all of the following parameters:

- i. a one-time basis only; and
- ii. for a period not to exceed 90 days; and
- iii. where \$50,000.00 or less of obligated funds remain to be expended.

In other cases, where a request is outside one or more of the parameters, a no-funds extension can only be approved with the concurrence of the Program Manager in Block 15 of the Award/Modification document. For any no-funds extension to be effective, a written grant modification must be issued and signed by the AGO at the Administrative Office in Block 16 under the circumstances above or the Sponsoring Office in Block 6 of the Award/Modification document.

ARTICLE 28: DATA RIGHTS

- A. All rights and title to data and technical data, as defined in 48 CFR 27.401, generated under this agreement shall vest in the Recipient.
- B. The Recipient hereby grants to the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to use, duplicate, or disclose for governmental purposes any data, technology and inventions, whether patented or not, made or developed under this Agreement.
- C. The Recipient reserves the right to protect by copyright original works developed under this agreement. All such copyrights will be in the name of the Recipient. The Recipient hereby grants the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, for governmental purposes, any copyrighted materials developed under this agreement, and to authorize others to do so.
- D. The Recipient is responsible for affixing appropriate markings indicating the rights of the Government on all data and technical data delivered under the agreement. The Government shall be deemed to have unlimited rights in all data and technical data delivered without markings.

ARTICLE 29: USING TECHNICAL INFORMATION RESOURCES

To the extent practical, the recipient will use the technical information resources of the Defense Technical Information Center (DTIC) and other Government or private facilities to investigate recent and on-going research and avoid needless duplication of scientific and engineering effort.

ASSISTANCE AGREEMENT			
1. Award No. 2010*1058114*000	2. Modification No. 002	3. Effective Date 05 July 2012	4. Page 1 of 15
5. Awarded to University of Maryland		6. Sponsoring Office Office of Integrated Missions	7. Period of Performance 12 July 2010 through 30 June 2013
8. Type of Agreement Grant <input checked="" type="checkbox"/> Cooperative Agreement <input type="checkbox"/> Other <input type="checkbox"/>	9. Authority 31 USC 6304 and 10 USC 2358	10. Purchase Request or Funding Document No. N/A	
11. Remittance Address See Article 4		12. Total Grant Amount Govt. Share: \$240,000 Cost Share: \$0 Total: \$240,000	13. Funds Obligated: This action: \$0 Total: \$240,000
14. Principal Investigator Dr. Alan Migdall (301) 975-2331	15. Program Manager <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	16. Administrator <div style="border: 1px solid black; height: 20px; width: 100%;"></div> (b)(3)	
17. Submit Payment Requests to Vendor Payments Attn: Mail Room Address: <div style="border: 1px solid black; display: inline-block; width: 100px; height: 15px;"></div> Washington, DC 20505	18. Paying Office Same as Block 17	19. Submit Reports As Directed by the Technical Point of Contact (b)(3)	
20. Accounting and Appropriation Data Amount Obligated: \$240,000			
21. Research Title and/or Description of Project A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution			
22. For the Recipient		<div style="border: 1px solid black; height: 100px; width: 100%;"></div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-top: 10px;"></div> Grants Officer	
24. Signature of Person Authorized to Sign			
26. Name and Title	27. Date Signed		
		<div style="border: 1px solid black; width: 100px; height: 20px; display: inline-block;"></div> 8/7/2012 (b)(3)	

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ARTICLE 1: SCOPE OF THE AGREEMENT

The Recipient shall perform a coordinated research and development program in accordance with the Recipient's technical portion of the proposal entitled "A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution".

First Year (12 July 2010 – 11 July 2011)

Government's Share	\$120,000
Recipients Share (cash or in-kind)	\$ 0
Total First Year Agreement	\$120,000

Second Year (12 July 2011 – 30 June 2013)

Government's Share	\$120,000
Recipients Share (cash or in-kind)	\$ 0
Total Second Year Agreement	\$120,000

Total Government Share of Agreement \$240,000

Option Year (01 July 2013 – 30 June 2014) (UNEXERCISED)

Government's Share	\$119,999
Recipients Share (cash or in-kind)	\$ 0
Total Option Year Agreement	\$119,999

Grand Total Government Share of Agreement \$240,000

ARTICLE 2: DEFINITIONS

Parties -- For the purposes of this Agreement, the parties are University of Maryland and the United States of America, hereinafter called the Government or the Agency, represented by the Central Intelligence Agency.

Agreement -- The articles of this assistance agreement, Research Terms and Conditions (available at <http://www.nsf.gov/pubs/policydocs/rtr/termssidebyside.pdf>) and its attachments.

Recipient -- An organization or other entity receiving a grant or cooperative agreement. For purposes of this Agreement, the Recipient is University of Maryland.

Performance Year -- Each consecutive twelve-month period from the effective date of this agreement throughout the term of the agreement.

ARTICLE 3: ADMINISTRATIVE REQUIREMENTS

- A. This Agreement will be administered in accordance with, and recipients shall comply with, the Research Terms and Conditions (available at <http://www.nsf.gov/pubs/policydocs/rtr/termssidebyside.pdf>) the requirements of the following OMB Circulars which are incorporated herein by reference:
- a. OMB Circular A-21 now codified at 2 CFR part 220, "Cost Principles for Educational Institutions"
 - b. OMB Circular A-110, Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations now codified at 2 CFR part 215
 - c. OMB Circular A-122, "Cost Principles for Non-Profit Organizations", now codified at 2 CFR part 230
 - d. OMB Circular A-133, "Audits of State, Local Governments, and Nonprofit Institutions" (27 June 03); (revised 26 June 07) and

- e. The Provisions of CIA Broad Agency Announcement No. ICPDP-2010-0001, entitled "2010 Intelligence Community Postdoctoral Research Fellowship Program."

B. Should there be any inconsistency between the special conditions contained in the Articles of this agreement and the Research Terms and Conditions, the Articles of the agreement shall control. Should there be any inconsistency between the Research Terms and Conditions and any special conditions contained in the CIA Broad Agency Announcement, guides, brochures, etc., cited or included by reference in the agreement, the matter should be referred to the CIA Grants Officer for guidance.

ARTICLE 4: ADMINISTRATIVE RESPONSIBILITIES

Central Intelligence Agency Grants Office

Attn: [redacted] (b)(3)
 Address: Contracting Team
 ARC
 [redacted]
 Washington, DC 20505 (b)(3)
 Phone: [redacted]
 Fax: [redacted]
 Email: [redacted] (b)(3)

Technical Point of Contact

Central Intelligence Agency Program Officer (b)(3)
 ATTN: [redacted] (b)(3)
 Address: Washington, DC 20505
 Phone: [redacted]
 Fax: [redacted]
 Email: [redacted]

Government Payment Office

Invoices shall be submitted using the Internet Payment Platform (IPP). If the Grantee is not registered in IPP, the Grantee shall call the Vendor Service Center on [redacted] within two weeks of grant award to register. Items needed to facilitate registration include: a valid grant number and the name, phone number, and e-mail address for the Grantee's point of contact. The Grantee may make inquiries regarding invoices to the payment office on [redacted] (b)(3)

If the Grantee is unable to submit a payment request in electronic form, or the Agency is unable to receive a payment request in electronic form, the Grantee shall submit the payment request using a method mutually agreed to by the Grantee, the Grants Officer, and the payment office.

Invention Reporting

Grants Office
 Address: Contracting Team (b)(3)
 ARC
 [redacted]
 Washington, DC 20505 (b)(3)
 Phone: [redacted]
 Fax: [redacted]
 Email: [redacted]

Recipient's Principal Investigator

P.I. Name: Dr. Alan Migdall
Department: Joint Quantum Institute
Address: National Institute of Standards and Technology
University of Maryland
100 Bureau Dr, MS 8441
Gaithersburg, MD 20899-8441
Phone: (301) 975-2331
Fax: (301) 869-5700
Email: migdall@nist.gov

Recipient's Authorized Organizational Representative

AOR Name: Jill A. Frankenfield
Title: Contract Manager, Office of Research Administration & Advancement
Address: 3112 Lee Building
University of Maryland
College Park, MD 20742-4111
Phone: (301) 405-4577
Fax: (301) 314-9569
Email: jfranken@umd.edu

ARTICLE 5: TERM OF THE AGREEMENT

The project has been approved on scientific/technical merit for 36 months. The period of performance is 12 July 2010 – 30 June 2013.

ARTICLE 6: KEY PERSONNEL

The key personnel listed below must be employed with University of Maryland at the time of award and shall be maintained, to the maximum extent possible, throughout this agreement. Should changes be necessary, University of Maryland shall notify the Agency Grants Office (identified in Block 6 of the face page) in writing of the proposed substitute(s) within 30 days of the change in order to obtain approval of the substitution from the CIA Program Manager.

KEY PERSONNEL:

Principal Investigator: Dr. Alan Migdall
Fellow (when identified):

ARTICLE 7: FISCAL MANAGEMENT

7.1 Restrictions of the Use of Government Funds

Government funds provided under this Agreement must be allocated by the Recipient exclusively for the execution and operation of the Agreement Scope. Government funds shall not be utilized to support the Recipient's operations or administration unrelated to this Agreement.

7.2. Obligation

In no case shall the Government's financial obligation exceed the amount obligated on this Agreement or by amendment to this Agreement. The Government's share for full performance of this award is \$240,000. Of this amount, \$240,000 is allotted and available for payment. This grant is fully funded. The Government is not obligated to reimburse the Recipient for expenditures in excess of the amount of funding obligated and allotted by the Government.

7.3 Incremental Funding Actions

Unless otherwise specified in the agreement, each successive increment of a continuing grant will be funded at the level specified in Article 1 without a formal request from the recipient provided an annual report has been received from the Principal Investigator.

Incremental funding is contingent on:

- A. Availability of funds;
- B. Satisfactory scientific/technical progress; and
- C. Compliance with any special conditions of the agreement.

7.4 Advance Payment

To request advance payments, recipients shall submit a request for advance payment. The original and two copies of each request shall be submitted to:

CIA Grants Office, Block 6

7.5 Program Income

All program income earned during the project period shall be added to funds committed to the project by the Government and the Recipient and used to further eligible program objectives.

7.6 Closeout Adjustments

The Government may make a downward adjustment to the Government funding amount after completion of the effort under an agreement, when appropriate in accordance with OMB Circular A-110.

ARTICLE 8: REVISION TO FINANCIAL PLANS

A. The financial plan, or approved budget, is the financial expression of the effort to be performed under this agreement as approved during the award process. This agreement and its terms and conditions reflect the approved financial plan. Some changes to the plan require prior approval, as described below.

B. Recipients are authorized to:

Carry forward unobligated balances to subsequent funding periods (with the exception of the final funding period)

C. The CIA Grants Officer's prior written approval is required for actions which:

- a. Change the scope or objective of a project. The Principal Investigator must consult with the Program manager and receive written approval from the Grants Officer before deviating from the research objectives defined in the grant proposal or any sub-award, transfer or contracting out of substantive program performance under this agreement.
- b. Change key personnel. Support for the project may not continue without the active direction of the Principal Investigator and/or Postdoctoral Fellows approved for, and identified in, this Assistance Agreement. If the approved Principal Investigator/Postdoctoral Fellow severs his or her connection with the recipient institution or otherwise relinquishes active direction of the project, either permanently or for a significant length of time (three months or more), the recipient institution must either:
 - i. Appoint a replacement Principal Investigator/Postdoctoral Fellow with the approval of the Program Manager, or

- ii. Relinquish the Assistance Agreement, in which case the Agreement shall be terminated.
 - iii. Change the recipient institution's cost share amount reflected in the approved budget
 - iv. Use human subjects or vertebrate animals
 - v. Require no cost extensions exceeding 12 months
- D. Unless otherwise directed by the Grant Officer, any unexpended balance of funds which remains at the end of any funding period, except the final funding period of the grant, shall be carried over to the next funding period, and may be used to defray costs of any funding period of the grant. This includes allowing the carryover of funds to the second and subsequent years of a multiple year grant. This provision also applies to subcontractors performing substantive work under the grant.

E. SPECIAL CONDITIONS: N/A

F. OPTION

The Government may extend the term of this grant by issuing a unilateral modification.

Option Year (01 July 2013 – 30 June 2014)(UNEXERCISED)

Government's Share	\$119,999
Recipients Share (cash or in-kind)	\$ 0
Total Option Year Agreement	\$119,999

ARTICLE 9: INVENTIONS

- A. The clause entitled "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms," (37 CFR 401) is hereby incorporated by reference and the clauses in paragraph 401.14 are modified as follows: replace the word "contractor" with "Recipient"; replace the words "agency," "Federal Agency" and "funding Federal Agency" with "government"; replace the word "contract" with "agreement"; delete paragraphs (g)(2), (g)(3) and the words "to be performed by a small business firm or domestic nonprofit organization" from paragraph (g)(1); paragraph (1), Communications, point of contact on matters relating to this clause will be the CIA Grants Officer
- B. The Recipient shall file Invention (Patent) Reports as of the close of the performance year and at the end of the term for this Agreement. Annual reports are due 60 days after the end of each year of performance and final reports are due 60 days after the expiration of the final performance period. Negative reports are also required. The Recipient shall submit the original and one copy to the Grants Officer.
- C. Final payment cannot be made nor can the agreement be closed out until the recipient delivers to the Government all disclosures of subject inventions required by this agreement, an acceptable final report pursuant to article 12 entitled "Annual and Final Technical Reports," and all confirmatory instruments.
- D. All rights and title to data and technical data, as defined in 48 CFR 27.401, generated under this agreement shall vest in the Recipient.
- E. The Recipient hereby grants to the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to use, duplicate, or disclose for governmental purposes any data, technology and inventions, whether patented or not, made or developed under this Agreement.
- F. The Recipient reserves the right to protect by copyright original works developed under this agreement. All such copyrights will be in the name of the Recipient. The Recipient hereby grants the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, for governmental purposes, any copyrighted materials developed under this agreement, and to authorize others to do so.

- G. The Recipient is responsible for affixing appropriate markings indicating the rights of the Government on all data and technical data delivered under the agreement. The Government shall be deemed to have unlimited rights in all data and technical data delivered without markings.

ARTICLE 10: ANNUAL PERFORMANCE REPORTS

10.1 Annual Performance Report

- A. Annual reports are required for efforts of more than one year. This report will provide a concise and factual discussion of the significant accomplishments and progress during the year covered by the report. Each of the topics described below shall be addressed for the effort being performed:
- a. A comparison of actual accomplishments with the goals and objectives established for the period, the findings of the investigator, or both.
 - b. Reasons why established goals were not met, if appropriate.
 - c. Other pertinent information including, when appropriate, analysis and explanation of cost overruns.
- B. In addition, for research awards, each of the following topics (a) through (d) shall be addressed as appropriate to the research effort being performed:
- a. A cumulative chronological list of written publications in technical journals. Include those in press as well as manuscripts in preparation and planned for later submission. Indicate likely journals, authors, and titles.
 - b. A list of professional personnel associated with the research effort. List any advanced degrees awarded, including dates, recipient, type of degree, and thesis title.
 - c. Interactions (Related Activities):
 - i. Papers presented at meetings, conferences, seminars, etc.
 - ii. Consultative and advisory functions to other laboratories and agencies on research supported under the agreement. Provide factual information about the subject matter, institutions, dates, and the names of individuals involved.
 - d. New discoveries, inventions, or patent disclosures and specific applications stemming from the research effort.

The Postdoctoral Fellow is also required to present the status of the research grant at the annual IC Postdoctoral Research Fellowship Program Colloquium.

10.2 Final Technical Report

- A. A Final Technical Report is due at the completion of the agreement. This report will provide a comprehensive, cumulative, and substantive summary of the progress and significant accomplishments achieved during the total period of the effort covered by the agreement. Each of the topics described in section 2.1 above shall be addressed as appropriate for the effort performed. Publications may be bound and attached as appendices.
- B. When the results of a research effort have not previously been reported in scientific or technical publications, the Final Technical Report must provide sufficient detailed discussions of findings and accomplishments obtained in pursuit of the planned research objectives.

10.3 Report Submittal

The Recipient shall submit annual and final technical reports in the original and two copies to the Agency's program officer within 90 days after completion of the period covered by the report. The Recipient shall provide a copy of the transmittal letter to the Grants Officer.

10.4 Format

- A. Cover and title page. Standard Form (SF) 298, Report Documentation Page, shall be used. Item 13 of the form should contain a 100 to 200 word abstract summarizing technical progress during the reporting period. Style should be third person singular using past tense. Jargon, special symbols or notations, subscripts, mathematical symbols or foreign alphabet letters are not permitted. All pages should be of good quality for copying purposes.
- B. Recipient's format is acceptable.

ARTICLE 11: INFORMAL TECHNICAL REPORTS

11.1 Reports

This report shall be prepared only if requested by the Government program officer. It shall be submitted in letter format and is usually not longer than three pages in length. Its primary purpose is to inform the project engineer/program manager about significant events, accomplishments, and anticipated problems that may affect the conduct of the planned effort. It should summarize the progress of the effort being performed, new discoveries, inventions or patent disclosures, anticipated changes in commitments of key personnel and in the planned approach; acquisition or fabrication of major or special research equipment; and the titles of manuscripts planned for publication. The Recipient shall send the Agency program officer one copy signed by the principal investigator within 15 days after the request.

A brief quarterly report may be required after each three month period. (The annual report replaces the report for the last quarter of the year). Each quarterly report should describe the progress of the research project relative to the milestones that were defined in the proposal.

11.2 Government Visits

The Government may visit the Recipient to discuss project status and results. It is anticipated that Government involvement in this grant will be limited to general oversight.

ARTICLE 12: SCIENTIFIC REPORTS

- A. For research agreements, this report shall be used for rapidly disseminating highly significant research results or for scientific reports that are too long or that contains useful compilations of data, tables, and computations not normally accepted by technical journals. It is not appropriate for a student's thesis. Before preparing a Scientific Report, obtain written permission from the Program Manager who will then furnish detailed instructions for formatting, reproducing, and distributing the report. Send the Agency program manager two copies.
- B. On its cover, a scientific report shall prominently display the following disclaimer: "The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies or endorsements, either expressed or implied, of the U.S. Government."

ARTICLE 13: REPORTING FINANCIAL INFORMATION

Recipients shall submit financial reporting information in accordance with the following.

13.1 Interim Financial Reports

- A. The Recipient shall submit an interim Federal Financial Report (FFR 425) within 30 days following the end of each quarter. The original and a copy of the report should be submitted to the Grants Officer list identified in Block 16 of the cover page. Recipients are required to update, certify and submit the FFR to the Agency by the due date even if funds have not been drawn during the reporting period.

- B. Both cash management and financial status information should be reported on the same form for single award reporting.

13.2 Final Federal Financial Report

The recipient shall submit the final FFR no later than 90 days following the completion of the agreement. The original and a copy of the report shall be submitted to the Grants Administration Office identified in block 16 of the cover page.

13.3 Unexpended Balances

Unless otherwise directed by the Grant Officer, any unexpended balance of funds which remains at the end of any funding period, except the final funding period of the grant, shall be carried over to the next funding period, and may be used to defray costs of any funding period of the grant. This includes allowing the carry over of funds to the second and subsequent years of a multiple year grant, but it does not apply to options, which require current year funding. This provision also applies to subcontractors performing substantive work under the grant.

ARTICLE 14: PUBLIC DISCLOSURE OF SCIENTIFIC AND TECHNICAL INFORMATION

- A. The Recipient may make formal public disclosure of the scientific and technical information from this supported work (e.g., release articles for appropriate professional publications or present papers at scientific meetings or symposia) and will take the following steps;
 - a. A copy of the article, paper, report, etc., shall be provided to the Government 45 days prior to submission for publication.
 - b. Reference shall be attributed to a grant issued by the Intelligence Community Postdoctoral Research Fellowship Program, or as may otherwise be prescribed by the Grants Officer.
- B. The Recipient may utilize the scientific and technical information resulting from this support in consulting or discussing this and related information with other qualified individuals or groups of individuals, where appropriate, for furthering this research and/or development effort. The provision of A(2) shall apply to such exchanges of information.

ARTICLE 15: Non-Publicity

The Recipient shall not use or allow to be used any aspect of this solicitation and/or agreement for publicity. Publicity means, but is not limited to, advertising (e.g. trade magazines, newspapers, Internet, radio, television etc.), communications with the media, marketing, or a reference for new business. It is further understood that this obligation shall not expire upon completion or termination of this agreement, but will continue indefinitely. The Recipient may request a waiver or release from the foregoing but shall not deviate there from unless authorized to do so in writing by the Grants Officer. Recipients are not required to obtain waivers when informing offices within this Agency of agreements it has performed or is in the process of performing.

ARTICLE 16: HUMAN SUBJECTS

Approval is required by CIA prior to any work beginning involving human subject use. All proposals that involve the use of human subjects must include documentation of their ability to follow Federal guidelines for the protection of human subjects. This includes, but is not limited to, protocol approval mechanisms, approved Institutional Review Boards (IRB), and Federal Wide Assurances. These requirements are based on expected human use issues sometime during the entire length of the proposed effort. The recipient shall provide their IRB approval of specific research, the blank informed user consent form, and the protocol and related documents as requested for secondary approval by CIA.

ARTICLE 17: ANIMAL SUBJECTS

Approval is required by CIA prior to work beginning involving animal subject use. Proposals selected for funding that will use vertebrate animals in the research must comply with the Animal Welfare Act [7 U.S.C. 2131 et seq.] and the regulations promulgated there under by the Secretary of Agriculture [9 CFR 1.1- 4.11] pertaining to the humane care, handling, and treatment of vertebrate animals held or used for research, teaching or other activities supported by Federal awards. The recipient is expected to ensure that the guidelines described in the National Academy of Science (NAS) Publication, "Guide for the Care and Use of Laboratory Animals" (1996) are followed and to comply with the Public Health Service Policy and Government Principles Regarding the Care and Use of Animals (included as Appendix D to the NAS Guide).

ARTICLE 18: MODIFICATIONS

Any party to this Agreement who wishes to modify the Agreement shall confer in good faith with the other signatory parties to determine the desirability of the proposed modification. Modifications shall not be effective until a written modification is signed by the Agreement signatories (or their successors). Administrative modifications may be unilaterally executed by the CIA Grants Officer.

ARTICLE 19: SUSPENSION AND TERMINATION PROCEDURES

19.1

The Government reserves the right to suspend or terminate this agreement for cause. If the Recipient fails to comply with the terms and conditions of this agreement, the CIA Grants Officer will provide written notice of breach or deficiency to the Recipient and will provide the Recipient an opportunity to explain or correct the breach or deficiency within 30 days from receipt of notice. If grounds for termination for cause still exist, the Government may terminate or suspend performance. If suspension is invoked, the Government may withhold further payments, or prohibit the Recipient from incurring additional obligation of funds until corrective action is taken. If this agreement is terminated after the Recipient has received Government funding, the closeout procedures in OMB Circular A-110 apply.

The agreement may be suspended or terminated in whole or in part in any of the following situations by:

- A. The Agency when the recipient has materially failed to comply with the terms and conditions of the award;
- B. The Agency when it has other reasonable cause; including departure of the Principal Investigator.
- C. The Agency and the recipient by mutual agreement (if the Agency and the recipient cannot reach an agreement, the Agency reserves the right to unilaterally terminate the award); or
- D. The recipient on written notice to the Agency setting forth the reasons for such action, the effective date, and, in the case of partial termination, the portion to be terminated or suspended (with the understanding that if the Agency determines that the unterminated portion will not accomplish the purposes of the agreement, it may suspend or terminate the entire agreement.)
- E. Notwithstanding the above, for security or safety reasons or in the case of a serious breach that could lead to irreparable damage, the Agency Grants Officer may order immediate suspension of work, in whole or in part.

19.2 Informal Resolution of Grant Administration Disputes

- A. Consistent with the Recommendation on Grant Disputes by the Administrative Conference of the U.S., and with the intent of the provisions of Alternative Dispute Resolution, the CIA provides the informal resolution processes described below concerning disputes or disagreements that may arise over a Grants Officer's post-award decisions under a CIA agreement.

B. Scope of Post-Award Disputes Covered

The disputes below are covered under this process:

- a. Cost disallowances pursuant to a Grants Officer's decision (e.g., specific disallowances under an individual grant or as a result of an audit report);
- b. Termination orders; and
- c. The final settlement amount under a termination.

C. Procedures

- a. The recipient should submit a certified letter to the Agency's Procurement Executive via the Grants Officer noting the recipient's disagreement or dispute and identifying the Agency's Grants Officer's decision in question, giving reasons for the request for review and providing any other material pertinent to the request.
- b. The letter to the Procurement Executive must be postmarked no later than 30 days after the date of the letter notifying the recipient of the decision in question. The time for filing a request for review is strictly enforced and no extensions for the purpose of preparing it will be granted.
- c. The request for review need not follow a prescribed format; however, it must contain a full statement of the recipient's position with respect to the disputed matter and the facts and reasons in support of the recipient's position. Requests will be reviewed if the recipient submits new information (which was unavailable at the time of the original decision); if an error in fact or application of Agency policy is noted in the original decision; or improper procedures were followed in the original decision.
- d. The Procurement Executive, will review or designate one or more individuals to review the matter. One reviewing official will be at least at a management level equivalent to the official who made the decision that is being reviewed. In no case, will the review be undertaken by any individual involved with the decision or involved in recommending and/or monitoring the scientific and engineering aspects of the project or responsible for negotiating and/or administrating its business aspects.
- e. The designated individual(s) will review and consider all relevant information available. A report which identifies the conclusion and recommendation will be completed within 30 days and forwarded to the Procurement Executive or his/her designee for a final and unappealable written decision for the agency. The Procurement Executive or his/her designee will communicate the decision in writing to the recipient.

ARTICLE 20: RESEARCH MISCONDUCT

All research awards issued by the CIA are subject to the Federal Policy on Research Misconduct published in the Federal Register on December 6, 2000 (65 FR 76260). The following definitions will be used when applying this policy:

- A. Research misconduct means the fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. Research misconduct does not include honest error or difference of opinion.
- B. Fabrication is making up data or results and recording or reporting them.
- C. Falsification means manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.
- D. Plagiarism is the appropriation of another person's ideas, processes, results or words without giving appropriate credit.

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For questions regarding this modification please contact [REDACTED]

(b)(3)

Summary of Changes

The purpose of this modification is to change the Administrative Grants Officer from [REDACTED] to [REDACTED] and update the Program Manager's contact information. As a result, the following changes are made:

(b)(3)

(b)(3)

1. In Block 15 Program Manager, [REDACTED] phone number is changed from [REDACTED]
2. In Block 16, the Administrator is changed from [REDACTED] The phone number is changed from [REDACTED]
3. In Article 4, the following changes are made:

(b)(3)

(b)(3)

- a. The Grants Officer and contact information is changed as follows:

(b)(3)

	From	To
Grants Officer	[REDACTED]	
Phone		
Fax		
Email		

(b)(3)

- b. The Technical Point of Contact remains the same [REDACTED]; however, the following contact information is changed to reflect new numbers (mailing address and email remain unchanged):

(b)(3)

	From	To
Phone	[REDACTED]	
Fax		

(b)(3)

- c. The following Invention Reporting contact information is changed as follows (mailing address remains the same):

	From	To
Phone	[REDACTED]	
Fax		
Email		

(b)(3)

All other articles remain unchanged and in full force and effect.

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ASSISTANCE AGREEMENT			
1. Award No. 2010*1058114*000	2. Modification No. 004	3. Effective Date 14 January 2013	4. Page 1 of 15
5. Awarded to University of Maryland	6. Sponsoring Office Office of Integrated Missions		7. Period of Performance 12 July 2010 through 30 June 2013
8. Type of Agreement Grant <input checked="" type="checkbox"/> Cooperative Agreement <input type="checkbox"/> Other <input type="checkbox"/>	9. Authority 31 USC 6304 and 10 USC 2358	10. Purchase Request or Funding Document No. N/A	
11. Remittance Address See Article 4	12. Total Grant Amount Govt. Share: \$240,000 Cost Share: \$0 Total: \$240,000	13. Funds Obligated: This action: \$0 Total: \$240,000	
14. Principal Investigator Dr. Alan Migdall (301) 975-2331	15. Program Manager <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	16. Administrator <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	
17. Submit Payment Requests to Vendor Payments Attn: Mail Room Address: <div style="border: 1px solid black; display: inline-block; width: 100px; height: 15px;"></div> Washington, DC 20505	18. Paying Office Same as Block 17	19. Submit Reports As Directed by the Technical Point of Contact	
20. Accounting and Appropriation Data Amount Obligated: \$240,000			
21. Research Title and/or Description of Project A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution			
22. For the Recipient		23. For the United States of America	
24. Signature of Person Authorized to Sign	25. <div style="border: 1px solid black; display: inline-block; width: 200px; height: 20px;"></div>		
26. Name and Title	27. Date Signed	28. Name of Officer <div style="border: 1px solid black; display: inline-block; width: 100px; height: 15px;"></div> Grants Officer	29. Date Signed 2/9/2013

(b)(3)

(b)(3)

(b)(3)

(b)(3)

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ARTICLE 1: SCOPE OF THE AGREEMENT

The Recipient shall perform a coordinated research and development program in accordance with the Recipient's technical portion of the proposal entitled "A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution".

First Year (12 July 2010 – 11 July 2011)

Government's Share	\$120,000
Recipients Share (cash or in-kind)	\$ 0
Total First Year Agreement	\$120,000

Second Year (12 July 2011 – 30 June 2013)

Government's Share	\$120,000
Recipients Share (cash or in-kind)	\$ 0
Total Second Year Agreement	\$120,000

Total Government Share of Agreement	\$240,000
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Option Year (01 July 2013 – 30 June 2014) (UNEXERCISED)

Government's Share	\$119,999
Recipients Share (cash or in-kind)	\$ 0
Total Option Year Agreement	\$119,999

Grand Total Government Share of Agreement \$240,000

ARTICLE 2: DEFINITIONS

Parties -- For the purposes of this Agreement, the parties are University of Maryland and the United States of America, hereinafter called the Government or the Agency, represented by the Central Intelligence Agency.

Agreement -- The articles of this assistance agreement, Research Terms and Conditions (available at <http://www.nsf.gov/pubs/policydocs/rtr/termssidebyside.pdf>) and its attachments.

Recipient -- An organization or other entity receiving a grant or cooperative agreement. For purposes of this Agreement, the Recipient is University of Maryland.

Performance Year -- Each consecutive twelve-month period from the effective date of this agreement throughout the term of the agreement.

ARTICLE 3: ADMINISTRATIVE REQUIREMENTS

- A. This Agreement will be administered in accordance with, and recipients shall comply with, the Research Terms and Conditions (available at <http://www.nsf.gov/pubs/policydocs/rtr/termssidebyside.pdf>) the requirements of the following OMB Circulars which are incorporated herein by reference:
- OMB Circular A-21 now codified at 2 CFR part 220, "Cost Principles for Educational Institutions"
 - OMB Circular A-110, Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations now codified at 2 CFR part 215
 - OMB Circular A-122, "Cost Principles for Non-Profit Organizations", now codified at 2 CFR part 230
 - OMB Circular A-133, "Audits of State, Local Governments, and Nonprofit Institutions" (27 June 03); (revised 26 June 07) and
 - The Provisions of CIA Broad Agency Announcement No. ICPDP-2010-0001, entitled "2010 Intelligence Community Postdoctoral Research Fellowship Program."

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- B. Should there be any inconsistency between the special conditions contained in the Articles of this agreement and the Research Terms and Conditions, the Articles of the agreement shall control. Should there be any inconsistency between the Research Terms and Conditions and any special conditions contained in the CIA Broad Agency Announcement, guides, brochures, etc., cited or included by reference in the agreement, the matter should be referred to the CIA Grants Officer for guidance.

ARTICLE 4: ADMINISTRATIVE RESPONSIBILITIES

Central Intelligence Agency Grants Office

Attn:
 Address: Contracting Team
 ARC

 Washington, DC 20505
 Phone:
 Fax:
 Email:

Technical Point of Contact

Central Intelligence Agency Program Officer
 ATTN:
 Address: Washington, DC 20505
 Phone:
 Fax:
 Email:

Government Payment Office

Invoices shall be submitted using the Internet Payment Platform (IPP). If the Grantee is not registered in IPP, the Grantee shall call the Vendor Service Center on within two weeks of grant award to register. Items needed to facilitate registration include: a valid grant number and the name, phone number, and e-mail address for the Grantee's point of contact. The Grantee may make inquiries regarding invoices to the payment office on

If the Grantee is unable to submit a payment request in electronic form, or the Agency is unable to receive a payment request in electronic form, the Grantee shall submit the payment request using a method mutually agreed to by the Grantee, the Grants Officer, and the payment office.

Invention Reporting

Grants Office
 Address: Contracting Team
 ARC

 Washington, DC 20505
 Phone:
 Fax:
 Email:

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Recipient's Principal Investigator

P.I. Name: Dr. Alan Migdall
Department: Joint Quantum Institute
Address: National Institute of Standards and Technology
University of Maryland
100 Bureau Dr, MS 8441
Gaithersburg, MD 20899-8441
Phone: (301) 975-2331
Fax: (301) 869-5700
Email: migdall@nist.gov

Recipient's Authorized Organizational Representative

AOR Name: Jill A. Frankenfield
Title: Contract Manager, Office of Research Administration & Advancement
Address: 3112 Lee Building
University of Maryland
College Park, MD 20742-4111
Phone: (301) 405-4577
Fax: (301) 314-9569
Email: jfranken@umd.edu

ARTICLE 5: TERM OF THE AGREEMENT

The project has been approved on scientific/technical merit for 36 months. The period of performance is 12 July 2010 – 30 June 2013.

ARTICLE 6: KEY PERSONNEL

The key personnel listed below must be employed with University of Maryland at the time of award and shall be maintained, to the maximum extent possible, throughout this agreement. Should changes be necessary, University of Maryland shall notify the Agency Grants Office (identified in Block 6 of the face page) in writing of the proposed substitute(s) within 30 days of the change in order to obtain approval of the substitution from the CIA Program Manager.

KEY PERSONNEL:

Principal Investigator: Dr. Alan Migdall
Fellow

(b)(3)

ARTICLE 7: FISCAL MANAGEMENT**7.1 Restrictions of the Use of Government Funds**

Government funds provided under this Agreement must be allocated by the Recipient exclusively for the execution and operation of the Agreement Scope. Government funds shall not be utilized to support the Recipient's operations or administration unrelated to this Agreement.

7.2. Obligation

In no case shall the Government's financial obligation exceed the amount obligated on this Agreement or by amendment to this Agreement. The Government's share for full performance of this award is \$240,000. Of this amount, \$240,000 is allotted and available for payment. This grant is fully funded. The Government is not obligated

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to reimburse the Recipient for expenditures in excess of the amount of funding obligated and allotted by the Government.

7.3 Incremental Funding Actions

Unless otherwise specified in the agreement, each successive increment of a continuing grant will be funded at the level specified in Article 1 without a formal request from the recipient provided an annual report has been received from the Principal Investigator.

Incremental funding is contingent on:

- A. Availability of funds;
- B. Satisfactory scientific/technical progress; and
- C. Compliance with any special conditions of the agreement.

7.4 Advance Payment

To request advance payments, recipients shall submit a request for advance payment. The original and two copies of each request shall be submitted to:

CIA Grants Office, Block 6

7.5 Program Income

All program income earned during the project period shall be added to funds committed to the project by the Government and the Recipient and used to further eligible program objectives.

7.6 Closeout Adjustments

The Government may make a downward adjustment to the Government funding amount after completion of the effort under an agreement, when appropriate in accordance with OMB Circular A-110.

ARTICLE 8: REVISION TO FINANCIAL PLANS

- A. The financial plan, or approved budget, is the financial expression of the effort to be performed under this agreement as approved during the award process. This agreement and its terms and conditions reflect the approved financial plan. Some changes to the plan require prior approval, as described below.
- B. Recipients are authorized to:
 - Carry forward unobligated balances to subsequent funding periods (with the exception of the final funding period)
- C. The CIA Grants Officer's prior written approval is required for actions which:
 - a. Change the scope or objective of a project. The Principal Investigator must consult with the Program manager and receive written approval from the Grants Officer before deviating from the research objectives defined in the grant proposal or any sub-award, transfer or contracting out of substantive program performance under this agreement.
 - b. Change key personnel. Support for the project may not continue without the active direction of the Principal Investigator and/or Postdoctoral Fellows approved for, and identified in, this Assistance Agreement. If the approved Principal Investigator/Postdoctoral Fellow severs his or her connection with the recipient institution or otherwise relinquishes active direction of the project, either permanently or for a significant length of time (three months or more), the recipient institution must either:

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- i. Appoint a replacement Principal Investigator/Postdoctoral Fellow with the approval of the Program Manager, or
 - ii. Relinquish the Assistance Agreement, in which case the Agreement shall be terminated.
 - iii. Change the recipient institution's cost share amount reflected in the approved budget
 - iv. Use human subjects or vertebrate animals
 - v. Require no cost extensions exceeding 12 months
- D. Unless otherwise directed by the Grant Officer, any unexpended balance of funds which remains at the end of any funding period, except the final funding period of the grant, shall be carried over to the next funding period, and may be used to defray costs of any funding period of the grant. This includes allowing the carryover of funds to the second and subsequent years of a multiple year grant. This provision also applies to subcontractors performing substantive work under the grant.
- E. SPECIAL CONDITIONS: N/A
- F. OPTION

The Government may extend the term of this grant by issuing a unilateral modification.

Option Year (01 July 2013 – 30 June 2014) (UNEXERCISED)

Government's Share	\$119,999
Recipients Share (cash or in-kind)	\$ 0
Total Option Year Agreement	\$119,999

ARTICLE 2: INVENTIONS

- A. The clause entitled "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms," (37 CFR 401) is hereby incorporated by reference and the clauses in paragraph 401.14 are modified as follows: replace the word "contractor" with "Recipient"; replace the words "agency," "Federal Agency" and "funding Federal Agency" with "government"; replace the word "contract" with "agreement"; delete paragraphs (g)(2), (g)(3) and the words "to be performed by a small business firm or domestic nonprofit organization" from paragraph (g)(1); paragraph (1), Communications, point of contact on matters relating to this clause will be the CIA Grants Officer
- B. The Recipient shall file Invention (Patent) Reports as of the close of the performance year and at the end of the term for this Agreement. Annual reports are due 60 days after the end of each year of performance and final reports are due 60 days after the expiration of the final performance period. Negative reports are also required. The Recipient shall submit the original and one copy to the Grants Officer.
- C. Final payment cannot be made nor can the agreement be closed out until the recipient delivers to the Government all disclosures of subject inventions required by this agreement, an acceptable final report pursuant to article 12 entitled "Annual and Final Technical Reports," and all confirmatory instruments.
- D. All rights and title to data and technical data, as defined in 48 CFR 27.401, generated under this agreement shall vest in the Recipient.
- E. The Recipient hereby grants to the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to use, duplicate, or disclose for governmental purposes any data, technology and inventions, whether patented or not, made or developed under this Agreement.
- F. The Recipient reserves the right to protect by copyright original works developed under this agreement. All such copyrights will be in the name of the Recipient. The Recipient hereby grants the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to reproduce, prepare derivative works, distribute

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copies to the public, and perform publicly and display publicly, for governmental purposes, any copyrighted materials developed under this agreement, and to authorize others to do so.

- G. The Recipient is responsible for affixing appropriate markings indicating the rights of the Government on all data and technical data delivered under the agreement. The Government shall be deemed to have unlimited rights in all data and technical data delivered without markings.

ARTICLE 10: ANNUAL PERFORMANCE REPORTS

10.1 Annual Performance Report

- A. Annual reports are required for efforts of more than one year. This report will provide a concise and factual discussion of the significant accomplishments and progress during the year covered by the report. Each of the topics described below shall be addressed for the effort being performed:
- a. A comparison of actual accomplishments with the goals and objectives established for the period, the findings of the investigator, or both.
 - b. Reasons why established goals were not met, if appropriate.
 - c. Other pertinent information including, when appropriate, analysis and explanation of cost overruns.
- B. In addition, for research awards, each of the following topics (a) through (d) shall be addressed as appropriate to the research effort being performed:
- a. A cumulative chronological list of written publications in technical journals. Include those in press as well as manuscripts in preparation and planned for later submission. Indicate likely journals, authors, and titles.
 - b. A list of professional personnel associated with the research effort. List any advanced degrees awarded, including dates, recipient, type of degree, and thesis title.
 - c. Interactions (Related Activities):
 - i. Papers presented at meetings, conferences, seminars, etc.
 - ii. Consultative and advisory functions to other laboratories and agencies on research supported under the agreement. Provide factual information about the subject matter, institutions, dates, and the names of individuals involved.
 - d. New discoveries, inventions, or patent disclosures and specific applications stemming from the research effort.

The Postdoctoral Fellow is also required to present the status of the research grant at the annual IC Postdoctoral Research Fellowship Program Colloquium.

10.2 Final Technical Report

- A. A Final Technical Report is due at the completion of the agreement. This report will provide a comprehensive, cumulative, and substantive summary of the progress and significant accomplishments achieved during the total period of the effort covered by the agreement. Each of the topics described in section 2.1 above shall be addressed as appropriate for the effort performed. Publications may be bound and attached as appendices.
- B. When the results of a research effort have not previously been reported in scientific or technical publications, the Final Technical Report must provide sufficient detailed discussions of findings and accomplishments obtained in pursuit of the planned research objectives.

10.3 Report Submittal

The Recipient shall submit annual and final technical reports in the original and two copies to the Agency's program officer within 90 days after completion of the period covered by the report. The Recipient shall provide a copy of the transmittal letter to the Grants Officer.

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10.4 Format

- A. Cover and title page. Standard Form (SF) 298, Report Documentation Page, shall be used. Item 13 of the form should contain a 100 to 200 word abstract summarizing technical progress during the reporting period. Style should be third person singular using past tense. Jargon, special symbols or notations, subscripts, mathematical symbols or foreign alphabet letters are not permitted. All pages should be of good quality for copying purposes.
- B. Recipient's format is acceptable.

ARTICLE 11: INFORMAL TECHNICAL REPORTS

11.1 Reports

This report shall be prepared only if requested by the Government program officer. It shall be submitted in letter format and is usually not longer than three pages in length. Its primary purpose is to inform the project engineer/program manager about significant events, accomplishments, and anticipated problems that may affect the conduct of the planned effort. It should summarize the progress of the effort being performed, new discoveries, inventions or patent disclosures, anticipated changes in commitments of key personnel and in the planned approach; acquisition or fabrication of major or special research equipment; and the titles of manuscripts planned for publication. The Recipient shall send the Agency program officer one copy signed by the principal investigator within 15 days after the request.

A brief quarterly report may be required after each three month period. (The annual report replaces the report for the last quarter of the year). Each quarterly report should describe the progress of the research project relative to the milestones that were defined in the proposal.

11.2 Government Visits

The Government may visit the Recipient to discuss project status and results. It is anticipated that Government involvement in this grant will be limited to general oversight.

ARTICLE 12: SCIENTIFIC REPORTS

- A. For research agreements, this report shall be used for rapidly disseminating highly significant research results or for scientific reports that are too long or that contains useful compilations of data, tables, and computations not normally accepted by technical journals. It is not appropriate for a student's thesis. Before preparing a Scientific Report, obtain written permission from the Program Manager who will then furnish detailed instructions for formatting, reproducing, and distributing the report. Send the Agency program manager two copies.
- B. On its cover, a scientific report shall prominently display the following disclaimer: "The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies or endorsements, either expressed or implied, of the U.S. Government."

ARTICLE 13: REPORTING FINANCIAL INFORMATION

Recipients shall submit financial reporting information in accordance with the following.

13.1 Interim Financial Reports

- A. The Recipient shall submit an interim Federal Financial Report (FFR 425) within 30 days following the end of each quarter. The original and a copy of the report should be submitted to the Grants Officer list identified in Block 16 of the cover page. Recipients are required to update, certify and submit the FFR to the Agency by the due date even if funds have not been drawn during the reporting period.

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- B. Both cash management and financial status information should be reported on the same form for single award reporting.

13.2 Final Federal Financial Report

The recipient shall submit the final FFR no later than 90 days following the completion of the agreement. The original and a copy of the report shall be submitted to the Grants Administration Office identified in block 16 of the cover page.

13.3 Unexpended Balances

Unless otherwise directed by the Grant Officer, any unexpended balance of funds which remains at the end of any funding period, except the final funding period of the grant, shall be carried over to the next funding period, and may be used to defray costs of any funding period of the grant. This includes allowing the carry over of funds to the second and subsequent years of a multiple year grant, but it does not apply to options, which require current year funding. This provision also applies to subcontractors performing substantive work under the grant.

ARTICLE 14: PUBLIC DISCLOSURE OF SCIENTIFIC AND TECHNICAL INFORMATION

- A. The Recipient may make formal public disclosure of the scientific and technical information from this supported work (e.g., release articles for appropriate professional publications or present papers at scientific meetings or symposia) and will take the following steps;
- a. A copy of the article, paper, report, etc., shall be provided to the Government 45 days prior to submission for publication.
 - b. Reference shall be attributed to a grant issued by the Intelligence Community Postdoctoral Research Fellowship Program, or as may otherwise be prescribed by the Grants Officer.
- B. The Recipient may utilize the scientific and technical information resulting from this support in consulting or discussing this and related information with other qualified individuals or groups of individuals, where appropriate, for furthering this research and/or development effort. The provision of A(2) shall apply to such exchanges of information.

ARTICLE 15: Non-Publicity

The Recipient shall not use or allow to be used any aspect of this solicitation and/or agreement for publicity. Publicity means, but is not limited to, advertising (e.g. trade magazines, newspapers, Internet, radio, television etc.), communications with the media, marketing, or a reference for new business. It is further understood that this obligation shall not expire upon completion or termination of this agreement, but will continue indefinitely. The Recipient may request a waiver or release from the foregoing but shall not deviate there from unless authorized to do so in writing by the Grants Officer. Recipients are not required to obtain waivers when informing offices within this Agency of agreements it has performed or is in the process of performing.

ARTICLE 16: HUMAN SUBJECTS

Approval is required by CIA prior to any work beginning involving human subject use. All proposals that involve the use of human subjects must include documentation of their ability to follow Federal guidelines for the protection of human subjects. This includes, but is not limited to, protocol approval mechanisms, approved Institutional Review Boards (IRB), and Federal Wide Assurances. These requirements are based on expected human use issues sometime during the entire length of the proposed effort. The recipient shall provide their IRB approval of specific research, the blank informed user consent form, and the protocol and related documents as requested for secondary approval by CIA.

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ARTICLE 17: ANIMAL SUBJECTS

Approval is required by CIA prior to work beginning involving animal subject use. Proposals selected for funding that will use vertebrate animals in the research must comply with the Animal Welfare Act [7 U.S.C. 2131 et seq.] and the regulations promulgated there under by the Secretary of Agriculture [9 CFR 1.1- 4.11] pertaining to the humane care, handling, and treatment of vertebrate animals held or used for research, teaching or other activities supported by Federal awards. The recipient is expected to ensure that the guidelines described in the National Academy of Science (NAS) Publication, "*Guide for the Care and Use of Laboratory Animals*" (1996) are followed and to comply with the *Public Health Service Policy and Government Principles Regarding the Care and Use of Animals* (included as Appendix D to the NAS Guide).

ARTICLE 18: MODIFICATIONS

Any party to this Agreement who wishes to modify the Agreement shall confer in good faith with the other signatory parties to determine the desirability of the proposed modification. Modifications shall not be effective until a written modification is signed by the Agreement signatories (or their successors). Administrative modifications may be unilaterally executed by the CIA Grants Officer.

ARTICLE 19: SUSPENSION AND TERMINATION PROCEDURES

19.1

The Government reserves the right to suspend or terminate this agreement for cause. If the Recipient fails to comply with the terms and conditions of this agreement, the CIA Grants Officer will provide written notice of breach or deficiency to the Recipient and will provide the Recipient an opportunity to explain or correct the breach or deficiency within 30 days from receipt of notice. If grounds for termination for cause still exist, the Government may terminate or suspend performance. If suspension is invoked, the Government may withhold further payments, or prohibit the Recipient from incurring additional obligation of funds until corrective action is taken. If this agreement is terminated after the Recipient has received Government funding, the closeout procedures in OMB Circular A-110 apply.

The agreement may be suspended or terminated in whole or in part in any of the following situations by:

- A. The Agency when the recipient has materially failed to comply with the terms and conditions of the award;
- B. The Agency when it has other reasonable cause; including departure of the Principal Investigator.
- C. The Agency and the recipient by mutual agreement (if the Agency and the recipient cannot reach an agreement, the Agency reserves the right to unilaterally terminate the award); or
- D. The recipient on written notice to the Agency setting forth the reasons for such action, the effective date, and, in the case of partial termination, the portion to be terminated or suspended (with the understanding that if the Agency determines that the unterminated portion will not accomplish the purposes of the agreement, it may suspend or terminate the entire agreement.)
- E. Notwithstanding the above, for security or safety reasons or in the case of a serious breach that could lead to irreparable damage, the Agency Grants Officer may order immediate suspension of work, in whole or in part.

19.2 Informal Resolution of Grant Administration Disputes

- A. Consistent with the Recommendation on Grant Disputes by the Administrative Conference of the U.S., and with the intent of the provisions of Alternative Dispute Resolution, the CIA provides the informal resolution

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processes described below concerning disputes or disagreements that may arise over a Grants Officer's post-award decisions under a CIA agreement.

B. Scope of Post-Award Disputes Covered

The disputes below are covered under this process:

- a. Cost disallowances pursuant to a Grants Officer's decision (e.g., specific disallowances under an individual grant or as a result of an audit report);
- b. Termination orders; and
- c. The final settlement amount under a termination.

C. Procedures

- a. The recipient should submit a certified letter to the Agency's Procurement Executive via the Grants Officer noting the recipient's disagreement or dispute and identifying the Agency's Grants Officer's decision in question, giving reasons for the request for review and providing any other material pertinent to the request.
- b. The letter to the Procurement Executive must be postmarked no later than 30 days after the date of the letter notifying the recipient of the decision in question. The time for filing a request for review is strictly enforced and no extensions for the purpose of preparing it will be granted.
- c. The request for review need not follow a prescribed format; however, it must contain a full statement of the recipient's position with respect to the disputed matter and the facts and reasons in support of the recipient's position. Requests will be reviewed if the recipient submits new information (which was unavailable at the time of the original decision); if an error in fact or application of Agency policy is noted in the original decision; or improper procedures were followed in the original decision.
- d. The Procurement Executive, will review or designate one or more individuals to review the matter. One reviewing official will be at least at a management level equivalent to the official who made the decision that is being reviewed. In no case, will the review be undertaken by any individual involved with the decision or involved in recommending and/or monitoring the scientific and engineering aspects of the project or responsible for negotiating and/or administering its business aspects.
- e. The designated individual(s) will review and consider all relevant information available. A report which identifies the conclusion and recommendation will be completed within 30 days and forwarded to the Procurement Executive or his/her designee for a final and unappealable written decision for the agency. The Procurement Executive or his/her designee will communicate the decision in writing to the recipient.

ARTICLE 20: RESEARCH MISCONDUCT

All research awards issued by the CIA are subject to the Federal Policy on Research Misconduct published in the Federal Register on December 6, 2000 (65 FR 76260). The following definitions will be used when applying this policy:

- A. Research misconduct means the fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. Research misconduct does not include honest error or difference of opinion.
- B. Fabrication is making up data or results and recording or reporting them.
- C. Falsification means manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.
- D. Plagiarism is the appropriation of another person's ideas, processes, results or words without giving appropriate credit.

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- E. Research means all basic, applied, and demonstration research in all fields of science, engineering, mathematics, education, linguistics, medicine, psychology, social sciences, statistics, and research involving human subjects or animals.
- F. Research institutions includes all organizations using Federal funds for research, including, for example, colleges and universities, intramural Federal research laboratories, Federally funded research and development centers, national user facilities, industrial laboratories, or other research institutes.
- G. Research record is the record of data or results that embody the facts resulting from scientific inquiry, and includes, but is not limited to, research proposals, laboratory records, both physical and electronics, progress reports, abstracts, theses, oral presentations, internal reports, and journal articles.

Any allegation of research misconduct should be reported to the CIA Grants Officer

ARTICLE 21: REPORTING CLASSIFIABLE INFORMATION

- A. This award is intended for unclassified, publicly releasable research. The recipient will not be granted access to classified information. The awarding agency does not expect that the results of the research project will involve classified information.
- B. If, however, in conducting the activities supported under this award, the principal investigator (PI) is concerned that any of the research results involve potentially classifiable information that may warrant Government restrictions on the dissemination of the results, the PI should promptly notify the awarding agency's program manager.

ARTICLE 22: ENVIRONMENTAL STANDARDS

The Recipient agrees to the following environment standards;

- A. Comply with applicable provisions of the Clean Air Act (42 U.S.C 7401, et seq.) and Clean Water Act (33 V.S.C. 1251, et seq.), as implemented by Executive Order 11738 (3 CFR, 1971- 1 975 Comp., p799] and Environmental Protection Agency (EPA) rules at 40 CFR part 15. In accordance with the EPA rules, the Recipient further agrees that it will:
 - a. Not use any facility on EPA's List of Violating Facilities in performing any award that is nonexempt under 40 CFR 15.5, as long as the facility remains on the list.
 - b. Notify the awarding agency if it intends to use a facility in performing this award that is on the List of Violating Facilities or that the Recipient knows has been recommended to be placed on the List of Violating Facilities.
- B. Identify to the awarding agency any impact this award may have on the quality of the human environment, and provide help the agency may need to comply with the National Environmental Policy Act (NEPA, at 42 V.S.C. 4321, et seq.) and to prepare Environmental Impact Statements or other required environmental documentation. In such cases, the Recipient agrees to take no action that will have an adverse environmental impact (e.g. physical disturbance of a site such as breaking of ground) until the agency provides written Approval.

ARTICLE 23: NONDISCRIMINATION

By signing this agreement or accepting funds under the agreement, the Recipient assures that it will comply with applicable provisions of the following, national policies prohibiting discrimination:

- A. On the basis of race, color, or national origin, in Title VI of the Civil Rights Act of 1964 (42 V.S.C. 2000d, et seq.).

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- B. On the basis of sex or blindness, in Title IX of the Education Amendments of 1972 (20 V.S.C. 1681, et seq.)
- C. On the basis of age, in the Age Discrimination Act of 1975 (42 V.S.C. 6101, et seq.), as implemented by the Department of Health and Human Services regulations at 45 CFR part 90.
- D. On the basis of disability, in the Americans with Disabilities Act.

ARTICLE 24: CERTIFICATIONS

The following Certifications, which have been executed by the Recipient prior to award of this agreement, are hereby incorporated by reference:

- A. Certification regarding Debarment, Suspension, and Other Responsibility Matters.
- B. Certification regarding Drug-Free Workplace Requirements.
- C. Certification regarding Lobbying.

ARTICLE 25: LIABILITY

The Agency cannot assume any liability for accidents, illnesses or claims arising out of any work supported by an award or for unauthorized use of patented or copyrighted materials. The grantee institution is advised to take such steps as may be deemed necessary to insure or protect itself, its employees, and its property.

ARTICLE 26: SPONSORSHIP BY AN AGENCY WITHIN THE INTELLIGENCE COMMUNITY

This grant is sponsored by the Central Intelligence Agency, an Agency within the Intelligence Committee. To ensure compliance with Executive Order 12333, dated 4 December 1981, (revised 30 July 08) the individual signing this instrument on behalf of the academic institution is authorized by the institution to contract with an Agency within the Intelligence Community.

ARTICLE 27: PRIOR APPROVALS

As appropriate, prior approval of the following deviations from budget and program plans are required:

- A. The Grantee must consult the Program Manager in Block 15 of the Award/Modification document through the AGO at the Administrative Office in Block 16 or the Grant Procurement Office in Block 6 of the Award/Modification document before deviating from the research objectives defined in the grant proposal or any sub-award, transfer or contracting out of substantive program performance under this award.
- B. Support for the project may not continue without the active direction of the Principal Investigator approved for, and identified in, this Grant. If the approved Principal Investigator severs his or her connection with the Grantee or otherwise relinquishes active direction of the project, either permanently or for a significant length of time (three months or more), the Grantee must either:
 - a. Appoint a replacement Principal Investigator with the approval of the Program Manager in Block 15 through the Grant Procurement Office in Block 6 of the Award/Modification document, or
 - b. Relinquish the Grant, in which case the Grant shall be terminated
 - c. Extension for the expiration period of this Grant – The AGO at the Administrative Office in Block 16 of the Award/Modification document has authority to approve a no-funds extension request meeting all of the following parameters:
 - i. a one-time basis only; and

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- ii. for a period not to exceed 90 days; and
- iii. where \$50,000.00 or less of obligated funds remain to be expended.

In other cases, where a request is outside one or more of the parameters, a no-funds extension can only be approved with the concurrence of the Program Manager in Block 15 of the Award/Modification document. For any no-funds extension to be effective, a written grant modification must be issued and signed by the AGO at the Administrative Office in Block 16 under the circumstances above or the Sponsoring Office in Block 6 of the Award/Modification document.

ARTICLE 28: DATA RIGHTS

- A. All rights and title to data and technical data, as defined in 48 CFR 27.401, generated under this agreement shall vest in the Recipient.
- B. The Recipient hereby grants to the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to use, duplicate, or disclose for governmental purposes any data, technology and inventions, whether patented or not, made or developed under this Agreement.
- C. The Recipient reserves the right to protect by copyright original works developed under this agreement. All such copyrights will be in the name of the Recipient. The Recipient hereby grants the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, for governmental purposes, any copyrighted materials developed under this agreement, and to authorize others to do so.
- D. The Recipient is responsible for affixing appropriate markings indicating the rights of the Government on all data and technical data delivered under the agreement. The Government shall be deemed to have unlimited rights in all data and technical data delivered without markings.

ARTICLE 29: USING TECHNICAL INFORMATION RESOURCES

To the extent practical, the recipient will use the technical information resources of the Defense Technical Information Center (DTIC) and other Government or private facilities to investigate recent and on-going research and avoid needless duplication of scientific and engineering effort.

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Facsimile

Date: Thursday, May 23, 2013
Time: 10:35:27 AM
To: Jill Frankenfield
Fax: 49569

Page: 1 of 7

From: 703
Company:
Phone: 54577
Fax: 000-000-0000

Subject: Fax received from '703'

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FACSIMILE TRANSMITTAL

FROM

FAX #

DATE: *22* May 2013

NO. OF PAGES: (INC.
FAX COVER SHEET) 6

(b)(3)

TO: University of Maryland

FAX #: (301) 314-8569

ORGANIZATION:

ATTN: Jill Frankenfield

TEL#/EXT: (301) 405-4577

COMMENTS:

Ms. Frankenfield,

Attached is Modification 5 to Grant Number 2010*1058114*000. Since we are exercising a priced option your signature is not necessary.

Additionally, Article 13 of the Grant requires submission of quarterly financial reports (FFR 425). We have not been receiving this report. Please immediately submit a report for the period ending 31 March 2013. This reported can be submitted via email to

(b)(3)

If you have any questions, let me know.

Thank you,

(b)(3)

**Only change pages being sent*

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For questions regarding this modification please contact

(b)(3)

Summary of Changes

The purpose of this modification is to exercise a priced option for the period 01 July 2013 through 30 June 2014. Specifically, this modification increases the Grant value and funding and extends the period of performance. As a result, the following changes are made:

1. Change Block 7 "Period of Performance" on Grant cover page from 12 July 2010 through 30 June 2013 by 12 months to 12 July 2010 through 30 June 2014.
2. Change Block 12 "Total Grant Amount" on Grant cover page from \$240,000 by \$119,999 to \$359,999.
3. Change Block 13 "Funds Obligated" and Block 20 "Accounting and Appropriation Data" on Grant cover page to increase funding amount obligated from \$240,000 by \$119,999 to \$359,999.
4. Change Article 1, Scope of the Agreement, to:
 - a. Option Year (01 July 2013 through 30 June 2014) EXERCISED 20 May 2013 versus UNEXERCISED.
5. Change Article 5, Term of Agreement, from 36 months by 12 months to 48 months and the period of performance from 12 July 2010 through 30 June 2013 by 12 months to 12 July 2010 through 30 June 2014.
6. Change Article 7, Fiscal Management, Section 7.2, Obligation to:
 - a. Increase the Government's share for full performance of this award from \$240,000 by \$119,999 to \$359,999. Additionally, the amount allotted and available for payment is increased from \$240,000 by \$119,999 to \$359,999.
7. Change Article 8, Revision to Financial Plans, Section 8, Option to:
 - a. Option Year (01 July 2013 through 30 June 2014) EXERCISED 20 May 2013 versus UNEXERCISED.

All other articles remain unchanged and in full force and effect.

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ASSISTANCE AGREEMENT			
1. Award No. 2010*1058114*000	2. Modification No. 005	3. Effective Date 20 May 2013	4. Page 1 of 15
5. Awarded to University of Maryland		6. Sponsoring Office Office of Integrated Missions	7. Period of Performance 12 July 2010 through 30 June 2014
8. Type of Agreement Grant <input checked="" type="checkbox"/> Cooperative Agreement <input type="checkbox"/> Other <input type="checkbox"/>	9. Authority 31 USC 6304 and 10 USC 2358	10. Purchase Request or Funding Document No. N/A	
11. Remittance Address See Article 4		12. Total Grant Amount Govt. Share: \$359,999 Cost Share: \$0 Total: \$359,999	13. Funds Obligated: This action: \$119,999 Total: \$359,999
14. Principal Investigator Dr. Alan Migdall (301) 975-2331	15. Program Manager <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	16. Administrator <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	
17. Submit Payment Requests to Vendor Payments Attn: Mail Room Address: <div style="border: 1px solid black; display: inline-block; width: 100px; height: 15px;"></div> Washington, DC 20505	18. Paying Office Same as Block 17	19. Submit Reports As Directed by the Technical Point of Contact	
20. Accounting and Appropriation Data Amount Obligated: \$359,999			
21. Research Title and/or Description of Project A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution			
22. For the Recipient		23. For the United States of America	
24. Signature of Person Authorized to Sign		25. Signature of Grants/Agreements Officer	
26. Name and Title	27. Date Signed	28. Name of Officer <div style="border: 1px solid black; height: 20px; width: 100%;"></div> Grants Officer	29. Date Signed 5/20/13

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ARTICLE 1: SCOPE OF THE AGREEMENT

The Recipient shall perform a coordinated research and development program in accordance with the Recipient's technical portion of the proposal entitled "A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution".

First Year (12 July 2010 - 11 July 2011)

Government's Share	\$120,000
Recipients Share (cash or in-kind)	\$ 0
Total First Year Agreement	\$120,000

Second Year (12 July 2011 - 30 June 2013)

Government's Share	\$120,000
Recipients Share (cash or in-kind)	\$ 0
Total Second Year Agreement	\$120,000

Total Government Share of Agreement	\$240,000
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Option Year (01 July 2013 - 30 June 2014) (EXERCISED 20 May 2013)

Government's Share	\$119,999
Recipients Share (cash or in-kind)	\$ 0
Total Option Year Agreement	\$119,999

Grand Total Government Share of Agreement \$359,999

ARTICLE 2: DEFINITIONS

Parties -- For the purposes of this Agreement, the parties are University of Maryland and the United States of America, hereinafter called the Government or the Agency, represented by the Central Intelligence Agency.

Agreement -- The articles of this assistance agreement, Research Terms and Conditions (available at <http://www.nsf.gov/pubs/policydocs/rtr/termsidebyside.pdf>) and its attachments.

Recipient -- An organization or other entity receiving a grant or cooperative agreement. For purposes of this Agreement, the Recipient is University of Maryland.

Performance Year -- Each consecutive twelve-month period from the effective date of this agreement throughout the term of the agreement.

ARTICLE 3: ADMINISTRATIVE REQUIREMENTS

- A. This Agreement will be administered in accordance with, and recipients shall comply with, the Research Terms and Conditions (available at <http://www.nsf.gov/pubs/policydocs/rtr/termsidebyside.pdf>) the requirements of the following OMB Circulars which are incorporated herein by reference:
- OMB Circular A-21 now codified at 2 CFR part 220, "Cost Principles for Educational Institutions"
 - OMB Circular A-110, Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations now codified at 2 CFR part 215
 - OMB Circular A-122, "Cost Principles for Non-Profit Organizations", now codified at 2 CFR part 230
 - OMB Circular A-133, "Audits of State, Local Governments, and Nonprofit Institutions" (27 June 03); (revised 26 June 07) and
 - The Provisions of CIA Broad Agency Announcement No. ICPDP-2010-0001, entitled "2010 Intelligence Community Postdoctoral Research Fellowship Program."

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Recipient's Principal Investigator

P.I. Name: Dr. Alan Migdall
Department: Joint Quantum Institute
Address: National Institute of Standards and Technology
University of Maryland
100 Bureau Dr. MS 8441
Gaithersburg, MD 20899-8441
Phone: (301) 975-2331
Fax: (301) 869-5700
Email: migdall@nist.gov

Recipient's Authorized Organizational Representative

AOR Name: Jill A. Frankenfield
Title: Contract Manager, Office of Research Administration & Advancement
Address: 3112 Lee Building
University of Maryland
College Park, MD 20742-4111
Phone: (301) 405-4577
Fax: (301) 314-9569
Email: jfranken@umd.edu

ARTICLE 5: TERM OF THE AGREEMENT

The project has been approved on scientific/technical merit for 36 months. The period of performance is 12 July 2010 – 30 June 2014.

ARTICLE 6: KEY PERSONNEL

The key personnel listed below must be employed with University of Maryland at the time of award and shall be maintained, to the maximum extent possible, throughout this agreement. Should changes be necessary, University of Maryland shall notify the Agency Grants Office (identified in Block 6 of the face page) in writing of the proposed substitute(s) within 30 days of the change in order to obtain approval of the substitution from the CIA Program Manager.

KEY PERSONNEL:

Principal Investigator: Dr. Alan Migdall
Fellow: Boris Glebov

ARTICLE 7: FISCAL MANAGEMENT**7.1 Restrictions of the Use of Government Funds**

Government funds provided under this Agreement must be allocated by the Recipient exclusively for the execution and operation of the Agreement Scope. Government funds shall not be utilized to support the Recipient's operations or administration unrelated to this Agreement.

7.2. Obligation

In no case shall the Government's financial obligation exceed the amount obligated on this Agreement or by amendment to this Agreement. The Government's share for full performance of this award is \$359,999. Of this amount, \$359,999 is allotted and available for payment. This grant is fully funded. The Government is not obligated

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2010-1058114-000
Modification No.: 005
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- i. Appoint a replacement Principal Investigator/Postdoctoral Fellow with the approval of the Program Manager, or
 - ii. Relinquish the Assistance Agreement, in which case the Agreement shall be terminated.
 - iii. Change the recipient institution's cost share amount reflected in the approved budget
 - iv. Use human subjects or vertebrate animals
 - v. Require no cost extensions exceeding 12 months
- D. Unless otherwise directed by the Grant Officer, any unexpended balance of funds which remains at the end of any funding period, except the final funding period of the grant, shall be carried over to the next funding period, and may be used to defray costs of any funding period of the grant. This includes allowing the carryover of funds to the second and subsequent years of a multiple year grant. This provision also applies to subcontractors performing substantive work under the grant.

E. SPECIAL CONDITIONS: N/A

F. OPTION

The Government may extend the term of this grant by issuing a unilateral modification.

Option Year (01 July 2013 – 30 June 2014) (EXERCISED 20 May 2013)

Government's Share	\$119,999
Recipient's Share (cash or in-kind)	\$ 0
Total Option Year Agreement	\$119,999

ARTICLE 9: INVENTIONS

- A. The clause entitled "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms," (37 CFR 401) is hereby incorporated by reference and the clauses in paragraph 401.14 are modified as follows: replace the word "contractor" with "Recipient"; replace the words "agency," "Federal Agency" and "funding Federal Agency" with "government"; replace the word "contract" with "agreement"; delete paragraphs (g)(2), (g)(3) and the words "to be performed by a small business firm or domestic nonprofit organization" from paragraph (g)(1); paragraph (1), Communications, point of contact on matters relating to this clause will be the CIA Grants Officer
- B. The Recipient shall file Invention (Patent) Reports as of the close of the performance year and at the end of the term for this Agreement. Annual reports are due 60 days after the end of each year of performance and final reports are due 60 days after the expiration of the final performance period. Negative reports are also required. The Recipient shall submit the original and one copy to the Grants Officer.
- C. Final payment cannot be made nor can the agreement be closed out until the recipient delivers to the Government all disclosures of subject inventions required by this agreement, an acceptable final report pursuant to article 12 entitled "Annual and Final Technical Reports," and all confirmatory instruments.
- D. All rights and title to data and technical data, as defined in 48 CFR 27.401, generated under this agreement shall vest in the Recipient.
- E. The Recipient hereby grants to the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to use, duplicate, or disclose for governmental purposes any data, technology and inventions, whether patented or not, made or developed under this Agreement.
- F. The Recipient reserves the right to protect by copyright original works developed under this agreement. All such copyrights will be in the name of the Recipient. The Recipient hereby grants the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to reproduce, prepare derivative works, distribute

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ASSISTANCE AGREEMENT			
1. Award No. 2010*1058114*000	2. Modification No. 006	3. Effective Date 31 March 2014	4. Page 1 of 15
5. Awarded to University of Maryland		6. Sponsoring Office Office of Integrated Missions	7. Period of Performance 12 July 2010 through 30 June 2014
8. Type of Agreement Grant <input checked="" type="checkbox"/> Cooperative Agreement <input type="checkbox"/> Other <input type="checkbox"/>	9. Authority 31 USC 6304 and 10 USC 2358	10. Purchase Request or Funding Document No. N/A	
11. Remittance Address See Article 4	12. Total Grant Amount Govt. Share: \$359,999 Cost Share: \$0 Total: \$359,999	13. Funds Obligated: This action: \$0 Total: \$359,999	
14. Principal Investigator Dr. Alan Migdall (301) 975-2331	15. Program Manager <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	16. Administrator <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	
17. Submit Payment Requests to Vendor Payments Attn: Mail Room Address: <div style="border: 1px solid black; display: inline-block; width: 100px; height: 15px;"></div> Washington, DC 20505	18. Paying Office Same as Block 17	19. Submit Reports As Directed by the Technical Point of Contact	
20. Accounting and Appropriation Data Amount Obligated:			
21. Research Title and/or Description of Project A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution			
22. For the Recipient <div style="border: 1px solid black; height: 20px; width: 100%;"></div>		23. For the United States of America <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	
24. Signature of Person Authorized to Sign		25. <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	
26. Name and Title	27. Date Signed	28. Name of Officer <div style="border: 1px solid black; display: inline-block; width: 100px; height: 15px;"></div> Grants Officer	29. Date Signed 3/31/14

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 2010-1058114-000
 Modification No. 006
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For questions regarding this modification please contact [REDACTED]

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Summary of Changes

The purpose of this modification is to change the Program Manager from [REDACTED] to [REDACTED] and update the grants office and invention reporting address. As a result, the following changes are made:

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1. In Block 15, the Program Manager is changed from [REDACTED]

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The phone number is changed from [REDACTED]

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2. In Article 4, the Central Intelligence Agency Grants Office and Invention Reporting address is updated to:

OIM Contracts
[REDACTED]
Washington DC 20505

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Email address, phone and fax numbers remain the same

3. In Article 4, the Program Manager and contact information is changed as follows(mailing address and fax number remain the same):

	From	To
Program Manager/ Technical Point of Contact	[REDACTED]	
Phone		
Email		

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All other articles remain unchanged and in full force and effect.

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2010-1058114-000
Modification No.: 006
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- e. The Provisions of CIA Broad Agency Announcement No. ICPDP-2010-0001, entitled "2010 Intelligence Community Postdoctoral Research Fellowship Program."

- B. Should there be any inconsistency between the special conditions contained in the Articles of this agreement and the Research Terms and Conditions, the Articles of the agreement shall control. Should there be any inconsistency between the Research Terms and Conditions and any special conditions contained in the CIA Broad Agency Announcement, guides, brochures, etc., cited or included by reference in the agreement, the matter should be referred to the CIA Grants Officer for guidance.

ARTICLE 4: ADMINISTRATIVE RESPONSIBILITIES

Central Intelligence Agency Grants Office

Attn:
Address: OIM Contracts

Washington, DC 20505
Phone:
Fax:
Email:

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Technical Point of Contact

Central Intelligence Agency Program Officer
ATTN:
Address: Washington, DC 20505
Phone:
Fax:
Email:

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Government Payment Office

Invoices shall be submitted using the Internet Payment Platform (IPP). If the Grantee is not registered in IPP, the Grantee shall call the Vendor Service Center on within two weeks of grant award to register. Items needed to facilitate registration include: a valid grant number and the name, phone number, and e-mail address for the Grantee's point of contact. The Grantee may make inquiries regarding invoices to the payment office on

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If the Grantee is unable to submit a payment request in electronic form, or the Agency is unable to receive a payment request in electronic form, the Grantee shall submit the payment request using a method mutually agreed to by the Grantee, the Grants Officer, and the payment office.

Invention Reporting

Grants Office
Address: OIM Contracts

Washington, DC 20505
Phone:
Fax:
Email:

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FACSIMILE TRANSMITTAL

FROM

FAX #

DATE: 31 March 2014

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NO. OF PAGES: (INC.
FAX COVER SHEET) 4

TO: University of Maryland

FAX #: (301) 314-9569

ORGANIZATION:

ATTN: Jill Frankenfield

TEL/EXT: (301) 405-4577

COMMENTS:

Jill,

Attached is unilateral modification 006. Only change pages are being sent and no signature is required.
Please let me know if you have any questions.

Thank you!

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ASSISTANCE AGREEMENT			
1. Award No. 2010*1058114*000	2. Modification No. 007	3. Effective Date 31 March 2014	4. Page 1 of 15
5. Awarded to University of Maryland		6. Sponsoring Office Office of Integrated Missions	7. Period of Performance 12 July 2010 through 31 December 2014
8. Type of Agreement Grant <input checked="" type="checkbox"/> Cooperative Agreement <input type="checkbox"/> Other <input type="checkbox"/>	9. Authority 31 USC 6304 and 10 USC 2358	10. Purchase Request or Funding Document No. N/A	
11. Remittance Address See Article 4		12. Total Grant Amount Govt. Share: \$359,999 Cost Share: \$0 Total: \$359,999	13. Funds Obligated: This action: \$0 Total: \$359,999
14. Principal Investigator Dr. Alan Migdall (301) 975-2331	15. Program Manager <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	16. Administrator <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	
17. Submit Payment Requests to Vendor Payments Attn: Mail Room Address: <div style="border: 1px solid black; display: inline-block; width: 100px; height: 15px;"></div> Washington, DC 20505	18. Paying Office Same as Block 17	19. Submit Reports As Directed by the Technical Point of Contact	
20. Accounting and Appropriation Data Amount Obligated: \$359,999			
21. Research Title and/or Description of Project A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution			
22. For the Recipient <i>Takela M. Bradley</i>		23. For the United States of America <div style="border: 1px solid black; height: 40px; width: 100%;"></div>	
24. Signature of Person Authorized to Sign		25. Signature of Principal Investigator	
26. Name and Title Takela M. Bradley, Contract Manager Office of Research Administration	27. Date Signed 5/16/14	28. Name of Officer <div style="border: 1px solid black; display: inline-block; width: 100px; height: 15px;"></div> Grants Officer	29. Date Signed 5/8/14

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2010-1058114-000
Modification No.: 007
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For questions regarding this modification please contact

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Summary of Changes

The purpose of this modification is to extend the period of performance by 6 months at no additional cost to the Government. As a result, the following changes are made:

1. Change Block 7 "Period of Performance" on Grant cover page from 12 July 2010 through 30 June 2014 by 6 months to 12 July 2010 through 31 December 2014.
2. Change Article 1, Scope of the Agreement, to:
 - a. Option Year (01 July 2013 through 31 December 2014) EXERCISED 20 May 2013.
3. Change Article 5, Term of Agreement, from 48 months by 6 months to 54 months and the period of performance from 12 July 2010 through 30 June 2014 by 6 months to 12 July 2010 through 31 December 2014.
4. Change Article 8, Revision to Financial Plans, Section 8F, Option to:
 - a. Option Year (01 July 2013 through 31 December 2014) EXERCISED 20 May 2013.

All other articles remain unchanged and in full force and effect.

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2010-1058114-000
Modification No.: 007
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ARTICLE 1: SCOPE OF THE AGREEMENT

The Recipient shall perform a coordinated research and development program in accordance with the Recipient's technical portion of the proposal entitled "A High Rate Photon Fock State Generator & Number-Resolving Detector for Super Resolution".

First Year (12 July 2010 – 11 July 2011)

Government's Share	\$120,000
Recipients Share (cash or in-kind)	\$ 0
Total First Year Agreement	\$120,000

Second Year (12 July 2011 – 30 June 2013)

Government's Share	\$120,000
Recipients Share (cash or in-kind)	\$ 0
Total Second Year Agreement	\$120,000

Total Government Share of Agreement	\$240,000
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Option Year (01 July 2013 – 31 December 2014) (EXERCISED 20 May 2013)

Government's Share	\$119,999
Recipients Share (cash or in-kind)	\$ 0
Total Option Year Agreement	\$119,999

Grand Total Government Share of Agreement \$359,999

ARTICLE 2: DEFINITIONS

Parties -- For the purposes of this Agreement, the parties are University of Maryland and the United States of America, hereinafter called the Government or the Agency, represented by the Central Intelligence Agency.

Agreement -- The articles of this assistance agreement, Research Terms and Conditions (available at <http://www.nsf.gov/pubs/policydocs/rtc/termsidebyside.pdf>) and its attachments.

Recipient -- An organization or other entity receiving a grant or cooperative agreement. For purposes of this Agreement, the Recipient is University of Maryland.

Performance Year -- Each consecutive twelve-month period from the effective date of this agreement throughout the term of the agreement.

ARTICLE 3: ADMINISTRATIVE REQUIREMENTS

- A. This Agreement will be administered in accordance with, and recipients shall comply with, the Research Terms and Conditions (available at <http://www.nsf.gov/pubs/policydocs/rtc/termsidebyside.pdf>) the requirements of the following OMB Circulars which are incorporated herein by reference:
- OMB Circular A-21 now codified at 2 CFR part 220, "Cost Principles for Educational Institutions"
 - OMB Circular A-110, Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations now codified at 2 CFR part 215
 - OMB Circular A-122, "Cost Principles for Non-Profit Organizations", now codified at 2 CFR part 230
 - OMB Circular A-133, "Audits of State, Local Governments, and Nonprofit Institutions" (27 June 03); (revised 26 June 07) and

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2010-1058114-000
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Page 5 of 15

Recipient's Principal Investigator

P.I. Name: Dr. Alan Migdall
Department: Joint Quantum Institute
Address: National Institute of Standards and Technology
University of Maryland
100 Bureau Dr, MS 8441
Gaithersburg, MD 20899-8441
Phone: (301) 975-2331
Fax: (301) 869-5700
Email: migdall@nist.gov

Recipient's Authorized Organizational Representative

AOR Name: Jill A. Frankenfield
Title: Contract Manager, Office of Research Administration & Advancement
Address: 3112 Lee Building
University of Maryland
College Park, MD 20742-4111
Phone: (301) 405-4577
Fax: (301) 314-9569
Email: jfranken@umd.edu

ARTICLE 5: TERM OF THE AGREEMENT

The project has been approved on scientific/technical merit for 54 months. The period of performance is 12 July 2010 – 31 December 2014.

ARTICLE 6: KEY PERSONNEL

The key personnel listed below must be employed with University of Maryland at the time of award and shall be maintained, to the maximum extent possible, throughout this agreement. Should changes be necessary, University of Maryland shall notify the Agency Grants Office (identified in Block 6 of the face page) in writing of the proposed substitute(s) within 30 days of the change in order to obtain approval of the substitution from the CIA Program Manager.

KEY PERSONNEL:

Principal Investigator: Dr. Alan Migdall
Fellow: Boris Glebov

ARTICLE 7: FISCAL MANAGEMENT

7.1 Restrictions of the Use of Government Funds

Government funds provided under this Agreement must be allocated by the Recipient exclusively for the execution and operation of the Agreement Scope. Government funds shall not be utilized to support the Recipient's operations or administration unrelated to this Agreement.

7.2. Obligation

In no case shall the Government's financial obligation exceed the amount obligated on this Agreement or by amendment to this Agreement. The Government's share for full performance of this award is \$359,999. Of this amount, \$359,999 is allotted and available for payment. This grant is fully funded. The Government is not obligated

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- i. Appoint a replacement Principal Investigator/Postdoctoral Fellow with the approval of the Program Manager, or
 - ii. Relinquish the Assistance Agreement, in which case the Agreement shall be terminated.
 - iii. Change the recipient institution's cost share amount reflected in the approved budget
 - iv. Use human subjects or vertebrate animals
 - v. Require no cost extensions exceeding 12 months
- D. Unless otherwise directed by the Grant Officer, any unexpended balance of funds which remains at the end of any funding period, except the final funding period of the grant, shall be carried over to the next funding period, and may be used to defray costs of any funding period of the grant. This includes allowing the carryover of funds to the second and subsequent years of a multiple year grant. This provision also applies to subcontractors performing substantive work under the grant.

E. SPECIAL CONDITIONS: N/A

F. OPTION

The Government may extend the term of this grant by issuing a unilateral modification.

Option Year (01 July 2013 – 31 December 2014) (EXERCISED 20 May 2013)

Government's Share	\$119,999
Recipients Share (cash or in-kind)	\$ 0
Total Option Year Agreement	\$119,999

ARTICLE 9: INVENTIONS

- A. The clause entitled "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms," (37 CFR 401) is hereby incorporated by reference and the clauses in paragraph 401.14 are modified as follows: replace the word "contractor" with "Recipient"; replace the words "agency," "Federal Agency" and "funding Federal Agency" with "government"; replace the word "contract" with "agreement"; delete paragraphs (g)(2), (g)(3) and the words "to be performed by a small business firm or domestic nonprofit organization" from paragraph (g)(1); paragraph (1), Communications, point of contact on matters relating to this clause will be the CIA Grants Officer
- B. The Recipient shall file Invention (Patent) Reports as of the close of the performance year and at the end of the term for this Agreement. Annual reports are due 60 days after the end of each year of performance and final reports are due 60 days after the expiration of the final performance period. Negative reports are also required. The Recipient shall submit the original and one copy to the Grants Officer.
- C. Final payment cannot be made nor can the agreement be closed out until the recipient delivers to the Government all disclosures of subject inventions required by this agreement, an acceptable final report pursuant to article 12 entitled "Annual and Final Technical Reports," and all confirmatory instruments.
- D. All rights and title to data and technical data, as defined in 48 CFR 27.401, generated under this agreement shall vest in the Recipient.
- E. The Recipient hereby grants to the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to use, duplicate, or disclose for governmental purposes any data, technology and inventions, whether patented or not, made or developed under this Agreement.
- F. The Recipient reserves the right to protect by copyright original works developed under this agreement. All such copyrights will be in the name of the Recipient. The Recipient hereby grants the U.S. Government a non-exclusive, non-transferable, royalty-free, fully paid-up license to reproduce, prepare derivative works, distribute

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UNCLASSIFIED**FACSIMILE TRANSMITTAL****FROM:****DATE:** 8 may 2014

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**NO. OF PAGES: (INC.
FAX COVER SHEET) 6****FAX #****TO:** University of Maryland**FAX #:** (301) 314-9569**ORGANIZATION:****ATTN:** Jill Frankenfield**TEL#/EXT:** (301) 405-4577**COMMENTS:**

Ms. Frankenfield,

Attached is Modification 7 to Grant Number 2010*1058114*000. Please sign the cover page and return it to me at

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If you have any questions, let me know.

Thank you,

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Highrate

A photon counting detector that can count the number of photons in a single optical pulse opens up a number of measurements that are not possible without that capability. The transition edge superconducting microbolometer (TES) is now offering such capability and doing so with very high (95%) detection efficiency. We will use this detector for measurement beyond the conventional optical limits. One scheme using the TES's capability along with a coherent source will push image resolution beyond the usual Rayleigh limit. Another scheme uses the TES's number resolving capability along with a photon pair source to create high photon number Fock states which can be use for additional resolution enhancement where the resolution can scale like λ/N where λ is the wavelength of light and N is the number of photons in the state.

To make the high photon number Fock states, we use the number resolving capability of the TES along with the basis of many heralded single photon sources to produce N-photon sources. That will be done using a typical pair source such as produced by parametric down conversion and instead of heralding at low rates on the occasional single photon, we will herald on N-photon events that the TES can detect. This will be the basis of a high rate N-photon source for the enhanced resolution measurements.