

BASOV, H.G.; STRAKHOVSKIY, G.M.; NIKITIN, A.I.; NIKITINA, T.F.; TATARENKOV, V.M.;  
USFENSKIY, A.V.

Laser operating on a beam of hydrogen atoms. Radiotekh. i elektron.  
10 no.10:1809-1813 0 '65. (MIRA 18:10)

BASOV, N.G.; GRASYUK, A.Z.; ZUBAREV, I.G.

Sensitivity of a laser operating on neodymium glass. Zhur. prikl.  
spekt. 3 no.1:26-31 J1 '65. (MIRA 18:9)

L 9461-66 FED/EWT(1)/EEC(k)-2/I/EWP(k)/EWA(m)-2/EWA(h) SCTB/LJP(c) WG  
ACC NR: AP5027406 SOURCE CODE: UR/0181/65/007/011/3289/3293

AUTHOR: Basov, N. G.<sup>44</sup> Bogdankevich, O. V.<sup>44</sup> Popov, Yu. M.<sup>44</sup>

57  
B

ORG: Physics Institute im. P. N. Lebedev, AN SSSR (Fizicheskiy institut AN SSSR)

TITLE: Generation of short-wavelength radiation and lifetimes with respect to spontaneous emission in semiconductors

SOURCE: Fizika tverdogo tela, v. 7, no. 11, 1965, 3289-3293

TOPIC TAGS: semiconductor, semiconductor laser, electron beam laser

ABSTRACT: The possibility of fabricating <sup>25, 44</sup>electron-beam-pumped semiconductor lasers generating in the ultraviolet spectral range is discussed. The analysis is limited to direct interband transitions and does not include the case when carriers must be treated as polarons. It is shown that the lifetime of excess carriers with respect to interband transitions accompanied by emission of a photon is inversely proportional to the energy width of the forbidden gap. The lifetime of radiationless transitions is thus neglected in the analysis. Expressions are derived for the minimal pump power and the optimal duration of the excitation pulse. It is suggested that high-purity ZnS, aluminum and boron phosphides, corundum, and other wide-gap semiconductors should be tested for laser action in the ultraviolet by means of electron beam excitation. Orig. art. has: 11 formulas. [CS]

SUB CODE: 20/ Cord 1/1 (u) SUBM DATE: 28May65/ ORIG REF: 008/ OTH REF: 005/ ATD PRESS: 4/22

I 4964-66 EWA(k)/FBD/EWT(l)/EWT(m)/EEC(k)-2/T/EWP(t)/EWP(k)/EWP(b)/EWA(m)-2/EWA(h)

ACC NR: AP5027449 SOURCE CODE: UR/0181/65/007/011/3460/3461

SCTB/IJP(c) WG/JD/JG 44  
AUTHOR: Basov, N. G.; Zakharov, Yu. P.; Nikitin, V. V.; Sheronov, A. A. 44

ORG: Physics Institute in P. N. Lebedev, AN SSSR, Moscow. (Fizicheskiy institut AN SSSR) 44

TITLE: Interaction between optically coupled GaAs diode lasers 44 54 B

SOURCE: Fizika tverdogo tela, v. 7, no. 11, 1965, 3460-3461

TOPIC TAGS: solid state laser, 25, 44 gallium arsenide 27 laser, laser coupling, laser synchronization, laser beam, beam quenching 21

ABSTRACT: Two systems of optical coupling between p-n GaAs diode lasers—"longitudinal," in which laser beams coincide, and "transverse," in which they are perpendicular to each other—were investigated. In both cases, the diodes were prepared in the form of Fabry-Perot resonators and set up on the same substrate from 5 to 100 μ apart. The effectiveness of beam quenching for the transversely coupled lasers was 12. The wavelength of the quenching laser emission was greater than that of the quenched and the beam entered the quenched laser laterally. Beam quenching in the longitudinally coupled system was observed only when the wavelength of the quenching emission was greater than that of the quenched. Similar effects were observed elsewhere.

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I 4964-66

ACC NR: AP5027449

(A. Fowler, J. Appl. Phys., 35, 2275, 1964; J. Appl. Phys. Lett., 3, 1, 1963). The low effectiveness of quenching in both cases was attributed to the difficulties experienced in accurately setting up both diodes on the same substrate. Improved (~20%) beam quenching was achieved by means of special diodes, each with two resonators, described elsewhere by the authors (FTT, 7, 3128, 1965). The quenching affect is potentially applicable in computer technology (high-speed optical keying).  
Orig. art. has: 1 figure.

[YK]

SUB CODE: EC/ SUBM DATE: 15Jun65/ ORIG REF: 001/ OTH REF: 003

ATD PRESS: 4131

Card *mlr*  
2/2

L 9460-66 FBD/EWT(1)/EWP(e)/EWT(m)/EEC(k)-2/T/EWP(t)/EWP(k)/EWP(b)/EWA(m)-2/EWA(h)  
ACC NR: AP6000868 SCTB/LJP(c) WG/JD SOURCE CODE: UR/0181/65/007/012/3639/3640

AUTHOR: Basov, N. G.; Grasyuk, A. Z.; Zubarev, I. G.; Katulin, V. A. 74

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy  
institut Akademii nauk SSSR) 44 44 44 15 6

TITLE: Laser action in CdS due to optical excitation by radiation from a ruby laser 44 15

SOURCE: Fizika tverdogo tela, v. 7, no. 12, 1965, 3639-3640 2, 44 44 15

TOPIC TAGS: laser, semiconductor laser, ruby laser, nonlinear optics, two photon absorption

ABSTRACT: Laser action is reported in CdS excited by a ruby laser at 77K. Since the energy of photons of incident radiation ( $\lambda = 1.78 \mu$ ) is smaller than the width of the forbidden gap (2.5 eV), two-photon absorption was responsible for laser action. A  $5 \times 3 \times 3$  mm sample forming a Fabry-Perot cavity was excited by radiation from a 1-J ruby laser (pulse duration  $\sim 50$  nsec). The emission spectrum from CdS at various pump densities (see Fig. 1) is similar to that of electron-beam-pumped CdS. The broadening of the oscillation line with higher pump power was attributed to an increase in the number of modes; however, a resolving power of  $1 \text{ \AA}$  did not make it pos-

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ACC NR: AP6000868

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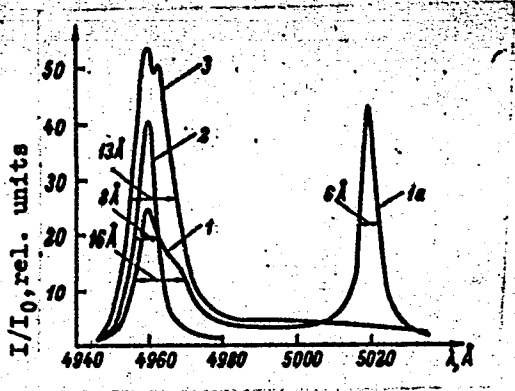


Fig. 1. The emission spectrum of CdS excited by a ruby laser. The pump power density: 1 and 1a - 60; 2 - 80; 3 - 600 Mw/cm<sup>2</sup>. The vertical scale is different for different curves.

sible to observe the different modes. At 100 Mw/cm<sup>2</sup> emission occurred throughout the thickness of the crystal. Orig. art. has: 1 figure and 1 table. [CS]

SUB CODE: 20 SUBM DATE: 15May65/ ORIG REF: 004/ ATD PRESS: 4156

Card 2/201

BASOV, N.G.; MOROZOV, V.N.; GRAYEVSKIY, A.N.

Nonlinear interaction of various kinds of oscillations in a laser.  
Zhur. eksp. i teor. fiz. 49 no.3:895-904 S '65. (MIRA 18:10)

1. Fizicheskiy institut imeni Lebedeva AN SSSR.



BASOV, N.G.; LETOKHOV, V.S.

Propagation of a light pulse in a medium with inverse population.  
Opt. i spektr. 18 no.6:1042-1046 Je '65.

(MIRA 18:12)

L 10396-66 EWT(1)/EEC(k)-2/EPF(n)-2/EWA(h) WW/AT

ACC NR: AP5026900

SOURCE CODE: UR/0109/65/010/010/1809/1813

AUTHOR: <sup>44,55</sup> ~~Basov, N. G.~~; <sup>44,55</sup> ~~Strakhovskiy, G. M.~~; <sup>44,55</sup> ~~Nikitin, A. I.~~; <sup>44,55</sup> ~~Nikitina, T. F.~~;   
 <sup>44,55</sup> ~~Tatarenkov, V. M.~~; <sup>44,55</sup> ~~Uspenskiy, A. V.~~

ORG: <sup>44,55</sup> Institute of Physics, AN SSSR (Fizicheskiy institut AN SSSR)

TITLE: <sup>25</sup> Quantum generator with hydrogen-atom beam

SOURCE: Radiotekhnika i elektronika, v. 10, no. 10, 1965, 1809-1813

TOPIC TAGS: quantum generator, atomic hydrogen quantum generator

ABSTRACT: Construction of two <sup>21,44,55</sup> atomic-hydrogen quantum generators (QG) designed after H. M. Goldenberg, D. Kleppner, and N. F. Ramsay (Phys. Rev. Let., 1960, 5, 8, 361; and Phys. Rev., 1962, 126, 2, 603) is reported. Atomic hydrogen from gas-discharge source 1 passes ( $10^{11}$  -  $10^{12}$  particles per sec) through diaphragm 2 and is focused by magnet 3. The sectionalized vacuum

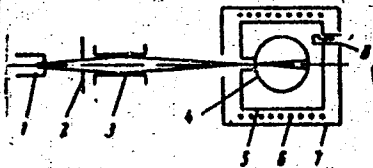
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ACC NR: AP5026900



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system uses ordinary N5SM pumps in the first sections and an ion-sorption titanium pump in the last section to achieve a vacuum of  $10^{-7}$  torr. Other parts of QG are: 4 - quartz teflon-lined bulb;

5 - resonator; 6 - solenoid for building an axial magnetic field; 7 - magnetic shield; 8 - coupling loop. A 0.01-0.02-sec pumping pulse, at a frequency corresponding to  $\lambda = 21$  cm transition, produced a post-radiation for 0.2-0.5 sec. The total estimated and measured relaxation constant was about 2 per sec, which corresponds to a lifetime of 0.5 sec. Data on frequency stability and shift is also given. "The authors wish to thank A. M. Prokhorov and A. N. Orayevskiy for discussing the results and valuable advice; and L. P. Yelkina, G. A. Yelkin, A. N. Ponomarev, A. A. Ul'yanov, L. M. Zak, N. A. Begun, and O. S. Lysoyev for their assistance in the project." Orig. 44.5

art. has: 5 figures and 6 formulas. 4.53-

SUB CODE: 20 / SUBM DATE: 10Jul64 / ORIG REF: 000 / OTH REF: 004

jw

Card 2/2

BASOV, N.G.; ZAKHAROV, Yu.P.; NIKITIN, V.V.; SHERONOV, A.A.

Laser on a GaAs p - n-junction with nonuniform distribution  
of the injection current. Fiz. tver. tela 7 no.10:3128-3130  
0 '65. (MIRA 18:11)

1. Fizicheskiy institut imeni Lebedeva AN SSSR, Moskva.

BASOV, S.G.; GRAGYUK, A.S.; ZUBAREV, T.G.; FATULIN, V.S.

Generation in QES in two-photon optical excitation by radiation  
from a ruby laser. Fiz. tver. tela 7 no. 12:3639-3643 1965  
(NIRA 1981)

1. Fizicheskiy institut imeni Lefebeva AN SSSR, Moskva.

BASOV, N.G.; GRASYUK, A.Z.; ZUBAREV, I.G.; KATULIN, V.A.

Generation in GaAs in the case of two-photon optical excitation by radiation from a laser operating on neodymium glass. Pis'. v red. Zhur. eksper. i teoret. fiz. 1 no.4:29-33 My '65. (MIRA 18:11)

1. Fizicheskiy institut imeni Lebedeva AN SSSR. Submitted April 16, 1965.

L 23390-66 EEC(k)-2/EWA(h)/EWP(k)/EWT(1)/FBD/T IJP(c) WJ

ACC NR: AT6009312 SOURCE CODE: UR/2504/65/031/000/0074/0095

AUTHORS: Basov, N. G.; Grasyuk, A. Z.; Zubarev, I. G.;  
Tevelev, L. V.

63  
B+1

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences,  
SSSR (Fizicheskii institut Akademii nauk SSSR)

TITLE: Regenerative optic quantum amplifiers

25

SOURCE: AN SSSR. Fizicheskii institut. Trudy, v. 31, 1965.  
Kvantovaya radiofizika (Quantum radio physics), 74-95

TOPIC TAGS: laser application, image amplification, molecular  
amplifier, ruby laser, amplifier design, quantum electronics, electronic  
amplifier, coherent light, light emission

ABSTRACT: An optical quantum amplifier is defined as a device in which  
coherent light emission is amplified by using the laser principle,  
and the authors deal with the properties of regenerative optic  
quantum amplifiers and ways of their practical utilization. The  
article is devoted to the fundamental theoretical relations necessary

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ACC NR: AT6009312

to estimate the property of such amplifiers, and to results of experimental investigations of certain amplifier schemes and their main characteristics. Theoretical relations are obtained for the gain and bandwidth of regenerative amplifiers operating in one mode, and for the sensitivity of the regenerative amplifier (with and without account of mode spectrum in the resonator). In addition, the authors report an experimental investigation of a regenerative optical quantum amplifier, using a Q-switched ruby laser, the amplifier itself being operated with and without Q switching. Several models of the amplifier were tested for gain, bandwidth, and for operation as an image intensifier. Orig. art. has: 12 figures and 38 formulas.

SUB CODE: 20/ ORIG REF: 021/ OTH REF: 017 / SUBM DATE: none/

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~~REF ID: A665138~~ REG(K)-2/EWA(h)/BWP(K)/EWT(1)/FBD/T IJP(c) WU

ACC NR: AT6009314

SOURCE CODE: UR/2504/65/031/000/0113/0138

AUTHORS: Basov, N. G.; Belenov, E. M.; Markin, Ye. P.;  
Nikitin, V. V.; Orayevskiy, A. N.

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49  
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ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR  
(Fizicheskii institut Akademii nauk SSSR)

TITLE: Investigation of a gas-mixture laser 25, 44

SOURCE: AN SSSR. Fizicheskii institut. Trudy, v. 31, 1965.  
Kvantovaya radiofizika (Quantum radio physics), 113-138

TOPIC TAGS: gas laser, laser r and d, laser beam, laser modulation

ABSTRACT: The purpose of this combined theoretical and experimental investigation was to assess the possibility of increasing the power of different gas lasers by choosing optimal operating conditions (pressure of mixture, partial pressures of the individual components, pump power, mirror transmission coefficient, diameter and length of discharges). The divergence of the beam and the spectrum of the generated radiation as functions of the outward power of the genera-

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ACC NR: AT6009314

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tor are also investigated. Using a neon helium mixture and a special laser design, the authors obtained a power of 100 MW at  $1.15 \mu$  with an optimal tube radius of 8 mm and length 3 meters. The angular modulation characteristics were measured as a function of the output power. Reduction of the beam divergence by filtering out certain modes is discussed. Rotating-laser apparatus constructed for the measurement of the laser emission spectrum (a modification of the Sagnac experiment) is described. The results show that the output power of the laser can be increased by adding a buffer gas to intensify the decay of the metastable neon, by increasing the temperature of the working gas, by using pulsed excitation to populate the upper working level, by increasing the resonator length and the length of the discharge tube, and by decreasing the transverse dimensions of the discharge tube. The authors thank Yu. P. Trokhin, V. N. Lukanin, B. I. Prokopov, B. I. Belov, F. S. Titov, and A. F. Suchkov for a discussion of the results and help with the calculations. Orig. art. has: 16 figures and 13 formulas.

SUB CODE: 20/ ORIG REF: 022/ OTH REF: 020/ SUBM DATE: none

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L 23392-66 EWA(h)/EEG(k)-2/EWT(l)/EWT(m)/EWP(k)/FBD/T/EWP(t) IJP(c) WG/JD  
ACC NR: AT6009315 SOURCE CODE: UR/2504/65/031/000/0139/0177

AUTHORS: Basov, N. G.; Strakhovskiy, G. M.; Nikitin, A. I.; Nikitina, T. F.; Tatarenkov, V. M.; Uspenskiy, A. V.

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76  
341

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences, SSSR  
(Fizicheskiy institut Akademii nauk SSSR)

TITLE: Problems of construction and investigation of the operation of a hydrogen-atom-beam maser

SOURCE: AN SSSR. Fizicheskiy institut. Trudy, v. 31, 1965.  
Kvantovaya radiofizika (Quantum radio physics), 139-177

TOPIC TAGS: maser theory, gaseous state maser, hydrogen, maser, quantum generator, excited state, stimulated emission

ABSTRACT: The authors review the hitherto published work on the theory and construction of hydrogen-beam maser and discuss the construction, choice of optimal parameters, and preliminary operating results of a maser using the transition ( $F = 1, m_F = 0$ ) -- ( $F = 0, m_F = 0$ )

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ACC NR: AT6009315

$m_F = 0$ ) at 1420.405 Mcs. Two installations of different construction are described. The operation of the maser in the underexcited mode is investigated. A procedure for determining the lifetimes of the excited atoms in the storage bulb are described. The apparatus was operated with an axial resonator magnetic field of 100 -- 300 mOe. The dependence of the amplitude and frequency of generation on the various parameters was investigated and it was found that the greatest contribution to the maser instability is due to the instability of the supplementary magnetic field and the detuning of the resonator as a result of thermal expansion. Methods of overcoming these difficulties are discussed. The section headings are: Introduction. I. Construction and adjustment of hydrogen-beam maser. 1. Operating principle of hydrogen-beam maser. 2. Vacuum system. 3. Atomic-beam sources. 4. State sorting and atomic-beam focusing. 5. Detection of hydrogen-atom beam. Methods of adjusting the apparatus. 6. Bulb for accumulation of atomic hydrogen. 7. Cavity resonator. 8. Radiation receiver for 1420 Mcs frequency. II. Investigation of operation of hydrogen-beam maser (preliminary results). 1. Investigation of stimulated emission of atomic hydrogen at 1420.4 Mcs.

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2. Characteristics of hydrogen-beam maser. Conclusions. The authors thank A. M. Prokhorov and A. N. Oraevskiy for a discussion of the results and valuable advice, and L. P. Yelkina, G. A. Yelkin, A. N. Ponomarev, A. A. Ul'yanov, L. M. Zak, N. A. Begun, and O. S. Lysogorov for help with the work. Orig. art. has: 28 figures and 69 formulas.

SUB CODE: 20/ ORIG REF: 021/ OTH REF: 034 / SUBM DATE: none

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L 20515-66 FBD/EWT(1)/EEG(k)-2/T/EAP(k)/EWA(h) IJP(c) WG

ACC NR: AP6012069

SOURCE CODE: UR/0053/65/085/004/0585/0598

AUTHOR: Basov, N. G.

ORG: none

TITLE: Semiconductor lasers 25

SOURCE: Uspekhi fizicheskikh nauk, v. 85, no. 4, 1965, 585-598

TOPIC TAGS: semiconductor laser, resonance absorption, electron hole, semiconductor device, optic pumping

ABSTRACT: After an introduction which describes the differences in the theoretical and experimental approaches to physics and their interrelations in such areas as the creation of quantum generators (lasers), the author presents a popular-level discussion of the operating principles of a semiconductor laser, including the three following processes: resonance absorption of light by the semiconductor, resulting in the formation of electron-hole pairs; induction radiation of light as it falls on the semiconductor; and spontaneous radiation upon recombination of electron-hole pairs. Semiconductors are reported to be suitable for radiation of coherent energy from the far infrared to the ultraviolet areas of the spectrum. Conditions for obtaining minus temperatures, in which all the levels in the kT conductivity zone are occupied by electrons but holes exist in the valent zone so that the semiconductor can radiate but cannot absorb light, are described for direct and indirect transitions. Methods for producing negative temperatures include optical pumping, excitation of the semiconductor by rapid electrons, and injection of electrons and holes across the p-n junction. A table of the various types of semiconductor lasers

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ACC NR: AP6012069

described in the literature cited is presented, showing the material, wavelength of radiation and excitation method. Very high efficiencies (70-80%) and amplification coefficients (2000) are claimed for semiconductor quantum generators. 30 bibliographic references are presented. Orig. art. has: 15 figures and 1 table. [JPRS]

SUB CODE: 20 / SUM DATE: none / ORIG REF: 014 / OTH REF: 024

Card 2/2 *LAC*

L 20707-66

FBD/EWT(1)/EBC(k)-2/T/EWP(k)/EWA(h) IJP(e) WG

ACC NR: AP6011996

SOURCE CODE: UR/0020/65/161/004/0799/0801

AUTHOR: Basov, N. G. (Corresponding member AN SSSR); Belenov, E. M.; Letokhov, V. S.

ORG: Physics Institut im P. N. Lebedev, AN SSSR (Fizicheskiy Institut AN SSSR)

TITLE: Limiting cross-section of a laser beam

SOURCE: AN SSSR. Doklady, v. 161, no. 4, 1965, 799-801

TOPIC TAGS: laser beam, laser theory

ABSTRACT: In principle, beam cross-sections of continuously-operating lasers having large resonators can be limited owing to the delayed interaction of remote parts of the laser or mismatching of the natural frequencies of the various parts of the resonator. In Q-modulated pulse lasers the beam cross-section is limited because the pulse generation time is of the order of time required for the resonator oscillations to become established. Beams of both types of laser are considered. In the first case the problem is treated by splitting the laser into two coupled "sublasers" and then analyzing the interaction. In the second case, generation can occur in one of two modes: a) development of individual incoherent "streams", and b) confluence of adjacent "streams" with coherence becoming established due to diffraction field exchange. Under the given conditions the maximum cross-section of generation in case 1 is about 5 cm; in case 2 it is 6 and 4 mm respectively for the two modes. The authors thank V. N. Morozov for a series of useful discussions. Orig. art. has: 8 formulas. [JPRS]

SUB CODE: 20 / SUBM DATE: 24Nov64 / ORIG REF: 004 / OTH REF: 001

Card 1/1 BK



L 21583-66 FBD/EWT(1)/EEG(k)-2/T/EWP(k)/EWA(h) IJP(c) WG  
ACC NR: AP0008754 SOURCE CODE: UR/0386/66/003/006/0261/0264

AUTHOR: Ambartsumyan, R. V.; Basov, N. G.; Kryukov, P. G.; Letokhov, V. S. 42

ORG: Physics Institute in P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR) B

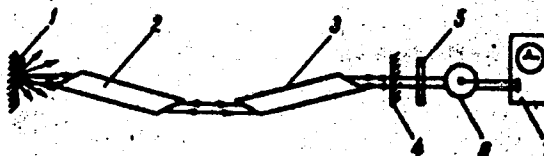
TITLE: Laser with nonresonant feedback

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 3, no. 6, 1966, 261-264

TOPIC TAGS: laser r and d, ruby laser, laser beam, light scattering, laser optics

ABSTRACT: The authors report achievement of laser action with nonresonant feedback, produced by back-scattering from a volume or a surface, which behaves like a "stochastic" resonator with a continuous natural-frequency spectrum. The lasing frequency does not depend on the length of the resonator, but is determined by the resonant frequency of the active medium. In this laser (Fig. 1) the active medium comprised two

Fig. 1. Diagram of experiment. 1 - Scatterer, 2,3 - ruby crystal, 4 - mirror, 5 - filter, 6 - photocell, 7 - oscilloscope.



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ACC NR: AP6008754

ruby crystals in series, each 24 cm long and 1.8 cm in diameter. The feedback was produced with the aid of a mirror (reflection 99%) and a volume scatterer (suspension of chalk particles in water) or surface scatterer (plate with a layer of sputtered MgO). The light was recorded with a photocell and oscilloscope, and its spectrum was measured with a Fabry-Perot interferometer. The gain of a weak signal in one passage through the two crystals reached 900. The condition of self excitation of the laser is described. The lasing threshold is found to be practically independent of the angle of inclination of the scatterer, over a wide range, but increases with increasing distance between the scatterer and the crystal. The radiation line width was smaller than  $0.015 \text{ cm}^{-1}$  and was determined by the resolution of the interferometer (the spontaneous emission line width of ruby is  $15 \text{ cm}^{-1}$ ). An investigation of the beat radiation spectrum has shown that there are no frequencies characteristic of lasers with resonant feedback. The angle spread of the beam was proportional to the ratio of the crystal diameter to the average distance between the mirror and the scatterer. The distribution of the radiation field in the far zone was quite homogeneous. A pulse with duration 200 nsec was obtained in the case of Q-switching of the stochastic resonator. The average frequency of the generated radiation in the laser with nonresonant feedback was determined by the position of the center of the atomic transition, and not by the resonance of the feedback. It is consequently possible to produce an optical frequency standard on the basis of a laser with nonresonant feedback, using high-gain atomic transitions in a gas discharge (Ne, Xe, etc.) operating in the continuous mode, and also scatterers with narrow back-scattering directivity pattern.

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ACC NR: AF6008754

It is noted that generation with feedback due to scattering by inhomogeneities of the crystal and by the matte side surface of the crystal can limit the maximum gain.  
Orig. art. has: 2 figures.

[02]

SUB CODE: 20/    SUBM DATE: 09Feb66/    ORIG REF: 002/    OTH REF: 003/    ATD PRESS:

4219

Card 3/3 ULR

L 22478-66 FBD/EWT(1)/EWT(m)/EEC(k)-2/T/EWP(t)/EWP(k)/EWA(h) IJP(c) WG/JD

ACC NR: AP6003754

SOURCE CODE: UR/0181/66/008/001/0021/0023

AUTHOR: Basov, N. G.

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ORG: Physics Institute im. P. N. Lebedev AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: Laser operating on gallium arsenide with excitation by means of fast electrons 25 27 27

SOURCE: Fizika tverdogo tela, v. 8, no. 1, 1966, 21-23

TOPIC TAGS: laser, solid state laser, semiconductor laser, laser emission

ABSTRACT: A description is given of a laser excited by a beam of fast electrons. The carrier concentration was  $10^{15} - 10^{16} \text{ cm}^{-3}$  and a mobility  $6 \times 10^3 \text{ cm}^2 \cdot \text{v}^{-1} \cdot \text{sec}^{-1}$  at  $T = 300 \text{ K}$ . The pulse duration of the electron beam was  $2 \mu\text{sec}$ , the repetition frequency was 50 cps, and the electron energies were 50 or 200 keV. The GaAs specimens had the form of a rectangular parallelepiped. The emission spectrum of all investigated specimens was practically the same. The dependence of emission intensity on the current density of the electron beam varied from specimen to specimen within a small range and depended on the quality of the resonator. The

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ACC NR: AP6003754

observation of emission in the near zone showed that the luminous region spread to a depth of not more than  $10\mu$  in the crystal from the bombarded surface (vertical direction) and  $150 - 200\mu$  in the horizontal direction. The observation of emission in the far zone showed the divergence angle to be  $15^\circ$  in the horizontal direction (i. e., in the plane bombarded with electrons) and  $\sim 20^\circ$  in the vertical direction. The efficiency of the laser, evaluated by measuring the power in the solid angle  $5.5 \times 10^{-4}$  sterad, gave a value of not less than 4—5%. The efficiency was defined as the ratio of the radiation power emitting from both faces of the optical resonator in the aforementioned divergence angle and the power of the electron beam penetrating through the region of the crystal participating in the generation (the cross section of this region in this case had an area of  $0.48 \times 0.2$  mm).  
Orig art. has: 1 formula and 2 figures. [JA]

SUB CODE: 20/ SUBM DATE: 19Jun65/ ORIG REF: 003/ OTH REF: 004

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21412-66 EWP(e)/EWT(m)/ETC(f)/EWG(m)/EWP(t) ITP(c) ID/JG/AT/WH  
ACC NR: AP6009664 SOURCE CODE: UR/0181/66/008/003/0802/0804

AUTHOR: Basov, N. G.; Bogdankevich, O. V.; Devyatkov, A. G.

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: Recombination radiation of  $\alpha$ -SiC excited by electrons

SOURCE: Fizika tverdogo tela, v. 8, no. 3, 1966, 802-804

TOPIC TAGS: silicon carbide, recombination radiation, semiconductor

ABSTRACT: The recombination radiation of 1 x 2 x 3 mm samples of  $\alpha$ -SiC with polished sides excited by a beam of 200-keV electrons was investigated at a temperature of 60K. The electron beam was either perpendicular to the large face of the sample or at a 45° angle to it. The beam's penetration depth was determined to be ~120  $\mu$ . The emission spectra of three of the samples are shown in Fig. 1. A detailed spectrum observed in the region between 4700-4850 Å is shown in Fig. 2. The energy difference between the lines in the 4700-4850 Å region, indicating some kind of

Card 1/4

L: 21412-66

ACC NR: AP6009664

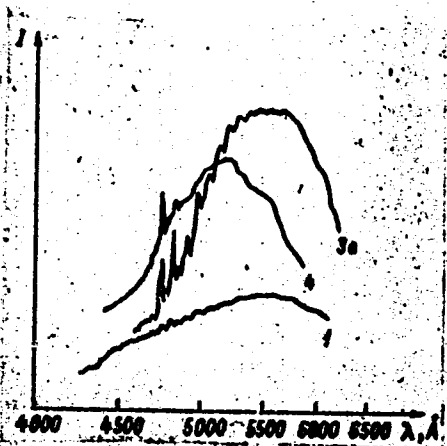
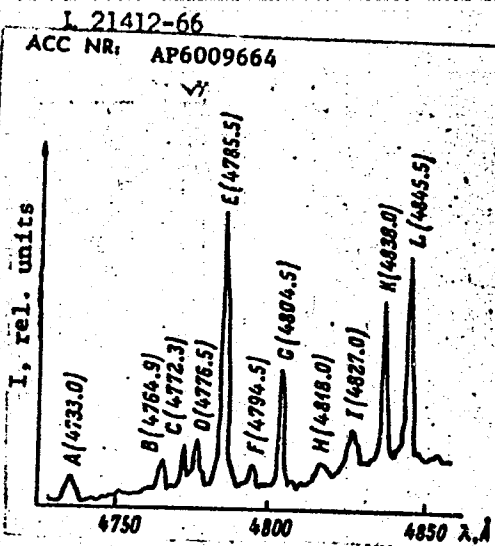


Fig. 1. Emission spectra of  $\alpha$ -SiC at 60K and at a current density  $j = 140 \text{ ma/cm}^2$ .

The numbers indicate samples: 1 - bluish-greenish industrial-type crystal; 3a - colorless compensated p-type crystal doped with about  $10^{17}$  impurity atoms per  $\text{cm}^3$ ; 4 - purest sample with an impurity concentration of  $7 \times 10^{16}/\text{cm}^2$ .

Card 2/4



D-F	0.0049	F-I	0.0174
E-F	0.0049	G-K	0.0178
H-I	0.0048	A-G	0.0390
A-B	0.0175	B-K	0.0393
C-G	0.0174	C-L	0.0392
E-H	0.0175		

Table 1. Energy difference between emission lines (ev)

Fig. 2. The emission spectrum of sample No. 4 in the spectral region 4700-4850 Å. (T = 60K, j = 140 ma/cm<sup>2</sup>)

Card 3/4



L 21412-66

ACC NR: AP6009664

connection between the lines, is tabulated in Table 1. No stimulated emission was observed in the experiments. Orig. art. has: 3 figures and 1 table. [CS]

SUB CODE: 20/ SUBM DATE: 26Jul65/ ORIG REF: 003/ OTH REF: 003/ ATD PRESS: 4221

Cord 4/4 UUR

L 21005-66 ERC(k)-2/EWA(h)/EAT(1)/FED/T/EMP(k) TJP(e) WG

ACCESSION NR: AP5024711

UR/0056/65/049/003/0895/0904

AUTHOR: Basov, N. G.; Morozov, V. N.; Orayevskiy, A. N.

15  
B

TITLE: Nonlinear mode interaction in a laser 25/44

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 3, 1965, 895-904

TOPIC TAGS: laser, stimulated emission, nonlinear optics, oscillation mode

ABSTRACT: A theoretical analysis is conducted of the operation of a two-mode solid state laser. It is shown that the mode interaction can be described by a set of rate equations and that the steady-state regime is stable. The solution of the system of equations depends on the frequency difference of the modes. The two possible cases, nearly biharmonic and nearly harmonic oscillations, are analyzed. In the case of close modes the steady-state regime may be unstable, resulting in the appearance of undamped spiking. The laser operating regime is shown to depend on the shape and position of the mirrors and the quality of the crystal. Orig. art. has: 17 formulas and 1 figure.

[CS]

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute, Academy of Sciences, SSSR)

Card 1/1

L 21005-66

ACCESSION NR: AP5024711

SUBMITTED: 03Apr65

ENCL: 00

0  
SUB CODE: EC,SS

NO REF SOV: 010

OTHER: 012

ATD PRESS: 4/11

Card 2/2 *lo*

L 21840-66 EEC(k)-2/EWA(h)/EWP(k)/EWT(1)/FBD/T IJP(c) W2

ACC NR: AP6004913

SOURCE CODE: UR/0056/66/050/001/0023/0034

AUTHOR: Basov, N. G., Ambartsumyan, R. V., Zuyev, V. S., Kryukov, P. G., Letokhov, V. S.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR  
(Fizicheskiy institut Akademii nauk SSSR)

TITLE: Nonlinear amplification of a light pulse 5/8

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 50, no. 1, 1966, 23-34

TOPIC TAGS: laser, nonlinear optics, stimulated emission, quantum amplifier

ABSTRACT: A theoretical and experimental analysis is made of the passage of a powerful light pulse from a laser through a laser amplifier consisting of two ruby rods operating in a saturation regime. The preliminary experimental results have already been reported (Akademiya nauk SSSR. Doklady, v. 165, no. 1, 1965, p. 58-60 (see ATD Press, v. 4, no. 138, p. 7-8)). In the experiments performed, it was shown that as the result of nonlinear amplification the velocity of the pulse is 6—9 times greater than the velocity of light in vacuum. To decrease the pulse duration during nonlinear amplification, the slope of the incident pulse should be

Card 1/2

L 21840-66

ACC NR: AP6004913

increased by chopping off the exponential leading edge of the pulse. By using a second Kerr cell, the duration of the pulse was shortened from  $8.7 \pm 0.5$  nsec to  $4.7 \pm 0.5$  nsec and the time from  $3.7 \pm 0.5$  nsec to  $1.9 \pm 0.5$  nsec. The theoretical analysis of nonlinear amplification predicts both of the observed effects. Orig. art. has: 19 formulas and 8 figures. [CS]

SUB CODE: 20/ SUBM DATE: 31Jul65/ ORIG REF: 011/ OTH REF: 008

Card 2/2 nst

L 22769-66 FBD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(h) IJP(c) WG

ACC NR: AP6010975

SOURCE CODE: UR/0056/66/050/003/0551/0559

AUTHOR: Basov, N. G.; Grasyuk, A. Z.; Zubarev, I. G.; Katulin, V. A.; Krokhin, O. N. 58 BORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)TITLE: Two-photon optically excited semiconductor laser 25, 44

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 50, no. 3, 1966, 551-559

TOPIC TAGS: laser, semiconductor laser, nonlinear optics, two photon absorption, optical excitation

ABSTRACT: The present paper is an expanded version of an earlier article on a two-photon optically excited GaAs laser (Zhurnal eksperimental'noy i teoreticheskoy fiziki, pis'ma v redaktsiyu, v. 1, no. 4, 1965, p. 29; (see ATD PRESS, v. 4, no. 15, 1965, p. 9)). It is pointed out that in calculating the coefficients of two-photon absorption in CdC, R. Braunstein and N. Ockman (Physical Review, v. 134, no. 2A, 1964, p. 499) neglected the interband states in the valence band and the interference term in the matrix elements, and thus arrived at incorrect results. Since a formula derived by L. V. Keldysh (Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47, 1964, p. 1945) for the probability of multiphoton absorption gives a lower value than the experimentally obtained data for two-photon absorption, formulas are derived for the probability and the coefficient of two-photon absorption in GaAs, using the perturba-

Card 1/2

L 22769-66

ACC NR: AP6010975

tion theory and taking into account the band structure parameters of GaAs. In addition expressions are also obtained for the dependence of the excitation intensity on the penetration depth of the exciting radiation into the semiconductor and the external coherent quantum yield and its dependence on the internal losses in the laser and on the length of the cavity. The calculated data are found to be in good agreement with the experimental results. Orig. art. has: 18 formulas and 7 figures. [CS]

SUB CODE: 20/ SUBM DATE: 06Oct65/ ORIG REF: 007/ OTH REF: 004/ ATD PRESS: 4229

Card 2/2 *dda*

L 21432-66 FBD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(h) IJP(c) WG

ACC NR: AP6009485

SOURCE CODE: UR/0020/66/167/001/0073/0076

AUTHOR: Basov, N. G. (Corresponding member); Letokhov, V. S.

48

ORG: Physics Institute im. P. N. Lebedeva, Academy of Sciences SSSR (Fizicheskii institut Akademii nauk SSSR)

B

TITLE: Change in the shape of a light pulse during nonlinear amplification

SOURCE: AN SSSR. Doklady, v. 167, no. 1, 1966, 73-76

TOPIC TAGS: laser, stimulated emission, nonlinear optics

ABSTRACT: A theoretical investigation is made of the change in the shape of a pulse from a laser during nonlinear amplification. The assumption is made that pulse duration is considerably longer than the transverse relaxation time of the medium. An expression is derived for the pulse velocity in such a medium as a function of the shape of the initial pulse. In the case of the exponential leading edge, this expression, which applies to the general case when the velocity pulse varies with the displacement of the pulse along the leading edge, reduces to the one derived by Basov et al. (AN SSSR, Doklady, v. 165, no. 1, 1965, p. 58). It is shown that it is possible to predict uniquely the change in the shape of the pulse of light during nonlinear amplification or even the shape of the ultrasonic pulse in a two-level phonon maser amplifier, if the shape of the initial pulse is known. Orig. art. has: 8 formulas and 3 figures.

[CS]

SUB CODE: 20/ SUBM DATE: 26Nov65/ ORIG REF: 009/ OTH REF: 006/ ATD PRESS#221  
Card 1/1 ULK UDC: 621.375.9



L 35886-66 FBD/EWT(1)/EEC(k)-2/T/ENP(k) IJP(c) WG

ACC NR: AP6024516

SOURCE CODE: UR/0386/66/004/002/0061/0062

AUTHOR: Basov, N. G.; Orayevskiy, A. I.; and Shcheglov, V. A. 54ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR) 8TITLE: Beam laser for the infrared band 1/5

SOURCE: Zh eksper i teor fiz. Pis'ma v redaktsiyu. Prilozheniye, v. 4, no. 2, 1966, 61-62

TOPIC TAGS: molecular generator, ir quantum generator, optic transition, laser pumping

ABSTRACT: The authors show that atomic- or molecular-beam masers, the development of which has hitherto been confined to the radio band, are also feasible for the infrared band and discuss briefly the possible molecular transitions that can be used to construct an ir laser with thermal pumping. Such a laser is based on a very simple idea: a highly heated beam of molecules is allowed to escape to a vacuum in which the equilibrium radiation is much smaller than  $(E_\beta - E_\alpha)/k$  ( $E_\beta$  and  $E_\alpha$  are two molecular levels,  $E_\beta > E_\alpha$ , whose radiative decay times satisfy the relation  $\tau_\beta > \tau_\alpha$ ). Spontaneous emission soon depletes the  $\alpha$  level and a state with population inversion can be produced for the  $\beta \rightarrow \alpha$  transition. The necessary condition for the occurrence of population inversion between the levels  $\beta$  and  $\alpha$  is  $\tau_\beta > (1 + \tau_{\beta\alpha}/\tau_\beta)\tau_\alpha$ . The most convenient wavelength range for the proposed method is 3 - 20  $\mu$ . The suitable transitions for the  $\text{CO}_2$  molecule are illustrated. Similar transitions can be obtained for  $\text{N}_2\text{O}$  and  $\text{HCN}$ . It is

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L 35886-66

ACC NR: AP6024516

also possible to excite the molecules not only by heating but also by electric dis-  
charge, as in a gas laser. Orig. art. has: 1 figure. [02]

SUB CODE: 20/  
17/      SUBM DATE: 19May66/      OTH REF: 002/      ATD PRESS: 5037

Card 2/2 *lll*

L 44793-66 EWT(1)/EWP(e)/EWT(m)/EWC(k)-2/T/EWP(k) LWP(c) WJ/WJ

ACC NR: AP6031433

SOURCE CODE: UR/0056/66/051/002/0406/0411

AUTHOR: Ambartsumyan, R. V.; Basov, N. G.; Zuyev, V. S.; Kryukov, P. G.;  
Letokhov, V. S.; Shatberashvili, O. B.55  
8ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences, SSSR (Fizicheskiy  
institut Akademii nauk SSSR)TITLE: The structure of a giant pulse of a Q-switched laser 25

SOURCE: Zh eksper i teor fiz, v. 51, no. 2, 1966, 406-411

TOPIC TAGS: solid state laser, ruby laser, giant pulse laser, Q switched laser,  
laser output

ABSTRACT: The spatial and temporal development of a giant pulse of a Q-switched ruby laser in a transverse direction and the effects of the cavity on it were investigated experimentally by means of the setup shown in Fig. 1. A ruby rod 9 mm in diameter and 120 mm long with dull lateral surfaces was placed in a reflector with a helical IFK-15000 flashlamp. For an 8-kj pump the gain per pass was approximately 12. A 1.5-j single laser pulse was generated with a duration of 10-15 nanosec. Q-switching was done by means of a Kerr cell or a vanadium phthalocyanin solution. The exponential results indicate that generation commences in the center of the crystal and spreads transversely over the entire crystal in 3-10 nanosec, i.e., in a time comparable to the duration of the integral pulse. The spatial development of generation

Card 1/2

L 117575-66 EEC(k)-/SWP(k)/EWT(1)/EWT(m)/T/EWP(e) IJP(c) WH/WG

ACC NR: AP603246

SOURCE CODE: UR/0056/66/051/003/0724/0729

AUTHOR: Ambartsumyan, R. V.; Basov, N. G.; Kryukov, P. G.; Letokhov, V. S.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences, SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Laser with a nonresonant feedback

SOURCE: <sup>15</sup>Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 51, no. 3, 1966, 724-729

TOPIC TAGS: solid state laser, ruby laser, nonresonant feedback, ~~laser~~, laser r and d

ABSTRACT: A description is given of a pulsed laser with a nonresonant feedback achieved by back scattering of radiation (See also FSB, v. 2, no. 5, 1966, 1-6). The arrangement used in the experiments is shown in Fig. 1. The active medium

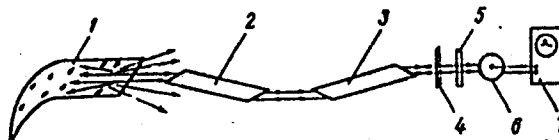


Fig. 1. Experimental arrangement

Card 1/2

1 00674-67 WLT(1)/RMP(R)/EWT(M)/RMP(I) IJP(O) WG/WW/GG/RN/WE

ACC NR: AP6023635

SOURCE CODE: UR/0386/66/004/001/0019/0022

AUTHOR: Ambartsyan, R. V.; Basov, N. G.; Zuyev, V. S.; Kryukov, P. G.; Letokhov, V. S.ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)TITLE: Propagation of a light pulse in a nonlinearly amplifying and absorbing medium

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 4, no. 1, 1966, 19-22

TOPIC TAGS: coherent light, light pulse, laser beam, laser r and d, pulse shape, ruby optic material

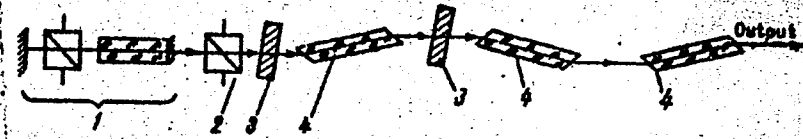
ABSTRACT: This is a continuation of earlier work by the authors (ZhETF v. 50, 23, 1966), where propagation of coherent light in a medium with nonlinear gain was investigated and the possible shortening of light pulses in such a medium predicted. The present letter reports on successful experiments in this direction, showing that to obtain compression of a propagating light pulse it is necessary to eliminate the transverse structure that is produced in the light pulse when the latter is produced, for example, by a Q-switched laser. In the test setup (Fig. 1) the amplifying component consisted of three ruby crystals and the absorbing component was two cuvettes filled with a solution of vanadium phthalocyanine in toluene. In the initial experiments the pulse compression could not be realized because of the transverse structure resulting

Card 1/2

G0574-67

ACC NR: AP6023635

Fig. 1. Diagram of experiment. 1 - Laser, 2 - Kerr shutter, 3 - cuvette, 4 - ruby crystal



from the fact that the development of pulse generation in the peripheral parts of the crystal is delayed by a time of the order of the pulse duration. Success was attained when this structure was eliminated by means of a second Kerr shutter that cut off the leading front of the generator pulse. The pulse width was reduced from about 11 nsec (at 0.5 J energy) past the Kerr shutter and the first absorbing cuvette to 5.7 nsec (10 J) past the second amplifying crystal, and 2 nsec (15 J) past the third. A light output of 7 - 8 GW (3 GW/cm<sup>2</sup>) was attained. The pulse power is much higher than the power causing damage in ruby crystals at 10<sup>-8</sup> sec duration (1 GW/cm<sup>2</sup>). Although damage to the crystal is hindered by the short duration of the pulse, it does not prevent generation of powerful light pulses shorter than 10<sup>-9</sup> sec. It is concluded that extremely short light pulses are obtainable with two-component media in which the absorbing component has a saturation energy much lower and a homogeneous line width much larger than the amplifying medium. Orig. art. has: 2 figures. [02]

SUB CODE: 20/ SUBM DATE: 03May66/ ORIG REF: 003/ OTH REF: 001/ ATD PRESS:

5037

Cord 2/2 vlr

L 27393-66 FRD/EWT(l)/EWT(m)/EEC(k)-2/T/EWP(k)/EWA(h) IJP(e) WS/JD/E  
 ACC NR: AP6015448 SOURCE CODE: UR/0181/66/008/005/1341/1342

AUTHOR: Basov, N. G.; Bogdankevich, O. V.; Yeliseyev, P. G.; Lavrushin, B. M. 65

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskii institut AN SSSR) B

TITLE: A solid solution  $\text{GaP}_x\text{As}_{1-x}$  <sup>23</sup>laser excited by a beam of fast electrons

SOURCE: Fizika tverdogo tela, v. 8, no. 5, 1966, 1341-1342

TOPIC TAGS: laser, semiconductor laser, coherent radiation, gallium phosphide,  
gallium arsenide 27 27

ABSTRACT: Laser action at nitrogen temperature is reported in n-type  $\text{GaP}_x\text{As}_{1-x}$  excited by a beam of 50-keV electrons. The GaP concentration was about 20% and that of uncontrolled donor impurities,  $\sim 10^{17} \text{ cm}^{-3}$ . The  $\text{GaP}_x\text{As}_{1-x}$  samples were obtained by epitaxial growth through gas transport reactions. The dimensions of the sample were 0.48 x 0.75 x 2.5 mm. The Fabry-Perot cavity (cavity length 0.48 mm) was prepared by polishing the sides of the sample. The experimental arrangement was similar to that used in electron beam excitation of GaAs (Fizika tverdogo tela, v. 8, no. 1, 1966, p. 21) except that a monochromator with a resolving power of 3 Å was used instead of the spectrometer. The pulse duration and the repetition rate were 2 μsec and 60 pps, respectively. At current densities (j) less than 0.3 amp/cm<sup>2</sup> spontaneous emission peaked at a wavelength of 8300 Å (half-width of about 1000 Å). 2

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L 27393-66

ACC NR: AP6015448

Above  $j = 0.3 \text{ amp/cm}^2$  a second peak appeared at approximately  $7000 \text{ \AA}$ . The intensity of the peak at  $7000 \text{ \AA}$  increased much faster than that at  $8300 \text{ \AA}$ , so that at  $j = 1 \text{ amp/cm}^2$  the intensity of the former peak was 10 times greater than that of the peak at  $8300 \text{ \AA}$ . Fig. 1. shows the emission spectrum at different values of  $j$ . The smallest value of half-width obtained was  $12 \text{ \AA}$ . The divergence in the plane exposed to the electron beam was  $14-15^\circ$ . Depending on the quality of the resonator the

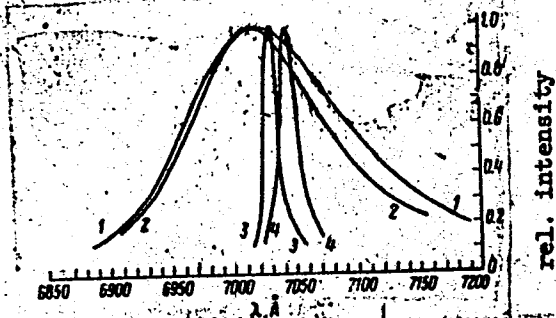


Fig. 1. The emission spectrum of  $\text{GaP}_{02}\text{As}_{08}$

$j, \text{ amp/cm}^2$ : 1 - 0.5; 2 - 0.75; 3 - 2.5; 4 - 3.5.

oscillation threshold varied between  $j = 1.5-2.5 \text{ amp/cm}^2$ . The duration of the laser pulse was not greater than 100 nsec. Orig. art. has: 3 figures. [CS]

SUB CODE: 20/ SUBM DATE: 26Jul65/ ORIG REF: 002/ OTH REF: 002/ ATD PRESS: 4257

Card 2/2



L 34380-66 FBD/EWT(1)/EWT(m)/EEC(k)-2/T/EWP(t)/ETI/EWP(k) IJP(c)

ACC NR: AP6023202 WG/JD/JG

SOURCE CODE: UR/0020/66/168/006/1283/1286

AUTHOR: Basov, N. G. (Corresponding member AN SSSR); Bogdankevich, O. V.; Goncharov, V. A.; Lavrushin, B. M.; Sudzilovskiy, V. Yu.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

62  
B

TITLE: A <sup>1</sup>GaAs <sup>1</sup>laser with a plane resonator

25

SOURCE: AN SSSR. Doklady, v. 168, no. 6, 1966, 1283-1286

TOPIC TAGS: semiconductor laser, gallium arsenide laser, plane resonator, electron beam pumping

ABSTRACT: Generation in a system with a plane resonator in which the mirror area S is much greater than  $L^2$  (L is the distance between mirrors) is described. Experiments were carried out on an n-type GaAs sample with an impurity concentration of  $2 \cdot 10^{16} \text{ cm}^{-3}$  and a mobility of  $5200 \text{ cm}^2/\text{v}\cdot\text{sec}$  at 300K. The sample was prepared in the form of a polished plane-parallel plate  $100 \mu$  thick and several mm in diameter, and was pumped by  $\sim 150$ -keV electron pulses with a duration of  $150 \cdot 10^{-9}$  sec and a repetition frequency of 10 cps. When L was equal to  $100 \mu$ , generation occurred at a current density of  $5 \text{ amp}/\text{cm}^2$ . The values of minimum gain necessary to achieve generation exceeded the experimentally measured value of the absorption coefficient at the generation wavelength by one order of magnitude. The magnitude of the discrepancy rules

Card 1/2

UDC: 535.89+535.14

L 34380-66

ACC NR: AP6023202

out experimental error and can be attributed to narrowing of the forbidden gap of the excited crystal. The narrowing (by  $8 \cdot 10^{-3}$  ev) can be due to the screening effect of the crystalline field by free carriers and their interactions. Expressions are given for the dependence of the width of the forbidden gap on the free carrier concentrations. Orig. art. has: 3 figures and 8 formulas. [YK]

SUB CODE: 20/ SUBM DATE: 05Feb66/ ORIG REF: 005/ OTH REF: 005/ ATD PRESS:

5034

Card 2/2

JD

L 29555-66 EEC(k)-2/EWP(k)/EWI(1)/FBD/T IJP(c) WG

ACC NR: AP6018052

SOURCE CODE: UR/0020/66/168/003/0550/0553

AUTHOR: Basov, N. G. (Corresponding member AN SSSR); Morozov, V. N.; Orayevskiy, A. N.ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR) 56  
BTITLE: Contribution to the theory of undamped pulsations of <sup>25</sup>laser intensity

SOURCE: AN SSSR. Doklady, v. 168, no. 3, 1966, 550-553

TOPIC TAGS: laser emission, solid state laser, laser pulsation, phase diagram, light pulse

ABSTRACT: The differential equation for the intensity of laser emission, which in the case of solid-state lasers reduces to an equation whose stable limiting cycle corresponds to undamped oscillations of the laser emission intensity, is solved analytically. It is shown that the solutions obtained approximate quite closely the phase trajectories of the system in a case of large depth of modulation. The solution consists of two parts. The first corresponds to a slow motion when the active particles accumulate and the amplitude increases relatively slowly. The second represents an increase in amplitude followed by a release of the stored energy by radiation during a short pulse. The analytic relations obtained are used to calculate the parameters of a scheme proposed by the authors (Paper at Scientific Congress in Leipzig, March 1965) to obtain short light pulses (Fig. 1). The periodic solution of the equations

Card 1/2

UDC: 621.378.325

L 29555-66

ACC NR: AP6018052

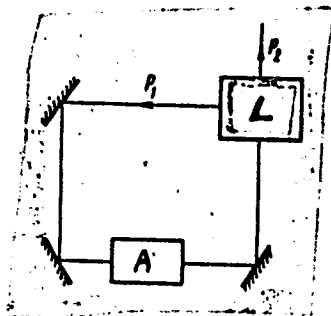


Fig. 1. Diagram of equipment for generation of short light flashes

L - Laser; A - amplifier.

is obtained and a numerical example is presented. It is shown that radiation pulses of  $5.6 \times 10^{-11}$  at half-power points with depth of modulation almost 100% are feasible in such a scheme. Orig. art. has: 1 figure and 19 formulas. [02]

SUB CODE: 20/ SUBM DATE: 23Feb66/ ORIG REF: 003/ ATD PRESS: 5015

Card 212 DC

L 39758-66 EWT(1)/EWT(m)/EEC(k)-2/FBD/T/EWP(k)/EWA(h)/EWP(t) IJP(c) WG/  
ACC NR: AP6015476 SOURCE CODE: UR/0181/66/008/005/1536/1538  
JD/GD-2

AUTHOR: Basov, N. G.; Bogdankevich, O. V.; Devyatkov, A. G.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR, Moscow  
(Fizicheskiy institut AN SSSR)

TITLE: Certain characteristics of emission generated in CdS by electron excitation

SOURCE: Fizika tverdogo tela, v. 8, no. 5, 1966, 1536-1538

TOPIC TAGS: laser, semiconductor laser, cadmium sulfide, coherent emission

ABSTRACT: The present paper is an extension of an earlier work (N. G. Basov, et al. Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47, no. 4(10), 1964, 1588) in which laser action was reported in CdS excited by a beam of electrons. The 0.5 x 0.85 x 1.5 mm sample was prepared by polishing. The Fabry-Perot cavity was formed by the 0.85 x 1.5 mm faces. The beam of 50-keV electrons was incident on the 0.5 x 1.5 mm face of the crystal cooled to the liquid nitrogen temperature. The pulse duration and the repetition frequency were ~2  $\mu$ sec and 50 cps, respectively. Fig. 1 shows the emission spectrum of CdS at different current densities ( $j$ ). At  $j = 100$  amp/cm<sup>2</sup> recombination radiation with a half-width ~70 Å peaked at 4960 Å. Although line narrowing was observed at  $j = 1.5$  amp/cm<sup>2</sup>, the oscillation threshold was at 5 amp/cm<sup>-2</sup>. The divergence at the threshold was 13° in the plane of the beam and 9° in the plane

Card 1/2

L 39758-66

ACC NR: AP6015476

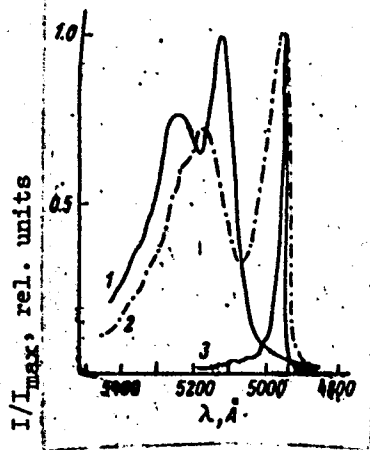


Fig. 1. The emission spectrum of CdS at different current densities

$j$  in amp/cm<sup>2</sup>: 1 - 0.18; 2 - 0.52; 3 - 8.5.  
( $T = 80K$ ).

perpendicular to it. The quantum efficiency, defined as the ratio of the radiated power to the power of the electron beam, exceeded 1%. Orig. art. has: 4 figures.

[CS]

SUB CODE: 20/ SUBM DATE: 15Nov65/ ORIG REF: 001/ ATD PRESS: 4259  
Card 2/2/15

I 28449-66 . FED/ENT(1)/ENT(m)/EEG(k)-2/T/ENP(t)/ETI/ENP(k) IJP(c) WG/JL

ACC NR: AP6018703

SOURCE CODE: UR/0386/66/003/011/0441/0443

AUTHOR: Bagov, N. G.; Zakharov, Yu. P.; Nikitina, T. F.; Popov, Yu. M.; Strakhovskiy, G. M.; Tatarenkov, V. M.; Khvoshchev, A. N.ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskii institut Akademii nauk SSSR)TITLE: Gallium arsenide laser operating at room temperatureSOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pisma v redaktsiyu. Prilozheniye, v. 3, no. 11, 1966, 441-443TOPIC TAGS: gallium arsenide, semiconductor laser, pn junction, junction diode, laser radiation spectrum

ABSTRACT: The authors investigated the performance of semiconductor lasers based on diffusion p-n junctions operating at 300K. The diodes were excited either with a pulse generator (current up to 4000 amp, pulse duration 20 nsec) or with a generator with discharge capacitor and mechanical discharge with current up to 1500 amp and pulse duration 30-60 nsec. The diode emission had at low currents a broad spectrum that narrowed down gradually from 300 to 110 Å with increasing current. At a threshold current density that varied from diode to diode ( $10^5 - 5 \times 10^5$  amp/cm<sup>2</sup>), a single generation line was produced at ~9000 Å, which is of longer wavelength than the maximum of the spontaneous emission spectrum. With increase in current, additional lines appear in the spectrum, corresponding to different resonator modes and the

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L 28449-66

ACC NR: AP6018703

generation wavelength increases. Measurement of the diode emission directivity pattern yielded for the width of the luminescent region a value of  $4 \mu$ . The directivity pattern in a plane parallel to the p-n junction shows a pronounced multilobe interference character, with average half-width  $8^\circ$ . Orig. art. has: 2 figures and 1 formula. [02]

SUB CODE: 30/ SUBM DATE: 02Apr66/ ORIG REF: 002/ OTH REF: 002/ ATD PRESS: 5006

Card 2/2 LC



L 446: Q-66 EWT(l)/EWT(m)/EWC(k)-2/T/EWP(k)/EWP(t)/ETI IJP(c) WG/JD

ACC NR: AP6030959

SOURCE CODE: UR/0181/66/008/009/2610/2615

AUTHOR: Basov, N. G.; Yeliseyev, P. G.; Ismailov, I.; Yakobson, S. V.; Nashel'skiy, A. Ya.; Pinsker, I. Z.ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut AN SSSR) 66  
BTITLE: Certain properties of <sup>21</sup> InP <sup>21</sup> lasers <sub>25</sub>

SOURCE: Fizika tverdogo tela, v. 8, no. 9, 1966, 2610-2615

TOPIC TAGS: solid state laser, semiconductor laser, indium phosphide laser, infrared laser, *INDIUM COMPOUND, PHOSPHIDE*

ABSTRACT: Stimulated emission of InP diodes in the 9060—9080 Å region was compared with that of their GaAs counterparts (see Table 1). InP bars were prepared by the directed crystallization method in the form of large-size polycrystals grained in the direction of the bar axis. The bars were tellurium-doped with electron concentrations of  $5 \cdot 10^{17} \text{ cm}^{-3}$ . The diffusion of zinc from the gas phase into polished plates each containing 2—3 seeds took place at 750C over a 30-min period. The depth of the p-n junction was 35 μ. The electrical contacts were made of gold which was sputtered on plates at 400C. The bar ends were polished and the sides were roughly worked. The GaAs diodes were prepared in a similar manner with the following exceptions: diffusion of zinc into GaAs lasted 4 hr at 850C under excess As pressure, and the resonator

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I 44600-66

ACC NR: AP6030959

Table 1. Basic characteristics of InP and GaAs lasers

	InP	GaAs
Electron concentration in the n-region, $\text{cm}^{-3}$	$5 \cdot 10^{17}$	$5 \cdot 10^{17}$
Electron mobility in the n-region, $\text{cm}^2/\text{v} \cdot \text{sec}$	2000	3200
Concentration of zinc in the gaseous phase during diffusion, $\text{cm}^{-3}$	$3 \cdot 10^{18}$	$7 \cdot 10^{18}$
Diffusion temperature, $^{\circ}\text{C}$	750	850
Diffusion time, hours	0.5	4
Length of Fabry-Perot resonator, mm	0.8	0.9
Wavelength of stimulated emission, $\text{\AA}$	9070	8480
Threshold current density, $\text{amp}/\text{cm}^2$	7200	940
Threshold current density after one surface is silvered, $\text{amp}/\text{cm}^2$	4700	630
Loss factor $\alpha$ , $\text{cm}^{-1}$	8	8
Gain divided by current density, $\beta$ , $\text{cm} \cdot \text{amp}^{-1}$	$3.7 \cdot 10^{-3}$	$2.5 \cdot 10^{-2}$

surfaces and diffusion plane were produced by cleavage along the contact plane. The diffusion depth in both cases was almost identical. As regards the width of directivity, InP lasers (5—7°) were shown to be superior to GaAs lasers (14—19°) by a factor of 3 or 4. InP laser diodes were characterized by a low loss factor ( $\sim 7 \text{ cm}^{-1}$ )

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ACC NR: AP6030959

and a gain relatively lower than that of GaAs, expressed in a linear approximation as  $k = 3.4 \times 10^{-3} j \text{ cm}^{-1}$ , where  $j$  (amp/cm<sup>2</sup>) is the current density. The latter can be due to a lower (than GaAs) quantum yield and to a thick active layer (8-10  $\mu$ ). The differential efficiencies of the InP laser made it possible to deliver pulsed power of 7 watts at 75 amp at the liquid N temperature. Orig. art. has: 2 tables, 2 figures, and 3 formulas. [YK]

SUB CODE: 20/ SUBM DATE: 17Jan66/ OTH REF: 012/ ATD PRESS: 5078

Card 3/3 *LJM*

L 44601-66 EWT(1)/EWT(m)/EEC(k)-2/T/EWP(k)/EWP(t)/ETI LJP(c) WG/JD/JG

ACC NR: AP6030960

SOURCE CODE: UR/0181/66/008/009/2616/2622

AUTHOR: Basov, N. G.; Yeliseyev, P. G.; Zakharov, S. D.; Zakharov, Yu. P.;  
Orayevskiy, I. N.; Pinsker, I. Z.; Strakhov, V. P.

72  
B

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: Certain properties of <sup>27</sup>GaAs <sup>27</sup>laser diodes

SOURCE: Fizika tverdogo tela, v. 8, no. 9, 1966, 2616-2622

TOPIC TAGS: solid state laser, semiconductor laser, gallium arsenide, laser,  
*SEMICONDUCTOR DIODE*

ABSTRACT: Phenomenological methods were used in an experimental study of certain properties of GaAs laser diodes (loss factor, quantum yield, differential efficiency, gain). The specimens were prepared by the diffusion of zinc into n-type GaAs crystals with electron concentrations of  $2 \times 10^{18} \text{ cm}^{-3}$ . The cavities consisted of silver mirrors sputtered on polished crystalline surfaces pre-coated with a thin layer of SiO<sub>2</sub>, and the electrical contacts consisted of sputtered metal (Au, Ni; In, Sn) films and fused-in electrodes. The measurements were carried out at 77K and the pulsed output was recorded by a calibrated silicon photodiode. The lowest threshold currents occurred in diodes which were cleaved on all four sides. A threshold current of 25 mamp was attained at the liquid He temperature and at a density of 75 amp/cm<sup>2</sup>. C-w operation was observed from diodes with  $I_{thr} < 0.5 \text{ amp}$  at 4.2K. The results

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L 44603-66 EWT(1)/EWT(m)/EEC(k)-2/T/EWP(t)/ETI/EWP(k) IJP(c) WG/ID/JG  
ACC NR: AP6030983 SOURCE CODE: UR/0181/66/008/009/2816/2818

AUTHOR: Basov, N. G.; Drozhdin, Yu. A.; Zakharov, Yu. P.; Nikitin, V. V.;  
Semenov, A. S.; Stepanov, B. M.; Tolmachev, A. M.; Yakovlev, V. A.

77  
B

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: The effect of injection current on the temporal characteristics of a GaAs laser

27 27

SOURCE: Fizika tverdogo tela, v. 8, no. 9, 1966, 2816-2818

TOPIC TAGS: solid state laser, semiconductor laser, gallium arsenide, laser, injection laser, *ELECTRIC CURRENT, INJECTION CURRENT*

ABSTRACT: In an investigation of the temporal characteristics of a GaAs laser the radiative delay time ( $\tau_g$ ) was determined as a function of the injection current. Ordinary diodes, prepared by means of the diffusion process, were placed in a dewar at the liquid N temperature. The laser was excited by a current oscillator with pulse amplitudes from 4 to 40 amp and a duration of 40 nanosec. Several diodes were investigated at threshold currents from 1.8 to 4 amp. The dependence of  $\tau_g$  on injection current indicates that the value of  $\tau_g$  approaches  $1.8 \times 10^{-9}$  sec. This corresponds approximately to the spontaneous radiative lifetimes for electrons and holes calculated theoretically elsewhere (W. P. Dumke, Phys. Rev., 132, 1998, 1963). With a 16-fold

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L 44603-66

ACC NR: AP6030983

increase of  $I_{thr}$ ,  $\tau_g$  increases to 0.9 nanosec; this is explained by the time increase necessary to achieve population inversion. To eliminate delay due to spontaneous emission and to achieve stimulated emission, the diode was pulsed by currents from an auxilliary oscillator with amplitudes of  $1.5 I_{thr}$  and durations of approximately 200 nanosec. Some 50 nanosec after the onset of the auxilliary pulse, the diode was pulsed by a positive current from the master oscillator. The delay time between the onset of the injection current from the master oscillator and the radiation induced by it was measured, and at  $17 I_{thr}$  was reduced to  $6 \times 10^{-11}$  sec. A further decrease in  $\tau_g$  calls for considerably increased injection currents. The experimental data indicate that GaAs lasers can be used as radiation modulators in the centimeter band and as high-speed ( $10^{-10}$ — $10^{11}$  sec) optical switches. Orig. art. has: 1 figure. [YK]

SUB CODE: 20/ SUBM DATE: 13Apr66/ ORIG REF: 001/ OTH REF: 002/ ATD PRESS: 5078

Card 2/2 *LJM*

L 32209-66 FBD/EWT(1)/EEC(k)-2/T/EWP(k) IJP(c) WG

ACC NR: AP6020791

SOURCE CODE: UR/0386/66/003/012/0468/0471

AUTHOR: Basov, N. G.; Orayevskiy, A. N.; Strakhovskiy, G. M.; Uspenskiy, A. V.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Two-cavity laser<sup>no</sup> as high-resolution spectroscope

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 3, no. 12, 1966, 468-471 71  
B

TOPIC TAGS: laser application, laser radiation spectrum, molecular spectroscopy, receiver resolution, hyperfine structure

ABSTRACT: The authors show that in a laser it is possible to resolve spectral components within the limits of a homogeneously broadened line, so that a spectroscope based on the use of such a laser can have a resolution limit determined by the width connected with the monochromaticity and stability of the radiation source. The spectroscope consists of a previously-described laser with two cavities in tandem (Pis'ma ZhETF v. 2, 77, 1965). Modulation of the distance between the two cavities normally modulates the signal in the second cavity, but if the signal frequency coincides exactly with the peak of the spectral line, then the

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L 32209-66

ACC NR: AP6020791

distance modulation does not cause phase modulation. Since the position of the line peak changes with the magnitude of the signal in the first cavity, it is possible, by measuring the generation frequency at which the phase of the second cavity does not depend on the modulation of the distance between cavities, to obtain at different signal values as many independent equations as there are hyperfine structure components in the line. Simultaneous solution of these equations determines the positions of the hyperfine components. A sample calculation is given for a line with two components, and it is shown that for cavities 10 cm long spaced 10 cm apart, a mean beam velocity  $6 \times 10$  cm/sec, a modulation frequency 10 cps, and a detection time of 1 sec it is possible to resolve spectral components separated by several cps. Orig. art. has: 2 formulas.

SUB CODE: 20/      SUBM DATE: 09Apr66/      ORIG REF: 002/      OTH REF: 001

LS  
Card 2/2



ACC NR: AP7011022

SOURCE CODE: UR/0053/66/089/003/0520/0525

AUTHOR: Barchukov, A. I.; Basov, N. G.; Bunkin, F. V.; Veselago, V. G.;  
Irisova, N. A.; Karlov, N. V.; Manenkov, A. A.

ORG: none

TITLE: Aleksandr Mikhailovich Prokhorov

SOURCE: Uspekhi fizicheskikh nauk, v. 89, no. 3, 1966, 520-525

TOPIC TAGS: physics personnel, radio wave propagation, maser, quantum  
generator, academic personnel

ABSTRACT:

Aleksandr Mikhailovich Prokhorov is one of the leading Soviet physicists, a corresponding member of the Academy of Sciences USSR, and a winner of the Lenin and Nobel prizes. He is associated with the development of quantum radiophysics and belongs to the widely known school of academicians L. I. Mandel'shtam and N. D. Papaleksi. Prokhorov has successfully combined physical investigations with the development of working devices employing new physical principles and phenomena.

Prokhorov was born on 11 July 1916 in Atherton, Australia. His father was a political refugee who had migrated to Australia in 1911. The family returned to Russia in 1923. In 1939 Prokhorov graduated with honors from the Physics Department of Leningrad University and entered the Oscillations Laboratory of the Physics Institute imeni P. N. Lebedev for postgraduate work. Prokhorov was in the army from 1941 until 1944, when after being

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UDC: 92:53

ACC NR: AP7011022

wounded for the second time he was released. Prokhorov's scientific activity began in 1939 under the guidance of M. A. Leontovich and V. V. Migulin with the study of radiowave propagation along the earth's surface. From this study Prokhorov and Migulin developed an original way to observe the ionosphere by means of the radio interference method. In 1944 Prokhorov investigated the frequency stabilization of tube oscillators in the Oscillations Laboratory of the Lebedev Physics Institute. His first dissertation work was accomplished under the guidance of S. M. Rytov and was devoted to the theory of nonlinear oscillations. Prokhorov, Rytov, and M. Ye. Zhabotinskiy received the Mandel'shtam Prize for the development of the theory of frequency stabilization.

After defending his dissertation, Prokhorov proceeded with his work in radiophysics. In 1948 he began a study of coherent radiation in a synchrotron. From this investigation Prokhorov developed a method for determining the size of electron bunches and showed experimentally that a synchrotron generates coherent radiation in the centimeter range. He presented his results in the form of a doctoral thesis, which he defended successfully in 1951.

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Simultaneously with his work in accelerator physics, Prokhorov, at the invitation of academician D. V. Skobel'tsyn, began working in the field of radiospectroscopy. Prokhorov's interest in radiospectroscopy was encouraged by the fact that well developed methods of radiolocation and radioengineering were being employed at that time. These methods were soon to find application in the new field of radiophysics, principally in the spectroscopy of the rotational and vibrational spectra of molecules. Besides investigating purely spectroscopic problems, Prokhorov also studied the employment of the absorption spectra in the uhf range for the construction of frequency and time standards. As a result of theoretical examinations of ways to raise the stability of molecular frequency and time standards, Prokhorov together with N. G. Basov wrote a series of classical works on the development of masers. It was at this point that Prokhorov became one of the founders of quantum electronics.

Prokhorov and Basov soon offered a new method for obtaining a system with negative temperature, the so-called "three levels method," which later became the basic method for developing paramagnetic as well as optical quantum generators and amplifiers. During the period from 1955 to 1960, Prokhorov concentrated on the development of quantum paramagnetic amplifiers in the uhf range, giving special attention to new crystals for

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ACC NR: AP7011022

paramagnetic amplifiers and to the investigation of their spectra and relaxation characteristics. The ruby was investigated in Prokhorov's laboratory and was proposed for use in quantum paramagnetic amplifiers.

Prokhorov's works in quantum radiophysics were highly regarded. In 1959 Prokhorov and Basov were co-recipients of the Lenin Prize for developing a new method for the amplification and generation of electromagnetic waves.

Prokhorov in 1954 became supervisor of the Oscillations Laboratory, which under his supervision developed into two new laboratories of the Lebedev Physics Institute: the Radioastronomy Laboratory and the Quantum Radiophysics Laboratory. A professor at Moscow State University since 1957, Prokhorov there organized the Laboratory of Radiospectroscopy at the Scientific Research Institute of Nuclear Physics. One of the paramagnetic amplifiers for 21-cm waves constructed under Prokhorov's guidance was installed on the 22-m parabolic mirror antenna operating at the Lebedev Institute's Radioastronomy Station at Pushchino (near Serpukhov) for use in observing hydrogen emissions from space.

During this period Prokhorov directed a great deal of attention to the search for new crystals for amplifiers and generators in the range of millimeter and submillimeter wavelengths. His greatest attention was given to

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ACC NR: AP7011022

lasers. In 1958, Prokhorov proposed a new type of resonator for submillimeter waves, the so-called open resonator in the form of two parallel mirror surfaces.

In 1960 Prokhorov was elected a corresponding member of the Academy of Sciences USSR in the Department of General and Applied Physics. Since then he has concentrated primarily on the study of processes in crystal lasers. Prokhorov has investigated and prepared crystals from fluorite with dysprosium and other impurities and has succeeded in using solar radiation to pump fluorite crystals.

A new principle for the operation of quantum generators by utilizing the two-quantum transitions was developed in 1963 under Prokhorov's supervision. The construction of multi-photon (in particular two-photon) transition lasers is the future of quantum electronics.

In 1964 Prokhorov along with Basov and Charles Townes was awarded the Nobel Prize in physics. Prokhorov has since achieved significant results in developing continuously operating lasers for use in radiocommunications and technological operations.

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ACC NR: AP7011022

Under Prokhorov' s guidance investigations have been proceeding in solid-state physics, particularly in the area of the behavior of superhigh-frequency solid-state plasma. This trend should open up possibilities for the construction of new physical devices and a new type of solid-state amplifier.

Through the initiative and under the scientific guidance of Prokhorov, a special system for obtaining continuous superstrong magnetic fields with intensities of the order of hundreds of kilooersteds has been developed. This will be the first such installation in the USSR.

A. M. Prokhorov has conducted investigations ranging over various fields of physics. The results of his investigations have been published in more than 160 scientific reports. A member of the Department of General and Applied Physics, Prokhorov is also Vice-President of the International Radio Association (URSI) and is Chairman of its Soviet committee.

Prokhorov' s works have influenced considerably the development of modern physics. His scientific and organizational activities have greatly affected the whole complex of works in quantum radiophysics carried out in the USSR. Orig. art. has: 1 figure. [FSB: v. 2, no. 9]

SUB CODE: 20 / SUBM DATE: none

Card 6/6

35386 Ispol'zovanie Zirnikh Pastbishch Diya Dal' neyshego Pod'ema Ovtsevodstva.  
Sov. Zootekhnika, 1949, No. 7, S. 81-88--Bibliogr: 5 NAZY.

SO: Letopis' Zhurnal'nykh Statey Vol. 34, Moskva, 1949

BASOV, N. I.

"The Utilization of Chernozem Pasture Lands by Fine-Wool Sheep."  
Cand Agr Sci, All-Union Sci Res Inst of Sheep and Goat Raising,  
Stavropol', 1953. (RZhBiol, No 2, Sep 54)

Survey of Scientific and Technical Dissertations Defended at USSR  
Higher Educational Institutions (10)

So: Sum. No. 481, 5 May 55



BASOV, N. I.

Chernye Zemli - Soils

Plowing methods for sandy and sandy loam soils of Chernye Zemli. Korm. baza 4, No. 2, 1953.

9. Monthly List of Russian Accessions, Library of Congress, June 1953. Unclassified.

BASOV, N. I.

BASOV, N. I. - "Investigation of the forces in a casting mold in casting polystyrene under pressure". Moscow, 1955. Min Higher Education USSR, Moscow Inst of Chemical Machine Building. (Dissertation for the Degree of Candidate Technical Sciences).

SO; Knizhnaya Letopis' No. 46, 12 November 1955. Moscow

67094

SOV/123-59-13-54211

15.8300

Translation from: Referativnyy zhurnal. Mashinostroyeniye, 1959, Nr 13, p 520 (USSR)

AUTHORS: Basov, N.I., Levin, A.N.

TITLE: Investigation of the Effects of Several Technological Factors on the Pressure in the Press-Mold of Casting Machines in the Pressure-Casting of Polystyrene

PERIODICAL: Tr. Mosk. in-ta khim. mashinostr., 1957, Vol 13, pp 97 - 109

ABSTRACT: The distribution of pressure in the test press-mold in dependence on the temperature of material, specific casting pressure, and mold design was investigated. As a test specimen a plate 155 mm long, 20 mm wide and 2.4 - 2.6 mm thick, was used. The pressure was measured in six places, located over the length of the specimen in a 25-mm distance. The pressure of the plastic on the walls of the mold was recorded on a film of a MPO-2 electromagnetic oscillograph through a 6-channel tensometer amplifier. The investigations were carried out on a mechanical casting machine of a capacity of 30 - 50 g per cycle, with a variation in pressure of from 400 to 1,300 kg/cm<sup>2</sup>, at a temperature of 170 - 210°C in intervals of 10°C. The distance of the pressure measuring points from the inlet

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SOV<sup>67094</sup>123-59-13-54211

## Investigation of the Effects of Several Technological Factors on the Pressure in the Press-Mold of Casting Machines in the Pressure-Casting of Polystyrene

amounted to 2, 27, 52, 77, 102, 127, 152 mm. Granulated transparent polystyrene, obtained by the cut-sheet method, was used. The relation between the maximum pressure in the mold ( $P_m$ ), the specific pressure ( $P_0$ ) and the temperature of the heating cylinder ( $t$ ), obtained from the curves by the method of least squares, looks as follows:

$$\frac{P_m}{P_0} = a + 0.00626 t,$$

where  $a$  is the coefficient dependent on the thickness of the manufactured object. The quantity  $a$  depends on the perimeter of the plate, according to the equation:  $a = -1.016 + 0.90056 \Pi$ , where  $\Pi$  is the perimeter. The investigation of the character of pressure variation in the mold under different casting conditions showed that the relative pressure drop  $P/P_m$  over the length of the manufactured object is the higher, the lower the temperature of the material to be pressed and the thinner the specimen. The relations obtained are expressed in the form of the empirical formula:

$$\frac{P}{P_m} = 0.72 \cdot e^{-0.134K} + 0.28e^{-3.98K}$$

where  $K = \frac{X}{\Pi} \left( \frac{170^4}{t} \right)$ ;  $X$  is the variable length of the manufactured object.

Card 2/2

M.L.P.

AFANAS'YEV, A.N., kand.tekhn.nauk; BASOV, N.I., kand.tekhn.nauk; BELO-VITSKIY, A.A., insh.; VESELOVSKIY, V.S., doktor tekhn.nauk, prof.; GORELIK, B.I., kand.tekhn.nauk; DORONENKOV, I.M., insh.; ZAK, D.L., insh.; IVCHIN, V.I., insh. [deceased]; KLINOV, I.Ya., doktor tekhn.nauk, prof.; LEVIN, A.N., doktor tekhn.nauk, prof.; LEVIN, S.N., kand.tekhn.nauk; LEPETOV, V.A., kand.tekhn.nauk; LEONT'YEV, N.L., doktor tekhn.nauk, prof.; LOKHINA, P.I., kand.tekhn.nauk; MATVEYEVA, E.V., insh.; MIKHAYLOV, A.N., doktor tekhn.nauk, prof.; MUDRIK, Kh.I., kand.tekhn.nauk; PERLIN, S.M., insh.; SALAZKIN, K.A., kand.tekhn.nauk; SIL'VESTROVICH, S.I., kand.tekhn.nauk; SOKOLOVSKAYA, S.I., kand.tekhn.nauk; KHENKIN, A.A., insh.; KHUKHRYANSKIY, P.N., doktor tekhn.nauk, prof.; SHEYDEMAN, I.Yu., kand.tekhn.nauk; YASHUNSKAYA, P.I., kand.tekhn.nauk; POGODIN-ALEKSEYEV, G.I., doktor tekhn.nauk, prof., red.; RYBAKOVA, V.I., insh., red.isd-va; SOKOLOVA, T.F., tekhn.red.

[Handbook on materials used in the manufacture of machinery] Spravochnik po mashinostroitel'nyim materialam; v chetyrekh tomakh. Pod red.G.I.Pogodina-Alekseeva. Moskva, Gos.nauchno-tekhn.isd-vo mashinostroit.lit-ry. Vol.4. [Nonmetallic materials] Nemetallicheskie materialy. Red.toma A.N.Levin. 1960. 723 p.

(MIRA 13:7)

(Machinery industry)

(Nonmetallic materials)

BASOV, A. I.

BASE I BOOK EXPLANATION 507/4419

Specimens of publications mentioned herein, can be found in the following sources: (1) "Handbook of Building Materials", Vol. 1, Commercial Materials, McGraw-Hill, 1960, 753 p. Extra 519 inserted. 40,000 copies printed.

Ed.: G.I. Pridobolnikov, Doctor of Technical Sciences, Professor; Ed. of this volume: A.I. Loran, Doctor of Technical Sciences, Professor; Ed. of Publishing House: V.I. Pyudov, Engineer; Tech. Ed.: S.F. Sokolov; Managing Ed. for Information Literature (Books): I.M. Komarovskiy, Engineer.

NOTE: This book is intended for machine-building and construction engineers, architects, and other persons interested in the properties of building materials.

CONTENTS: This is the fourth of a four-volume Handbook on Machine-Building Materials. Volume 4 also contains information on materials for use in machine building and in other construction applications. The materials for use in machine building and other applications and limitations of these materials are given, and also the physical and mechanical properties are listed. No personalities are mentioned. References follow individual chapters.

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ACCESSION NR: AP4024472

S/0141/64/007/001/0101/0112

AUTHOR: Bass, F. G.; Fács, I. M.

TITLE: Allowance for shadows in the scattering of waves by a statistically uneven surface

SOURCE: IVUZ. Radiofizika, v. 7, no. 1, 1964, 101-112

TOPIC TAGS: uneven surface, statistically uneven surface, scattering by inhomogeneities, shadow effect, sound wave reflection, reflection coefficient, average field intensity, average field potential, distribution density

ABSTRACT: The reflection of sound waves from a statistically rough surface is considered with allowance for the shadows produced by the projections on the surface. Formulas are derived in the Kirchhoff approximation for the reflection coefficient and for the average intensity of the scattered field. The average potential of the scattered field is determined under the assumption that the surface is described by a random function for which the joint distribution densities of the function and its first derivative are known. Only one-dimensional inhomogeneities on the surface are considered, but the results can be extended also to two-dimensional inhomogeneities. The results apply also to electromagnetic waves.  
Card 1/2

ACCESSION NR: AP4024472

"In conclusion the authors are deeply grateful to I. L. Verbitskiy for a discussion of this work." Orig. art. has: 2 figures and 45 formulas.

ASSOCIATION: Institut radiofiziki i elektroniki AN UkrSSR (Institute of Radiophysics and Electronics, AN UkrSSR)

SUBMITTED: 06Apr63

DATE ACQ: 15Apr64

ENCL: 00

SUB CODE: PH

NR REF SOV: 006

OTHER: 001

Card

2/2

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Abs Jour: Ref Zhur-Biol., No 12, 1958, 55722.

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Inst : Alma-Ata Institute of Zoology and Veterinary Sciences.

Title : Normal and Pathologic Secretive Stomach Functions in Horses.

Orig Pub: Tr. Alma-Atinsk. zoovet. in-ta, 1956, 9, 145-151.

Abstract: In 12 healthy and 32 sick horses the amount of general N was determined, of protein N and of globulins, of the residual N, of the amounts of urea (I) and of creatinine in the gastric juice (GJ) before the feeding of the animals. Also determined were for the blood serum the amount of protein, the protein coefficient, residual N, I and creatinine before and after

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