L 11085-63
ACCESSION NR: AT3002986   0.

negative absorption coefficient close to unity. The authors compute that a current density of 10 amp/cm^2 is required in order to achieve a density of the injected minority carriers of 10^{15} cm^{-3}, assuming a diffusion coefficient of 10 cm^2/sec and carrier lifetime of 10^{-10} sec.

ASSOCIATION: none

SUBMITTED: 00   DATE ACQ: 15May63.   ENCL: 00

SUB CODE: GE   NO REF SOV: 002   OTHER: 001

mcs/WWM
Card 2/2

BASOW, N. G. [Basov, N. G.]; KROCHIN, O. N. [Krokhin, O. N.]; POPOW,
J. M. [Popov, Yu. M.]

Preparation of states with negative temperature at p-n trans-
itions of degenerated semiconductors. Acta phys Hung 14 no.2 3:
241-243 '62.

1. P. N. Lebedew Institut fur Physik der Akademie der Wissen-
schaften USSR, Moskay, USSR. Vorgelegt von G. Szigeti [Gyorgy
Szigeti]

BASOW, N. G. [Basov, N. G.]; OSIPOW, B. D. [Osipov, B. D.]; HWOSCHTSCHEW,
A. N.[Khoshchev, A. N.]

Recombination luminescence of indium antimonide in strong
electric field. Acta phys Hung 14 no.2 3:245-246 '62.

1. P. N. Lebedew Institut fur Physik der Akademie der Wissen-
schaften USSR, Moskau, USSR. Vorgelegt von G. Szigeti [Gyorgy
Szigeti]

BASOV, N.G.; KROHIN, O.N. [Krokhin, O.N.]; ORAEVSKI, A.N. [Orayevskiy, A.N.];
STRAHOVSKI, G.M. [Strakhovskiy, G.M.]; CIHAOIEV, B.M.
[Chikhachev, B.M.]

Possibility of studying relativistic effects with the aid
of the molecular and atomic standards of frequency. Analele
mat 16 no.2:83-146 Ap-Je '62.

BASOV, N. G.; KROKHIN, O. N.; POPOV, J. M. [Popov, Yu. M.]

Negative absorption coefficient at indirect transitions in
semiconductors. Acta phys Hung 14 no.2 3:231-240 '62.

1. P. N. Lebedev Physical Institute of the Academy of Sciences
USSR, Moscow, USSR. Presented by G. Szigeti [Gyorgy Szigeti]

38861

S/056/62/042/006/018/047
B104/B102

AUTHORS: Basov, N. G., Orayevskiy, A. N.

TITLE: Emission of molecules in a mixed energy state

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42,
            no. 6, 1962, 1529-1535

TEXT: A double resonator molecule generator is investigated. It is shown
that a molecular current polarized by a monochromatic emission excites a
monochromatic oscillation in a resonator on which it is incident. The
frequency of this oscillation coincides with the frequency of the polarized
emission. A change in the eigenfrequency of the resonator affects only
the amplitude and phase of the excited oscillation, not its frequency.
The emission with frequencies different from that of the polarized field
is incoherent. Therefore it is not necessary to take the effect of
coherence into account while calculating the noise produced in quantum
generators and amplifiers by spontaneous emission. If the polarized
emission is not monochromatic the response of the resonator is also not
monochromatic for small intensities. The spectrum of the response affects

Card 1/2

BASOV, N.G.; ZUYEV, V.S.; KRYUKOV, P.G.

Increasing the power of a ruby-type quantum pulse optical maser
by resonator Q-factor modulation. Zhur. eksp. i teor. fiz. 43
no.1:353-355 Jl '62.   (MIRA 15:9)

1. Fizicheskiy institut im. P.N. Lebedeva AN SSSR.
                    (Masers)

7.2575 (4963)

40438
S/056/62/043/003/058/063
B104/B102

AUTHORS: Basov, N. G., Markin, Ye. P., Mash, D. I.

TITLE: Some characteristics of neon-helium quantum generator

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43,
              no. 3(9), 1962, 1116-1117

TEXT: The quantum generator shown in the figure is described. This operates on the principle of A. Javan (Phys. Rev. Lett., 3, 87, 1959; 6, 106, 1961). The discharge in the gas mixture is excited by a 30-Mc generator by way of external electrodes. Interference mirrors with a high coefficient of reflection are used. They consist of 13 quarter-wave ZnS films and cryolite. The mirror backings were optical fused quartz with a transmission factor of about 1 % for 11,530 $\overset{\circ}{\text{A}}$ waves. Power and angular dependence of the 11,530 $\overset{\circ}{\text{A}}$ emission were measured. The beam divergence was about one angular minute and the power about 8.2 mw. The latter remained virtually constant throughout the range of the neon-to-helium partial pressure ratios of 1:10-1:4 but decreased when the neon partial pressure was further increased. There is 1 figure.

Physics Inst. im P. N. Lebedev

ACCESSION NR: AT3012118   S/2504/63/021/000/0176/0199

AUTHORS: Basov, N. G.; Zuyev, V. S.; Svidzinskiy, K. K.

TITLE: Maser using a beam of ND_3 molecules

SOURCE: AN SSSR. Fizicheskiy institut. Trudy*, v. 21, 1963, 176-199

TOPIC TAGS: ND_3 maser, maser power output, maser frequency stability, maser absolute stability, microwave band maser, signal to noise ratio

ABSTRACT: The purpose of the investigation was to ascertain the feasibility of a maser using the inversion transitions in a beam of heavy-hydrogen ammonia ND_3, and resulted in the construction of an operating model of such a maser generating approximately 10^{-11} W at 1656.18 Mc (line J = 6, K = 6 of the ND_3 inversion spectrum). The absolute frequency stability is of the order of 10^{-9}. The calcula-

Card   1/3

ACCESSION NR: AT3012118

tions proving the feasibility of the maser are presented and include
proof that self-excitation can be attained with sensible maser para-
meters and a calculation of the hyperfine structure of the inversion
spectrum of ND_3. In addition to estimating the absolute stability
for the (6, 6) line, the possibilities of increasing the absolute
stability of the maser by choosing other lines (3, 2 and 5,5) or by
replacing N^{14} with N^{15} are also considered. The measurement results
agree well with the calculated data. The power yield of the ND_3
maser is approximately one-hundredth that of the NH_3 maser, but the
sensitivity of microwave receivers at 1600 Mc is much higher than
that at 24,000 Mc, so that detection of an ND_3 maser signal entails
no more difficulty than that of an NH_3 maser. The signal/noise ratio
exceeded 100 at 10^{-12} W. The resonator used had a diameter of 14 cm
and a beam length 1.2--1.5 meters, compared with 1 and 20--30 cm

Card 2/3

ACCESSION NR: AT3012118

respectively for the NH_3 maser. The entire apparatus (without dif-
fusion pump) measured 1.5 x 0.5 x 0.5 meters and weighed 150 kg,
but further reduction in size and weight is expected. "In conclu-
sion the authors thank A. M. Prokhorov for a useful discussion.
Orig. art. has: 17 figures, 14 formulas, and 2 tables.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR (Phy-
sics Institute, AN SSSR)

SUBMITTED: 00   DATE ACQ: 29Jul63   ENCL: 00

SUB CODE: PH   NO REF SOV: 010   OTHER: 015

Card   3/3

L 14972-63   EWA(k)/EWP(k)/EWG(k)/EWT(1)/BDS/ЭЖ2/EEC(b)-2/ES(t)-2
   AFFTC/ASD/ESD-3/RADC/AFGC/AFWL   Pf-4/Pz-4/P1-4   GG/AT/WG/JHB/K/EH/IJP(C)
ACCESSION NR: AP3005363   S/0181/63/005/008/2384/2386

AUTHOR: Basov, N. G.; Krokhin, O. N.

TITLE: Transformation of strong monochromatic radiation into electric current

SOURCE: Fizika tverdogo tela, v. 5, no. 8, 1963, 2384-2386

TOPIC TAGS: semiconductor laser, light-to-electricity conversion, light-to-current converter, inhomogeneous semiconductor laser, light transducer, laser detector

ABSTRACT: It is shown that strong monochromatic radiation can be converted into electric current in an inhomogeneous p-i-n semiconductor with strongly degenerate p and n regions. Space-coherent monochromatic radiation is focused on the semiconductor, producing electron-hole pairs. In this case the chemical potential in the electron region of the semiconductor (ζ_e) will coincide with the Fermi quasi-level of electrons in the i region (μ_e), and the chemical potential in the hole region (ζ_p) will coincide with the Fermi quasi-level of the holes in the i region (μ_p). Recombination current can be made small if

Card 1/3

L.14972-63
ACCESSION NR: AP3005363

$$\zeta_e - \mu_e - (\mu_p - E_v) > kT \text{ and } \zeta_p - \mu_p - (\mu_e - E_c) > kT,$$

where E_c and E_v are energies corresponding to the edge of the electron and hole zone, respectively, and T is the temperature of the sample. These conditions require strong degeneracy of the n and p regions. The potential difference across the sample will then be $\hbar\omega/e$. When current is produced, the absorption factor is a function of the current and the number of quanta absorbed per unit time becomes $\int RdV + (I/e)$, where I is the current and V the volume in which recombination occurs. The expression RdV includes recombination in the i region as well as the recombination current. The efficiency factor η, i.e., the ratio of the power at the load R_n to absorbed power equals

$$\eta = \frac{I^2 R_n}{\hbar\omega(\int RdV + I/e)}.$$

For large values of η to be obtained, two conditions must prevail: $I > e \int RdV$ and $R_n > R_i$, where R_i is the internal resistance of the device (mainly of the i

Card 2/3

L 14972-63
ACCESSION NR: AP3005363

region). The efficiency can approach unity. Strongly doped regions form a
waveguide along which the radiation is propagated. Dimensions of the i region
should be selected so as to ensure full absorption of the radiation. Another
possibility lies in the utilization of the coherence of the emission to create
an optical oscillator analogous to a semiconductor oscillator.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR, Moscow (Physics
Institute, AN SSSR)

SUBMITTED: 26Apr62   DATE ACQ: 06Sep63   ENCL: 00

SUB CODE: PH   NO REF SOV: 002   OTHER: 003

Card 3/3

ACCESSION NR: AP4003988   S/0109/63/008/012/2084/2086

AUTHOR: Basov, N. G.; Markin, Ye. P.; Nikitin, V. V.

TITLE: Some characteristics of the Ne and He laser for λ = 3.39 μ

SOURCE: Radiotekhnika i'elektronika, v. 8, no. 12, 1963, 2084-2086

TOPIC TAGS: laser, gas laser, pumping power, neon helium laser

ABSTRACT: The Physics Institute AN SSSR has investigated the relation-
ship between the output power of the neon-helium laser and its various
parameters, i.e., the diameter and form of discharge tubes, discharge
duration, mixture pressure pumping power, and transmission coefficient
of the mirrors with metallic and dielectric coating for the most in-
tensive spectrum line (Ne$3S_2$-$3P_4$, λ = 3.39 μ). Graphs of output power
(in millivolts across the measuring photoconductive cell) as a func-
tion of pumping power were plotted for various pressures in the dis-
charge tube. The discharge length was 0.9 m. Maximum output power
was obtained with a pumping power of 100 w and a pressure of roughly
1.2 mm Hg. The diameter of the generated light spot was equal to that
of the discharge tube. Variation in Ne and He mixture pressure in

Card 1/2

ACCESSION NR: AP4003988

the tube from 0.3 to 6 mm Hg did not disturb the stable operation of the generator. Generation cutoff occurred at a pressure of about 8 mm Hg. The optimum diameter of the tube was found to be 12 mm at λ = 3.39 μ. Output power depended only slightly on the change of pressure within the range 0.9—1.4 mm Hg and increased linearly with the length of the discharge. Output power oscillations were detected during nonalignment of the mirrors. Some 100 maxima were observed during shifts of the mirror ±1°. The relationship between output power and mirror transmission coefficient was investigated for coefficients of 2, 30, and 50%. The highest power was observed at 30%. After the addition of some spectrally pure Xe to the Ne-He mixture, simultaneous generation at wavelengths of 1.52, 2.02, 2.60, 3.10, 3.36, 3.39, and 3.50 μ was observed. With the Xe-He mixture, the following wavelengths were obtained: 2.02, 2.60, 3.10, 3.36, and 3.50 μ. Orig. art. has: 2 figures.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR (Physics Institute, AN SSSR)

Card 2/2

BASOV, N.G.; MARKIN, Ye.P.; NIKITIN, V.V.

Output power of a neon-helium laser as a function of various parameters. Opt. i spektr. 15 no.3:436-438 S '63.

(MIRA 16:10)

BASOV, N.G.; BOGDANKEVICH, O.V.

Recombination luminescence of AsGa and Ge following excitation by fast electrons. Zhur. eksp. i teor. fiz. 44 no.3:1115-1116 Mr '63.

(MIRA 16:3)

1. Fizicheskiy institut imeni P.N.Lebedeva AN SSSR.
   (Gallium arsenide)   (Germanium)   .   (Quantum electronics)

L 10504-63
PR/EPF(c)/EPF(n)-2/EWT(d)/EWT(1)/EWT(m)/BDS--AFFTC/ASD/SSD--Ps-4/Pu-4/Pr-4--BW/
WW/MW
ACCESSION NR: AP3000074   S/0056/63/044/005/1742/1745

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

TITLE: Obtaining negative temperatures by the method of heating and cooling of a system

SOURCE: Zhurnal eksper. i teoret. fiziki, v. 44, no. 5, 1963, 1742-1745

TOPIC TAGS: negative temperature state, laser theory, laser pumping method, thermal pumping

ABSTRACT: A method is proposed for establishing negative temperature states for certain pairs of energy levels by the rapid heating or cooling of a system having the appropriate energy level structure. In a three-level system, for instance, if the probability of transition from level 1 to level 3 is considerably greater than those from level 1 to level 2 and from level 3 to level 2, then with a sharp rise in temperature thermodynamic equilibrium will be established rapidly between levels 1 and 3 and slowly between levels 1 and 2 and levels 2 and 3. In such a case a negative temperature state will exist for a short time with respect to levels 3 and 2. The same state can occur during

Card 1/2

L 10504-63
ACCESSION NR: AP3000074

cooling of the system, but with a different distribution of energy level
transition probabilities. The optimum conditions are described by equations.
A mixture of para- and ortho-hydrogen is proposed as a concrete example;
molecules of the "symmetrical cone" type can be used as well. The abrupt
temperature change required may be produced by rapid chemical reactions or by
shock waves. Orig. art. has: 1 figure and 12 equations.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR,Moscow (Physics
Institute,AN SSSR)

SUBMITTED: 19Oct62   DATE ACQ: 12Jun63   ENCL: 00

SUB CODE: PH   NO REF SOV: 002   OTHER: 000

ss/QH
Card 2/2

BASOV, N.G.; ORAYEVSKIY, A.N.; STRAKHOVSKIY; TATARENKOV, V.M.

Molecular generator with resonators connected in series. Zhur.
eksp. i teor. fiz. 45 no.6:1768-1777 D '63.   (MIRA 17:2)

1. Fizicheskiy institut imeni Lebedeva AN SSSR.

Basov, N. G.

AID Nr. 971-27   20 May

.EXCITATION OF RECOMBINATION EMISSION BY MEANS OF A LASER (USSR)

Basov, N. G., L. M. Lisitsyn, and B. D. Osipov. IN: Akademiya nauk SSSR. Doklady, v. 149, no. 3, 21 Mar 1963, 561-562.   S/020/63/149/003/009/028

An experimental study of recombination emission in germanium, silicon, and gallium arsenide at various temperatures employs a ruby laser (6934 Å) to obtain high excitation levels. Samples of n-type germanium with a resistivity of 40 ohm·cm and a diffusion length of 1.5 mm in the shape of a "Weierstrass sphere" 8 mm in diameter were excited by light pulses with a duration of 200 μ sec and a density of 10^6 w/cm^2. A spectrometer with a lead sulfide indicator (100 μ sec time constant) was used to analyze the recombination emission pulses. The signal was amplified by a broadband amplifier and registered by a dual-beam oscillograph. Laser output was monitored by a photomultiplier.

Card 1/2

AID Nr. 971-27   20 May

EXCITATION OF RECOMBINATION [Cont'd]   8/020/63/149/003/009/028

The results show that the intensity of recombination emission at the tempera-
ture of liquid nitrogen is "two orders" greater than at room temperature, and
at the temperature of liquid helium 2 to 3 times greater than at the temperature
of liquid nitrogen. Analogous results were obtained for silicon and gallium
arsenide. It is proposed that laser pulses of 10^{-7} sec be used for further in-
vestigations of recombination processes.   [Bb]

Card 2/2

L 11280-63   EWA(k)/EWT(1)/FBD/BDS/T-2/3W2/EEC(b)-2/ES(t)-2—AFFTC/ASD/
ESD-3/RADC/APGC/AFWL—Pl-4/Po-4—JHB/IJP(C)/WG/K/EH

ACCESSION NR: AP3000510   S/0020/63/150/002/0275/0278

AUTHOR: Bagayev, V. S.; Basov, N. G. (Corresponding Member, AN SSSR); Bul, B. M.
(Corresponding Member, AN SSSR); Kopylovskiy, B. D.; Krokhin, O. N.; Markin,
E. P.; Khvoshchev, A. N.; Shotov, A. P.

TITLE: Semiconductor quantum oscillator based on the p-n transition in GaAs

SOURCE: AN SSSR Doklady, v. 150, no. 2, 1963, 275-278

TOPIC TAGS: laser, gallium arsenide laser, infrared

ABSTRACT: Coherent emission has been obtained from p-n transitions on GaAs at
77K. The current pulse length was less than 3 µsec and had a repetition fre-
quency of 50 pps. Threshold current density was about 10^4 amp/cm². Crystal
specimens were prepared by diffusing impurities into strongly doped GaAs to
secure a sufficiently flat and optically homogeneous p-n transition with an
area of 10^{-3} cm². Two surfaces perpendicular to the transition plane were
given optical flats and a high reflection coefficient. The width of the nar-
rowed line beyond the emission threshold was 1 to 5 Å. The sharp narrowing of
the line testified to the establishment of cavity feedback and commencement of
oscillation. The brightness of the crystal, observed through an infrared

Card 1/2

L 11280-63
ACCESSION NR: AP3000510

microscope, sharply increased upon crossing the threshold; the bright region of
the crystal was 10 to 15 μ wide. Two photos of the bright regions are given,
corresponding to injection currents of 10 and 18 a. Increasing current density
reduced the width of the emitting regions, apparently because of the stimulated
recombination processes occurring in an area of shorter initial diffusion
length. Some specimens manifested simultaneous emission from two transitions
in parallel planes spaced 30 μ apart. "The authors express their thanks to L.
Ya. Krol' for placing the monocrystals of gallium arsenide at their disposal,
Yu. N. Kopolev, N. N. Borzunov, L. N. Novak, and Yu. P. Zakharov for their help
with the work, and to V. I. Maly*shev and A. M. Leontovich for a wealth of
valuable advice." Orig. art. has: 13 formulas and 3 figures.

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

SUBMITTED: 11Feb63   DATE ACQ: 12Jun63   ENCL: 00

SUB CODE: PH   NO REF SOV: 007   OTHER: 003

1s/W
Card 2/2

BASOV, N. G.; BOGDANKEVICH, O. V.; DEVYATOV, A. G.

"Excitation of the semiconducting quantum oscillator by a beam of fast electrons."

paper presented at the Symp on Radiative Recombination in Semiconductors, Paris 27-28 Jul 64. [Intl Conf on Semiconductor Physics]

ORAYEVSKIY, Anatoliy Nikolayevich; IVEV, N.G., otv. red.;
BERKGAUT, V.G., red.

[Molecular generato.. " "olekuliarnye generatory. Mo-
skva, Nauka, 1964. 294 p.   (MIRA 18:1)

1. Chlen-korrespondent AN SSSR (for Basov).

I 8652-65   EWA(k)/EWT(1)/EEH GSS./EWT(1)/EEC(k)L-2/K/EHC-4/EEC(t)/T/EEC(b)L-2/EWP(k)/

Title: Semiconductor quantum generator

SOURCE: AN SSSR. Vestnik, no. 7, 1964, 19-33

TOPIC TAGS: semiconductor, quantum generator

ABSTRACT: This is a summary of the development and uses of such generators.
Special emphasis is placed on the application to communication. Information may
even now be transmitted to distances of tens of light years. The high directivity
and the ability to focus beams are pointed out. The author discusses the advantages
of very small size and low time lag of semiconductor quantum generators. Much of
the discussion is more a review of basic laser operation. The role of holes,
electrons, and different energy level schemes in detail, and the specific
feature of semiconductors is emphasized--the possibility of filling energy levels
with electrons or holes by introduction of special impurity atoms. The very low
time lag at p-n junctions permits modulating of generated radiation of high fre-
quency. Semiconductor materials that have proved successful as quantum generators
are listed with their radiation wavelengths and with their operating temperatures.

Card 1/2

L 8580-65
ACCESSION NR: AP4046583

Special emphasis is placed on the work accomplished at the Fizicheskiy institut im.
P. N. Lebedeva (Physical Institute) and the Fiziko-tekhnicheskiy institut im. A. F.
Ioffe (Physical and Technical Institute). The author discusses a new type of semi-
conductor quantum generator developed at the first of these institutes (during the
period 1961-1964): a generator excited by a beam of high-speed electrons. This
generator is discussed in considerable detail. The author outlines the search for
new efficient semiconductor materials that will permit generation and amplification
of different wavelengths. Several questions are raised relative to the
development of powerful and very efficient quantum generators. Is it still neces-
sary to preserve machining of the materials? Is it still necessary to use electri-
cal current, as formerly, for transmitting energy? May it not be simpler, at least
under certain circumstances, to transmit energy in the form of light?

L 8717-65   EWG(j)/EWA(k)/FBD/EWT(1)/EEC(k)-2/EEC(t)/T/EEC(b)-2/EWP(k)/EWA(m)-2/
EWA(h)   Pn-4/Po-4/Pf-4/Pi-4/Pab/Pl-4   IJP(c)/ESD(gs)/AFWL/ASD(a)-5/AFTC(p)/SSD/
RAEM(a), RAEM(t), AFETR, ESD, ESD(t), ASD(d)   WG

ACCESSION NR: AP4045491   8/0109/64/009/009/1680/1686

AUTHOR: Basov, N. G.; Grasyuk, A. Z.; Orayevskiy, A. N.

TITLE: Some special features of information transmission and recep-
tion by means of laser oscillators and amplifiers

SOURCE: Radiotekhnika i elektronika, v. 9, no. 9, 1964, 1680-1686

TOPIC TAGS: laser, multichannel communication line, laser beam,
traveling wave laser, image amplifier

ABSTRACT: Some basic properties of multichannel communication lines
using the time and space coherence of the radio emission of a laser
oscillator concurrently are studied. The information is transmitted
by irradiating an object of variable transparency with a laser beam.
The authors demonstrated that the transmission capacity of such a
system exceeds considerably the corresponding value yielded by the
Shannon formula for one channel. The receiver signal-to-noise ratio
required for the stable operation of communication lines using
traveling-wave lasers is evaluated. The problem of the possibility
of using regenerative lasers as image amplifiers is also studied.

Card 1/2

L 8717-65

ACCESSION NR: AP4045491

The authors note that, for the purpose of simplifying the receiver of a multichannel communication line, it is possible to utilize space quantization of transparency functions with limited diffraction spectra. Orig. art. has: 7 figures and 8 formulas.

ASSOCIATION: Fizicheskiy institut im. P. H. Lebedeva AN SSSR (Physics Institute, AN SSSR)

SUBMITTED: 25Apr 63   ATD PRESS: 3112   ENCL: 00

SUB CODE: EC   NO REF SOV: 004   OTHER: 003

Card 2/2

BASOV, N.G.

Semiconductor lasers. Vest. AN SSSR 34 no.9:19-33 S '64.
(MIRA 17:10)

1. Chlen-korrespondent AN SSSR.

BASOV, N.G.; KROKHIN, O.N.

Conditions for heating up a plasma by radiation from an optical
maser. Zhur. eksper. i teor. fiz. 46 no.1:171-175 Ja'64.

1. Fizicheskiy institut imeni Lebedeva AN SSSR.   (MIRA 17:2)

ACCESSION NR: AP4031193   8/0056/64/046/004/1508/1510

AUTHOR: Basov, N. G.; Krokhin, O. N.

TITLE: Optical excitation of semiconductors

SOURCE: Zh. ekspor. i teor. fiz., v. 46, no. 4, 1964, 1508-1510

TOPIC TAGS: laser, semiconductor laser, monochromatic radiation, coherent
radiation, recombination radiation, optical pumping, optical excitation,
resonant cavity

ABSTRACT: Excitation of semiconductors by monochromatic radiation with a fre-
quency slightly higher than that of the edge of the intrinsic absorption band
is investigated theoretically. A battery of independent p-n junction lasers
is suggested as the excitation source of incoherent monochromatic radiation.
It is pointed out that when the intensity of incident radiation is high, the sum
$\mu_e + \mu_p$ of Fermi quasi-levels for electrons and holes approaches the energy of
incident photons $\hbar\omega_1$. For some frequency band such that $\hbar\omega < \mu_e + \mu_p$, population
inversion is achieved and oscillation may become possible. An expression for

Card 1/2

ACCESSION NR: AP4031193

the minimum intensity of incident radiation J_{min} necessary to reach the threshold for $\mu_e + \mu_p$ corresponding to the oscillation threshold is derived. It is shown that when oscillation occurs $\mu_e + \mu_p$ remains constant for a wide range of $J > J_{min}$. At a very high intensity of radiation $(J \gg J_{min})$, when considerable heating of electron-hole gas takes place, the system becomes a highly efficient converter of incoherent into coherent radiation, with efficiency approaching 100%.

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

SUBMITTED: 17Feb64   DATE ACQ: 07May64   ENCL: 00

SUB CODE: EH   NO REF SOV: 005   OTHER: 002

Card 2/2

L 13952-65   ENG(j)/EWA(k)/FBD/EWT(1)/EWT(m)/EEC(k)-2/EEC(t)/T/EWP(t)/EWP(k)/
EEC(b)-2/EWP(h)/EWA(m)-2/EWA(h)   Pn-4/Po-4/Pf-4/Peb/Pl-4/Pl-4   ASD(d)/SSD/
AFWL/ASD(a)-5/ESD/AFETR/APMD(t)/RAEM(a)/RAEM(c)/ESD(c)/ESD(gs)/ESD(t)/IJP(c)
ACCESSION NR: AP4047929   JD/JG   8/0056/64/047/004/1588/1590

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

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47,
no. 4, 1964, 1588-1590

TOPIC TAGS: laser, semiconductor laser, cadmium sulfide, recombina-
tion radiation, coherent light

ABSTRACT: The present paper is an expanded version of an earlier
article (Basov, N. G., O. V. Bogdankevich, A. G. Devyatkov. Excitation
of a semiconductor laser by a fast electron beam. AN SSSR. Doklady,
v. 155, no. 4, 1964, 783) which reported successful development of
the first electron-beam pumped semiconductor laser. The following
additional data were provided in this paper: The 2 x 1.5 mm² faces
of the 3-mm long sample were made parallel and carefully polished.
The duration of the electron beam pulse from an electron gun was 2.5 μ
and not 2 μ as was reported in the earlier paper. The electron beam
was accelerated to energies on the order of 200 kev in a cylindrical

Card 1/2

L. 13952-65

ACCESSION NR: AP4047929

cavity with an Bore standing wave. The current density could be varied from 0 to 1 amp/cm^2 in the experiments. The recombination radiation spectrum consisted of a number of wide bands with transition energies smaller than the width of the forbidden band. Three narrow lines at wavelengths of 5035, 4966 and 4891 Å were observed at high current densities. The intensity variation of the emission line at 4966 Å with the current density is shown in Fig. 1 of the Enclosure and a simultaneous narrowing of the spectral line from 35 to 7 Å is shown in Fig. 2. Orig. art. has: 2 figures.

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

SUBMITTED: 08Feb64   ENCL: 02   SUB CODE: EC, NP

NO REF SOV: 003   OTHER: 002   ATD PRESS: 3135

Card 2/4

L 11962-65   ENG(j)/EWA(k)/FBD/ENT(1)/EWP(e)/ENT(m)/EEC(k)-2/EEC(t)/T/
EEC(b)-2/EWP(k)/EWA(m)-2/EWA(h)   Pn-4/Po-4/Pf-4/Pi-4/Pl-4/Peb   IJP(c)/SSD/AFWL/
AFETR/BSD/PAEM(a)/ASD(a)-5/ASD(d)/ESD(gs)/ESD(t)   WG/WH
ACCESSION NR: AP4047933   S/0056/64/047/004/1595/1597

AUTHOR: Basov, N. G.; Ambartsumyan, R. V.; Zuyev, V. S.; Kryukov,
P. G.; Stoylov, Yu. Yu.

TITLE: Q-switched laser   B

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47,
no. 4, 1964, 1595-1597

TOPIC TAGS: laser, ruby laser, laser amplifier, Q switch, Q switching
laser

...the source. The ruby rod was 1... cm long, 0.9 cm in diameter,
and had a Cr^{3+} concentration of 0.06%. A helical flash lamp was en-
ergized by an 8-kv, 300-uf power supply and produced a 700-usec pulse.
The Kerr cell was energized by a 0.5-usec pulse, whose rise time was
5 nanoseconds, 500 usec after ignition of the flash lamp. The laser
then emitted a single pulse with an energy of 1.8 joules. The addi-
tion of a second ruby laser as an amplifier produced an output pulse
of 8 joules having a steeper form. Orig. art. has: 2 figures.
Card 1/2

L 11962-65
ACCESSION NR: AP4047933

ASSOCIATION: none

SUBMITTED: 10Jul64   ATD PRESS: 3120   ENCL: 00

SUB CODE: EC   NO REF SOV: 002   OTHER: 001

Card 2/2

BASOV, N.G.; GRASYUK, A.Z.; ORAYEVSKIY, A.N.

Some special features of transmission and reception of information using masers and lasers. Radiotekh. i elektron. 9 no.9:1680-1686 S '64.

(MIRA 17:10)

1. Fizicheskiy institut im. P.N.Lebedeva AN SSSR.

L 23061-65   EWA(k)/EWT(1)/EEC(k)-2/T/EEC(b)-2/EWP(k)/EWA(m)-2   Pf-4/Pi-4/Pl-4/
Po-L   IJP(c)   JHB/WG
ACCESSION NR: AP5001858

8/0056/64/047/006/2314/2316

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

TITLE: The possibility of determining relaxation rates by means of a hydrogen-
atom beam maser

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47, no. 6, 1964,
2314-2316

TOPIC TAGS: maser, hydrogen beam maser, relaxation rate

ABSTRACT: The authors present some characteristics obtained at FIAN with a
hydrogen atom beam maser ($\lambda = 21$ cm) and show how a study of these characteristics
can be used to deduce the relaxation rates of various processes that lead to the
loss of active atoms (escape of active particles from the vessel, wall losses,
r e l a x a t i o n due to magnetic field inhomogeneities, and spin re-
orientation upon collision or two hydrogen atoms). An oscillogram of the time
dependence of the power of stimulated emission of an underexcited maser
under the influence of a light pulse yielded for the FIAN equipment a
relaxation rate $\gamma_0 = 3$ sec^{-1}. Information on the relaxation rate was also obtained

Card 1/2

L 23061-65

ACCESSION NR: AP5001858

by plotting the output power of an operating maser against the intensity of the active-atom beam. This yields the constant characterizing the relaxation due to collision of two hydrogen atoms with spin exchange. The value obtained was in the range $(1-6) \times 10^{-10}$ cm^3/sec/particle, which agreed with published data. A value of 2 sec^{-1}, obtained for γ_0 by plotting the resonance curve of the cavity and using a formula for the frequency pulling of the maser by the generator is in good agreement with the value obtained from the stimulated-emission oscillogram. Orig. art. has: 3 figures and 1 formula.   [02]

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

SUBMITTED: 10Jul64   ENCL: 00   SUB CODE: EC, EM

NO REF SOV: 000   OTHER: 003   ATD PRESS: 3173

Card 2/2

ACCESSION NR.   AP4030780   S/0020/64/155/004/0783/0783

AUTHOR: Basov, N. G. (Corresponding Member, AN SSSR); Bogdankevich,
O. V.; Devyatkov, A. G.

TITLE: Excitation of a semiconductor laser by a fast electron beam

SOURCE: AN SSSR. Doklady*, v. 155, no. 4, 1964, 783

TOPIC TAGS: laser, semiconductor laser, junction laser, electron
beam laser, cadmium sulfide laser

ABSTRACT: This article reports the first successful results of
experiments in which stimulated emission of radiation was achieved
from CdS monocrystals in pulsed operation by means of an electron
beam.   Intense radiation in the green part of the spectrum ($\lambda = 4966\text{Å}$)
was observed during irradiation of CdS monocrystal, placed in a
helium cryostat, by a beam of ~ 200 Kev electrons.   The intensity of
fluorescence increased sharply with current density.   A three-fold
increase of the current density above the threshold resulted in
a two-order increase in the intensity of radiation and a simultaneous

Card 1/2

ACCESSION NR. AP4030780

narrowing of the emission line from 35 to 7 Å. The threshold current was observed to depend strongly on the quality of the crystals used. The duration of the current pulses was 2 µsec and the repetition frequency was several tens of cps. At small current densities, the duration of emission after the end of the pulse was 2 µsec. At the maximum current densities, the light pulse was synchronous with the pulse.

ASSOCIATION: none

SUBMITTED: 12Feb64   DATE ACQ: 30Apr64   ENCL: 00

SUB CODE: PH   NO REF SOV: 002   OTHER: 000

Card 2/2

L 8723-65   EWG(j)/EWA(k)/FBD/EWT(1)/EEC(k)-2/EEC(t)/T/EEC(b)-2/EWP(k)/EWA(m)-2/
EWA(h)   Pn-4/Po-4/Pf-4/Peb/Pi-4/P1-4   IJP(c)/SSD/BSD/RAEM(t)/AFETR/ASD(d)/RAEM(a)/
ESD(gs)/ASD(a)-5/ESD(t)/AFWL   WG

ACCESSION NR: AP4043832   S/0020/64/157/005/1084/1087

AUTHOR: Basov, N. G. (Corresponding member AN SSSR); Grasyuk, A. Z.;
Zubarev, I. G.

TITLE: Regenerative laser

SOURCE: AN SSSR. Doklady*, v. 157, no. 5, 1964, 1084-1087

TOPIC TAGS: laser, ruby laser, regenerative laser, laser amplifier,
unidirectional laser, traveling wave laser, laser gain

ABSTRACT: An optical amplifying system is presented, consisting of
a Q-switching ruby laser driving a unidirectional amplifier laser.
The Q-switch of the signal source was provided to determine properly
the shape, length, power, and time reference of the driving pulse.
The unidirectional feature of the driven laser, achieved by a third
mirror taking the return path outside the ruby rod, renders the
threshold adjustment of the system less critical and makes it easier
to reach stable gain. Furthermore, the unidirectional system allows

Card 1/2

L 8723-65

ACCESSION NR: AP4043832

3

for the employment of several amplifying lasers in series without interstage isolators. In the experiment, the overall power gain was measured as a function of single-pass gain. An overall gain in the vicinity of 10 was recorded against a single-pass gain of 6 and the reflection coefficient of the semitransparent mirror was equal to 0.1. In order to measure the sensitivity of the amplifier, the photomultiplier was placed as far from it as possible to reduce luminescence effects and a flash lamp quenching device was used to eliminate the pump background. The measurements showed that the system is sensitive to signal power of the same order of magnitude as the theoretical value, given a signal-to-noise ratio close to unity. The pass bandwidth was 5 cm^{-1} for overall power gain of 25. "The authors extend their thanks to V. S. Zuyev, P. G. Kryukov, and V. I. Svergun for assistance in their work." Orig. art. has: 4 figures and 9 equations.

ASSOCIATION: none

SUBMITTED: 18Feb64   ATD PRESS: 3113   ENCL: 00

SUB CODE: EC   NO REF SOV: 004   OTHER: 002

Card 2/2

L 53981-65   EWA(k)/FBD/EWG(r)/EWT(l)/EWP(w)/EWT(m)/EEC(k)-2/EWP(l)/EEC(t)/T)

ACCESSION NR: AP5014226   UR/0386/65/001/004/0029/0033

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

TITLE: Generation of optically pumped GaAs by means of a neodymium glass laser

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu.
Prilozheniye, v. 1, no. 4, 1965, 29-33

TOPIC TAGS: gallium arsenide, optical pumping, neodymium glass laser, nonlinear
effect, two photon absorption, Raman scattering, second harmonic generation

ABSTRACT: A neodymium-doped glass Q-spoiled laser (pulse energy 0.5 J, power up
to 1 MW) was used to excite GaAs. The pumping energy was 1.17 ev,
which is considerably smaller than the energy gap of the forbidden zone in GaAs
(1.51 ev) = 5200 A) at T = 77K). The excitation was achieved in a 5 x 5 x 15 mm
n-type GaAs crystal in which carrier concentration and mobility were 1.7 x 10^15
and 6000 cm^2/v sec, respectively. The crystal, whose front surface 3,
was attached to a massive heat sink 6 placed in liquid nitrogen. The pumping light
1 was focused at one of the crystal edges 4 by means of a cylindrical lens 2. The
other two edges, orthogonal to edge 4, were polished accurately to form a plane
resonator . Light 5, from one side of the resonator, was directed at the ISP-51

Cord 1/4

L 53581-65
ACCESSION NR: AP5014226

spectrograph 7, where it was photographed; the light from the other side was
directed at a screen 3, where it was also photographed. The effect of the density
of pumping power on the width and intensity of spectral lines was studied and
shown in Fig. 2. The average of the ra... of ... ...
... a figure ... ... as is the ... ...
... of the Raman scattering of a ruby laser ... ... nitrogen ... ...
A. Z. Grasyuk, V. A. Katulin, Doklady AN SSSR, v. 161, no. 6, 1965), a comparatively
large volume of the semiconductor takes part in the generation. The efficiency of
the generation, expressed as a ratio of yield to pumping energy, was about 0.1%.
Research is currently being conducted to explain the physical nature of the exit... ion
of InAs. Attempts to observe the second harmonic of the pumping frequency under
conditions described by N. Blumbergen (International School of Physics "Enrico
Fermi", Course XXXI, Varenna, 1963) have not yet yielded positive results. Orig.
art. has: 2 figures.
                                                                              [YK]

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

SUBMITTED: 16Apr65   ENCL: 02   SUB CODE: EC
NO REF SOV: 001   OTHER: 001   ATD PRESS: 4015

Card 2/4

L 53581-65
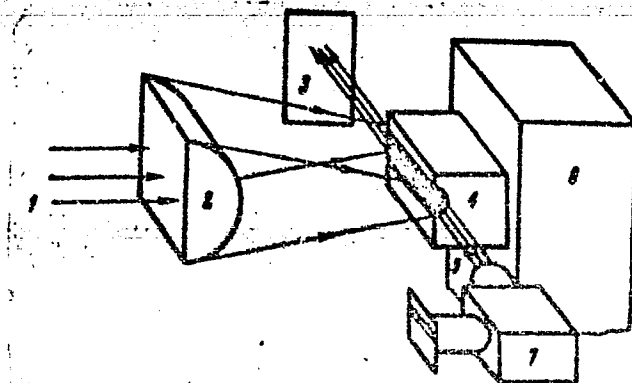
ENCLOSURE: 01

Fig. 1. Schematic of the installation

Card 3/4

L 53581-65
ACCESSION NR: AP5014226   ENCLOSURE: 02
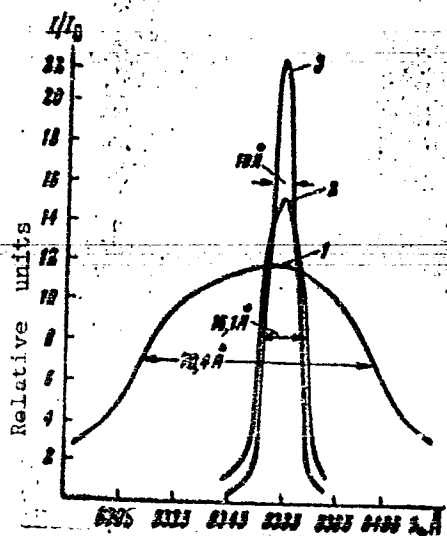
Fig. 2. Spectral line of GaAs for
various values of pumping power.
The scale along the ordinate axis
differs for various curves: the
maximum at curve 3 is much greater
that at curve 1.

Card 4/4

L 58925-65   EWA(k)/FBD/EWG(r)/EWT(1)/EWP(e)/EWT(m)/EEC(k)-2/EWP(1)/T/EEC(b)-2/
EWP(k)/EWP(b)/EWA(m)-2/EWA(h)   Pm-4/Pn-4/Po-4/Pq-4/Pf-4/Peb/P1-4/P1-4/ IJP(c)
ACCESSION NR: AP5018842   WG/WH   UR/0368/65/003/001/0026/0031
                                                       535.89

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

TITLE: The response of a neodymium-glass laser amplifier

SOURCE: Zhurnal prikladnoy spektroskopii, v. 3, no. 1, 1965, 26-31

TOPIC TAGS: laser amplifier, neodymium glass amplifier, traveling wave amplifier,
neodymium glass laser, amplifier response

ABSTRACT: Data are presented on the experimental investigation of a neodymium-glass
laser amplifier. The block diagram of a setup used for the measurement of the am-
plifier response is shown in Fig. 1 of the Enclosure. A neodymium-glass laser with
Q-switching was used as an exciter. The laser output was transmitted through the
theodolite T, where it was focused and subsequently converged on an object with var-
iable transparency. After passage through the theodolite the angular divergence of the
beam was smaller than the angular diffraction at the input and output apertures of
the amplifier. The beam from the theodolite was attenuated by neutral filters which
were precalibrated to the laser wavelength (1.06 mμ). After passage through an
object, one-half of the beam was separated by a 50% mirror and photographed. The
other half was passed through a neodymium-glass amplifier and was also photographed.
Card 1/3

L 58925-65

ACCESSION NR: AP5018842

The processed photographs show that, unlike the ruby amplifier, the neodymium-glass amplifier is capable of hf. amplification of the image of a laser-illuminated object. The amplifier response was computed theoretically and measured experimentally by means of a two-beam oscillograph, as a function of the area of the amplifier output aperture and the magnitude of the solid angle of the recorder. The experimental value of the response of a neodymium-glass amplifier was 1.7×10^{-6} w. This value is close to the theoretical limit of 1.2×10^{-6} w for a transmission band of 6×10^{12} cps. Orig. art. has: 4 figures and 12 formulas.

[YK]

ASSOCIATION: none

SUBMITTED: 08Apr65   ENCL: 01   SUB CODE: EC

NO REF SOV: 001   OTHER: 003   ATD PRESS: 4051

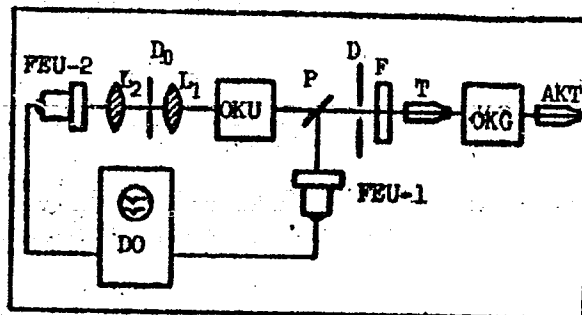Card 2/3

ACCESSION NR: AP5018842

Fig. 1. Block diagram of the setup for the measurement
of amplifier response

AKT - Autocollimator; OKG - laser with modulated Q;
T - theodolite; F - precalibrated filters; D, D_0 - dia-
phragms; P - plane-parallel glass layer; OKU - laser
amplifier; L_1 and L_2 - confocal lens (F ~ 6 cm);
FEU-1 - control photomultiplier; FEU-2 - recorder;
DO - two-beam oscillograph.

Card 3/3

L 24577-65   EWG(j)/EWA(k)/FBD/EWT(1)/EEC(k)-2/EEC(t)/T/EEC(b)-2/EWP(k)/EWA(m)-2/
EWA(h)   Pn-4/Po-4/Pf-4/Peb/P1-4/P1-4   IJP(c)   WG

ACCESSION NR: AP5003477   S/0181/65/007/001/0337/0339

AUTHOR: Basov, N. G.; Belenov, E. M.; Letokhov, V. S.

TITLE: Synchronization of oscillations in a semiconductor laser with
several p-n junctions
                                                                25

SOURCE: Fizika tverdogo tela, v. 7, no. 1, 1965, 337-339

TOPIC TAGS: laser, semiconductor laser, p n junction, stimulated
emission, laser action, mode, resonator cavity, cavity resonator,
standing mode

ABSTRACT: A theoretical analysis is conducted of the mode of operation
of an injection laser consisting of an array of p-n junctions in which
oscillations are synchronized in order to obtain larger power output
and better directionality of laser emission. An electrodynamic model
of a p-n junction as a dielectric waveguide with a low critical fre-
quency in which there are only the lowest order standing waves E_{00}
and H_{00} is used in deriving a formula for the internal coupling of the
junction due to the penetration of the field. An expression is also
derived for the external diffraction coupling coefficient by a method
1/2

L 22577-65
ACCESSION NR: AP5003477   /

developed by N. G. Basov et al which is described in a paper yet to be
published. External diffraction coupling of p-n junctions is obtained
by making a hole in the face of the semiconductor and using an external
mirror. The criteria for stability of the synchronized mode of oper-
tion are obtained by analyzing the oscillation equations of a system
similar to that of two interacting lasers. Numerical estimates for a
typical p-n junction show that synchronization of oscillations is more
favorable in the case of external coupling. Orig. art. has: 5 form-
ulas and 2 figures.   [CS]

ASSOCIATION: Fizicheskiy institut imeni P. N. Lebedev (Physics
Institute)

SUBMITTED: 02Nov64   ENCL: 00   SUB CODE: EC,SS

NO REF SOV: 002   OTHER: 002   ATD PRESS: 3172

Card 2/2

L 57545-65   EWA(k)/FBD/EWG(r)/EWT(l)/EWT(m)/EEC(k)-2/EWP(l)/EEC(t)/T/EWP(t)/
EEC(b)-2/EWP(k)/EWP(b)/EWA(m)-2/EWA(h)   Pf-4/Pl-4/Pl-4/Pm-4/Pn-4/Po-4/Peb   SCTB/
IJP(c)   WG/JD/JG

ACCESSION NR: AP5014611   UR/0181/65/007/006/1902/1904

AUTHOR: Basov, N. G.; Yeliseyev, P. G.; Nikitin, V. V.; Lishina, A. V.; Maslov, V. N.; Nashel'skiy, A. Ya.

TITLE: A semiconductor GaAs$_{1-x}$P$_x$ junction laser

SOURCE: Fizika tverdogo tela, v. 7, no. 6, 1965, 1902-1904

TOPIC TAGS: laser, semiconductor laser, junction laser, injection laser, stimulated emission, gallium arsenide, gallium phosphide

ABSTRACT: A GaAs$_{0.85}$P$_{0.15}$ pulsed injection laser operating at 77K is described. The monocrystalline solid solution of GaAs$_{0.85}$P$_{0.15}$ was prepared by epitaxial growth (sandwich method). The p-n junction was formed at a depth of 26 μ by diffusing zinc at 850C for 2.5 hr into a polished 6.5 μ thick wafer of GaAs$_{0.85}$P$_{0.15}$. Coherent emission was observed at 7420 Å at a threshold current density of 5900 amp/cm^2. A high resolution spectrum of laser emission showed multimode oscillations similar to those of GaAs injection lasers. The high threshold current density was attributed to optical inhomogeneity of the epitaxial film. Dimensions of the laser, pulse duration, and repetition rate are not given. Orig. art. has: 2 figures.
[CS]

Card 1/2

L 57545-65
ACCESSION NR: AP50.4611

ASSOCIATION: Fizicheskiy Institut im. P. N. Lebedeva AN SSSR, Moscow (Physics
Institute, AN SSSR)

SUBMITTED: 28Jan65   ENCL: 00   SUB CODE: SS

NO REF SOV: 001   OTHER: 004   ATD PRESS: 4037

Card 2/2

AUTHOR: Basov, N.G.; Belenov, E.M.; Letokhov, V.S.

TITLE: Diffraction synchronization of lasers

SOURCE: Zhurnal tekhnicheskoy fiziki, v.35, no.6, 1965, 1098-1105

TOPIC TAGS: laser, coupling constant, resonator, diffraction coupling

ABSTRACT: The authors calculate the diffraction coupling coefficient for two identical open resonators and derive conditions for the stable synchronous operation of diffraction coupled lasers. The calculations were undertaken because of their application to semiconductor lasers in which the working substance is deposited directly on the mirror and is separated into cells by absorbing partitions. The coupling coefficient for two open resonators with infinitely long reflectors of finite width operating in the TEM$_{00}$ or TEM$_{10}$ mode was calculated numerically for different values of the separation and the Fresnel number by the method of A.G.Fox and T.Li (BSTJ 40,453,1961). The results for

Card 1/3

L 54772-65
ACCESSION NR: AP5015635

Fresnel number 2.5 are presented graphically, and those for other Fresnel numbers are said to be similar. The coupling decreases so rapidly with increasing separation that in the case of many resonators it is only necessary to consider the coupling between nearest neighbors. Conditions for the stability of diffraction coupled lasers are deduced from the equations of A.N.Orayevskiy (Radiotekhnika i elektronika 4,718,1959) and V.M.Fayn (ZhETF 33,945,1957) by the method of Van der Pol. At some separations the stability conditions for both TEM_{00} and TEM_{10} oscillations are simultaneously satisfied. The present calculations do not show which is stable in this case. If resonators with Fresnel number 2.5 are separated by less than 4% of the width of the mirror, the TEM_{00} mode will be stable provided their lengths do not differ by more than approximately 2% of the wavelength. Orig.art.has: 23 formulas and 2 figures.

Card 2/3

L 54772-65

ACCESSION NR: AP5015635

ASSOCIATION: none

SUBMITTED: 24Aug64   ENCL: 00   SUB CODE: EC, EM

NR REF SOV: 010   OTHER: 002

Card 3/3

BASOV, N.G., laureat Nobelevskoy premii po fizike

Semiconductor quantum generators. Priroda 54 no.5:42-50 My '65.
(MIRA 18:5)

1. Chlen-korrespondent AN SSSR.

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

TITLE: Diffraction synchronization of lasers

SOURCE: AN SSSR. Doklady, v. 161, no. 3, 1965, 556-559

TOPIC TAGS: laser, semiconductor laser, laser cavity, stimulated
emission, laser array

ABSTRACT: A theoretical analysis is presented of the operation of a
laser consisting of a cavity in which the active substance (a semiconduc-
tor film) is deposited directly on the reflectors. To suppress unde-
sired oscillations in the plane of the active substance, the layer is
split into separate isolated elements by absorbing partitions. The
analysis is limited to the most desirable mode of operation, i. e.,
only the case of synchronized oscillations in the TEM_{00} and TEM_{10}
modes is considered. The coefficients of diffraction coupling of
open-cavity resonators are calculated, and the stability criteria for
such an operating regime are established. The losses in the TEM_{00}

Card   1/2

L 43190-65
ACCESSION NR: AP5010571

and TEM_{10} modes were calculated by a numerical method developed by A. G. Fox and T. Lee. It is shown that when the diffraction coupling coefficient has negative values, coupled resonator cavity losses are smaller than the losses of an isolated cavity resonator. It is established that a stable mode of operation is that of the energetically most affective regime. Orig. art. has: 10 formulas and 1 figure.   [CS]

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

SUBMITTED: 06Aug64   ENCL: 00   SUB CODE:EC,SS

NO REF SOV: 006   OTHER: 002   ATD PRESS: 3242

Card 2/2

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

TITLE: Maximum cross section of a laser beam

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

TOPIC TAGS: laser, ruby laser, Q modulated laser, laser beam, beam size, CW laser, pulsed laser

ABSTRACT: Limitations imposed on the cross section of a laser beam are discussed. In CW laser resonators with large transverse dimensions, the size of the emitted beam can be restricted, in principle, by delayed interaction of the remote areas of the laser, or by detuning of the natural frequencies of the individual parts of the resonator. The delay effect, however, imposes no restrictions on the size of the generation area. Thus, when $\lambda = 1 \mu$ and $\delta L \approx 1 \AA$, $N_{max} \approx 800$, or when $L = 100$ cm the maximum width of the generation area was ≈ 5 cm. In pulsed (Q-modulated) lasers, the cross section is restricted when laser action occurs during a time of the same order as that required to set up modes in the resonator. The generation area in pulsed lasers can develop as the result of 1) the appearance and growth of separate, mutually-incoherent "streams" and 2) the confluence of adjacent

Card 1/2

L 41810-65
ACCESSION NR: AP5010825

streams with the establishment of the coherence. Thus, in a Q-modulated pulsed laser with $L = 50$ cm and $\lambda = 7 \cdot 10^{-5}$ cm, the generation area expanded in $\sim 10^{-8}$ sec to ~ 6 mm. In the case of a Q-modulated pulsed ruby laser with identical parameters, the area was 4 mm. Orig. art. has: 8 formulas. 15

[YK]

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

SUBMITTED: 24Nov64	ENCL: 00	SUB CODE: EC
NO REF SOV: 004	OTHER: 001	ATD PRESS: 3235

Card 2/2

L 43907-65   EEC(b)-2/EWG(r)/EEC(k)-2/EWA(h)/EWA( )/EWP(k)/EWT(1)/EWT(m)/EEC(t)/FBD/
WG(m)/EWP(b)/T/EWA(m)-2/EWP(t)   Pf-4/P1-4/P1-4/Pn-4/Pn-4/Po-4/Pz-6/Feb   SCTb/
IJP(c)   RIM/AT/WF/JD/JG
ACCESSION NR: AP5011524   UR/0020/65/161/005/1059/1059

AUTHOR: Basov, N. G. (Corresponding member, AN SSSR); Bogdankevich, C. V.; Pechenov, A. N.; Abdulayev, G. B.; Akhundov, G. A.; Salayev, E. Yu.

TITLE: Stimulated emission in a monocrystal of GaSe excited by fast electrons

SOURCE: AN SSSR. Doklady, v. 161, no. 5, 1965, 1059

TOPIC TAGS: laser, semiconductor laser, stimulated emission, gallium selenide, electron beam laser, coherent light

ABSTRACT: Achievement of laser action in a III-VI semiconductor (GaSe) pumped by an electron beam is reported. Samples of p-type GaAs with a carrier concentration of 5×10^{15} cm^{-3} and resistivity of ~200 ohm/cm at 300K were cleaved to form two plane-parallel faces. Monocrystalline samples 1 mm thick or less, cooled by liquid nitrogen, were bombarded with a 2-μsec 200-kev electron beam directed to the cleaved surface at an angle of 70 degrees. Emission observed in the direction perpendicular to the surface was recorded by a spectrograph. The emission spectrum extending between 5870 Å and 6150 Å showed four peaks. The maximum was observed at 5925 Å, indicating that laser action is generated by interband recombination (the forbidden gap of GaAs at 77K is 2.09 ev). Fig. 1 of the Enclosure shows that the

Card 1/3

L 43907-65

ACCESSION NR: AP5011524   2

line at 5925 Å narrows with increasing current density of the beam. The displace-
ment of the line toward the long wavelength region at high current densities was
attributed to heating. When the cleaved surfaces were silvered, the line width of
the peak decreased to one-half its value and additional peaks appeared at 5960 Å
and 5983 Å. Orig. art. has: 1 figure.   [CS]

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

SUBMITTED: 21Aug64   ENCL: 01   SUB CODE: SS

NO REF SOV: 002   OTHER: 002   ATD PRESS: 3248

Card 2/3

L ~~~~~~   SEC(b)-2/EWG(r)/SEC(k)-2 EWA .../EWA/.../EWF(A)/EWF(.)//EWF(m)/EE.(z)//EE/
EWF(b)/3/EWA(m)-2/EWP(a)/EWP(t)   Pt-4/Pl-4/Pl-4/Ps-4/Pn-4/Po-4/Peb   SCTB/IJP(c)

ACCESSION NR: AP5012760   WH/WG/JD/JG   UR/0020/65/161/006/1306/1307

AUTHOR: Basov, N. G. (Corresponding member AN SSSR); Grasyuk, A. Z.; Katulin, V. A.

TITLE: Stimulated emission from an optically pumped GaAs laser

SOURCE: AN SSSR. Doklady, v. 161, no. 6, 1965, 1306-1307

TOPIC TAGS: laser, semiconductor laser, GaAs, GaAs laser, optical pumping, stimulated emission, optically pumped laser, Raman laser, Raman scattering, Raman pumped laser

ABSTRACT: This article, submitted for publication on 4 January 1965, describes the first Soviet optically pumped semiconductor laser. Stimulated emission was attained in GaAs pumped by a ruby laser and by the Stokes component of Raman emission from liquid nitrogen excited by radiation from a ruby laser. A 2 x 1 x 0.5 mm sample was fabricated from a GaAs monocrys'   The plane polished surface exposed to irradiation was parallel to the ... the emission was recorded photographically or observed visually by means of an image converter. The energy of the pumping source was increased by means of a

Card 1/3

L 46150-65

ACCESSION NR: AP5012760

photomultiplier. A narrow spectral line in the spectral interval between 8340 and 8400 Å was emitted by the GaAs laser pumped by an unfocused 0.1 J(2 Mw) pulse from a ruby laser. When the pulse energy reached 0.15 J, the line became very narrow and oscillation occurred on the 8365 Å line. Narrowing of the line was accompanied by a narrowing of the directionality pattern and a sharp increase of the spectral line intensity. Stimulated emission by Raman excitation was accomplished by placing a dewar with liquid nitrogen between the ruby and the GaAs laser. A lens was placed in front of the dewar's entrance window and another one, confocal with the first, in front of its exit window. An infrared filter transparent only to the Stokes component of Raman emission from liquid nitrogen (8061 Å) was installed in front of the GaAs laser. Experiments showed that 10% of the energy from a 0.3 J beam of ruby laser emission is transformed into Stokes radiation. Focusing of the Raman emission up to an energy density of 0.2 J/cm² resulted in laser oscillation at both liquid nitrogen and room temperatures. The quantum yield of the Raman pumped GaAs laser was about 4%; its divergence, about 4°. Orig. art. has; 3 figures.

[CS]

Card 2/3

L 46150-65
ACCESSION NR: AP5012760

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

SUBMITTED: 04Jan65   ENCL: 00   SUB CODE: EC

NO REF SOV: 007   OTHER: 001   ATD PRESS: 4002

Card 3/3 CC

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

Dynamics of a laser with two types of oscillation. Dokl. AN SSSR
162 no.4:781-784 Je '65.
(MIRA 18:5)

1. Fizicheskiy institut im. P.N.Lebedeva AN SSSR. 2.Chlen-kor-
respondent AN SSSR (for Basov).

BASOV, N.G.; BOGDANKEVICH, O.V.; DEVYATKOV, A.G.

Optical maser operating on a CdS crystal with excitation by
fast electrons. Zhur. eksp. i teor. fiz. 47 no.4:1588-1589
O '64.
(MIRA 18:1)

1. Fizicheskiy institut imeni P.N. Lebedeva AN SSSR.

BASOV, N.G.; AMBARTSUMYAN, R.V.; ZUYEV, V.S.; KRYUKOV, P.G.; STOYLOV, Yu.Yu.

Optical maser with pulse switching-on of the Q-factor. Zhur. eksp.
i teor. fiz. 47 no.4:1595-1597 O '64.   (MIRA 18:1)

L 2686-66   EWA(k)/FBD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(h)/EWA(m)-2   SCTB/IJP(c)
WG

ACCESSION NR: AP5021139   UR/0386/65/002/001/0006/0009

AUTHOR: Basov, N. G.; Letokhov, V. S.

TITLE: Concerning atomic beam lasers

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 2, no. 1, 1965, 6-9

TOPIC TAGS: atomic spectroscopy, laser beam, optic transition, forbidden transition, spectral line, line intensity, line width

ABSTRACT: The authors examine the possibility of reducing the line width of a laser by using an atomic beam in a direction parallel to the front of the wave in the resonator. Since population inversion cannot be produced in this case by allowed optical transitions, they propose the use of the 180° pulse method, wherein the atomic beam passes through a light ray whose frequency equals the excitation frequency necessary for the atom to go over into a long-lived excited state. To avoid the difficulty raised by the possible deviation of the lasing frequency from the central transition frequency, the atomic beam is made to interact with the light beam generated by the laser itself. A diagram of such a laser is shown in Fig. 1 of the Enclosure. Its essential part is a quantum amplifier operating at the transition frequency. It is possible to use a semiconductor quantum amplifier in the case of Ca

Card 1/3

L 2686-66

ACCESSION NR: AP5021139   2

and Sr beams, and an amplifier with an Nd^{3+}-doped crystal in the case of an Se beam.
It is indicated in the conclusion that an atomic beam can also be excited by an in-
tense spectral line from an incoherent source, such as the recently developed spec-
tral lamps which emit intense intercombination lines of Ca, Sr, and other substances.
Orig. art. has: 1 figure.   [02]

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

| SUBMITTED: 15May65 | ENCL: 01 | SUB CODE: EC, NP |
| NO REF SOV: 003 | OTHER: 004 | ATD PRESS: 4102 |

Card 2/3

L 2686-66

ENCLOSURE: 01
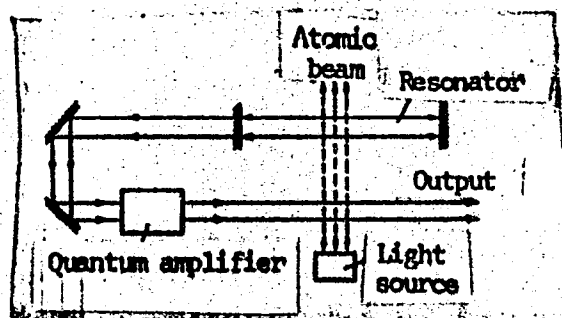
Fig. 1. Schematic diagram of atomic beam laser.

Card 3/3

TITLE: Neodymium glass laser with pulsed Q-switching

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 2, no. 2, 1965, 57-58

TOPIC TAGS: glass laser, neodymium laser, Q modulation, Q switching, electrooptic switching, air breakdown

ABSTRACT: An electrooptic switch was used for the Q-modulation of a neodymium-doped glass laser which consisted of two KGSS-7 neodymium glass rods (120 mm long, 10 mm in diameter) with parallel ends and a mirror with a 98% reflection coefficient at 1.06 µ. The electrooptic switch consisted of two crossed polarizing prisms and a Kerr cell controlled by a pulse with a 5 nanosec rise front and a 600 nanosec duration. The laser was pumped by 8-kJ 600-µsec pulses from two spiral lamps. Emission was in the form of a 2-J, 20 nanosec polarized pulse with a beam divergence not exceeding 15'. The pulse was beamed at an optical amplifier consisting of one rod 120 mm long and 12 mm in diameter. The emission energy at the amplifier output was 4 J, which when focused by means of lenses with f = 250 and 400 mm, induced several

Card 1/2

L 65003-65
ACCESSION NR: AP5021725

2

"sparks" in the surrounding air. Passage of the laser beam through the amplifier
rod caused local defects in the material.   [YK]

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

SUBMITTED: 25May65   ENCL: 00   SUB CODE: EC

NO REF SOV: 002   OTHER: 000   ATD PRESS: 4079

Card 2/2

BASOV, N.G.; BELENOV, E.M.; LETOKHOV, V.S.

Synchronization of oscillations in a semiconductor laser with
several p - n-junctions. Fiz. tver. tela 7 no.1:337-339 Ja '65.
(MIRA 18:3)

1. Fizicheskiy institut imeni Lebedeva AN SSSR, Moskva.

BASOV, N.G.; YELISEYEV, P.G.; NIKITIN, V.V.; LISHINA, A.V.; MASLOV, V.N.;
NASHEL'SKIY, A.Ya.

Semiconductor laser on a p – n. junction of the compound $CaAs_{1-x}P_x$.
Fiz. tver. tela 7 no.6:1902-1904 Je '65.

(MIRA 18:6)

1. Fizicheskiy institut imeni Lebedeva AN SSSR, Moskva.

L 3977-66   EWA(k)/FBD/EWT(l)/EEC(k)-2/T/EWP(k)/EWA(m)-2/EWA(h)   SCTB/IJP(c)   WG

AUTHOR: Basov, N. G.; Zakharov, Yu. P.; Nikitin, V. V.; Sheronov, A. A.

TITLE: GaAs junction laser with a nonuniform distribution of injected current

TOPIC TAGS: laser, junction laser, injection laser, semiconductor laser, GaAs, p n junction, injection current, coherent radiation, recombination radiation

ABSTRACT: The effect of an uneven distribution of the injection current along the p-n junction area of a GaAs laser diode on its emission was experimentally investigated. Diodes with a 2-mm overall cavity length and a 0.4-mm width were used in the experiments. The p-side of a standard laser with polished ends was cut perpendicular to diode's length down to the junction area (see Fig. 1 of Enclosure), resulting in two electrically separated cavity sections with a contact attached to each part. The coupling resistance between the diodes was large in comparison with the resistance of the contacts and the bulk resistance. The diode, cooled to the liquid nitrogen temperature, was excited by current pulses of 1-μsec duration. The lowest threshold current was required when injection current densities in both sections of the diodes were equal. The wavelength of coherent emission at the threshold current was larger

Card 1/3

L 3977-66
ACCESSION NR: AP5025404

by about 20 Å than the wavelength of emission during uneven excitation regime, i.e., when current $I_1 = I_2$. When I_2 was constant while I_1 was increased from 0 to 1 amp, the frequency of laser emission at $\lambda \sim 8430$ Å was gradually shifted toward higher frequencies by 50 cps. When I_1 was further increased, generation was achieved at $\lambda \sim 8450$ Å while coherent emission at $\lambda \sim 8430$ Å decreased and finally disappeared. At the same time the maximum of the line (half width ~ 30 Å) was shifted by ~ 2 Å toward the longer wavelengths. A similar quenching effect at ~ 8430 Å was observed in the direction perpendicular to the axis of the diode. It was determined that when the injection current was sufficiently large in one section of the laser a large increase in power output was obtained by simultaneously injecting current through both contacts on the p-side of the diode. Since the slope of the power-current curve of the dual diode structure increased approximately two times in comparison with that of a single section diode, the use of the dual structure for modulation may be more useful than that of a standard injection laser. Orig. art. has: 1 figure. [CS]

ASSOCIATION: Fizicheskiy institut, im. P. N. Lebedeva AN SSSR, Moscow (Physics Institute, AN SSSR)

SUBMITTED: 17May65   ENCL: 01   SUB CODE: EC, OP,
NO REF SOV: 001   OTHER: 002   ATD PRESS: 4118
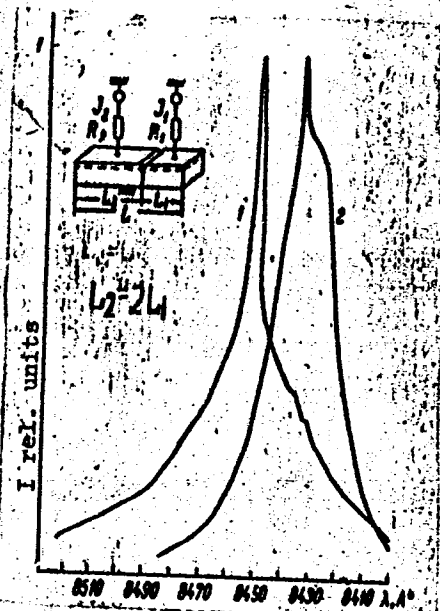
Card 2/3

L 3977-66

ACCESSION NR: AP5025404

ENCLOSURE: 01

Fig. 1. Emission spectra near the threshold

1 - Current densities in both parts of the dual diode structure are equal, I - 19 amp; 2 - current densities in the two parts are not equal, $I_1 = 0$, $I_2 = 34$ amp.

Card 3/3

L 1379-66   EWA(k)/FBD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(m)-2/EWA(h)   SCTB/IJP(c)
ACCESSION NR: AP5022443   WG

UR/0109/65/010/009/1729/1730
621.378.325.001.5:621.383.52

AUTHOR: Ambartsumyan, R. V.; Basov, N. G.; Yeliseyev, P. G.; Zuyev, V. S.;
Kryukov, P. G.; Stoylov, Yu. Yu.

TITLE: The measurement of the time parameters of a giant pulse laser by means of
a photodiode

SOURCE: Radiotekhnika i elektronika, v. 10, no. 9, 1965, 1729-1730

TOPIC TAGS: giant pulse laser, gallium arsenide, photodiode, resolving time, Kerr
cell, photomultiplier

ABSTRACT: The time-dependent characteristics of a giant pulse laser switched by
a Kerr cell were measured by means of a gallium arsenide photodiode. The photodi-
ode was obtained by diffusion of cadmium into n-type GaAs with a 2×10^{18} cm^{-3} con-
centration of tellurium during a period of 60 hr. The depth, thickness, and area
of the p-n junction were 80 μ, 0.9 μ, and 2.5×10^{-3} cm^2, respectively. The photo-
diode was pumped at right angles by a nonfocused laser beam and the pulse width
from the photodiode (connected across a 75-ohm load) was 40 nanosec at room tempera-
ture, and 20 nanosec at 77K. The results indicate that the resolving time of the

Card 1/2

L 1379-66

ACCESSION NR: AP5022443

photodiode is not greater than 5 nanosec, a quality which makes it competitive with photomultipliers. Unlike photomultipliers, which introduce a signal time lag, photodiodes are capable of accurately determining the time lag of a laser pulse released by the Kerr cell. The experimental value of the lag was 80 nanosec. Orig. art. has: 2 figures.

[YK]

ASSOCIATION: none

SUBMITTED: 09Dec64   ENCL: 00

                                                    SUB CODE: EC

NO REF SOV: 001   OTHER: 001

                                                    ATD PRESS: 4072

Card 2/2

L 63963-65   EWA(k)/FBD/EWG(r)/EWT(1)/EPF(c)/EEC(k)-2/T/EEC(b)-2/EWT(k)/
EWA(l)-2/EWA(h)   ETC/IJP(c)   WG/WH/GG

ACCESSION NR: AP5016177

UR/0051/65/018/006/1042/1046

621.375.9:535

AUTHOR: Basov, N. G.; Letokhov, V. S.

TITLE: Propagation of a light pulse in a medium with population inversion

SOURCE: Optika i spektroskopiya, v. 18, no. 6, 1965, 1042-1046

TOPIC TAGS: pulsed laser, pulse shape, laser optics, nonlinear optics, population
inversion, ruby laser

ABSTRACT: Propagation of a light pulse is investigated in a medium with popu-
lation inversion. Nonlinear distortions of the medium by a strong radia-
tion pulse are taken into account. A nonlinear integral equation is derived
which defines the limiting shape of a light pulse which passes a relatively great
distance through the medium. Losses and degree of inversion of the induced radia-
tion are taken into account in this equation. An expression is derived for the
limiting energy of the pulse, and the nonlinear integral equation for the
asymptotic shape of the pulse is solved numerically and plotted (see
Fig. 1 of the Enclosure) for various ratios of loss factor to amplifi-

Card 1/3

L 63963-65

ACCESSION NR: AP5016177

6

cation factor per unit of length. The effect of ionization on inversion in a ruby is numerically evaluated by the authors in another work (N. G. Basov, V. S. Letokhov, "Resonance Interaction of a Radiation Pulse with an Inverse-Population Medium" FIAN, A-2, 1965). "The authors are grateful to V. S. Zuyev and A. N. Orayevskiy for useful discussions and to A. T. Matuchin for help with the calculations." Orig. art. has: 1 figure and 22 formulas.

ASSOCIATION: none

SUBMITTED: 26Feb64   ENCL: 01   SUB CODE: EG

NO REF SOV: 000   OTHER: 004   ATD PRESS: 4071
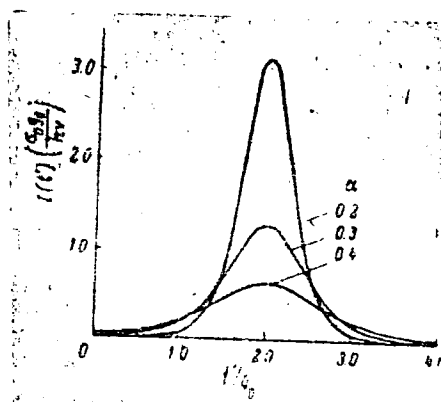
Card 2/3

L 63963-65
ENCLOSURE: 01

Fig. 1. Asymptotic shape of a light pulse in a medium with population inversion for various ratios of loss factor to amplification factor per unit of length $\alpha = \gamma/\sigma_0 n_0$

1 - 0.2; 2 - 0.3; 3 - 0.4.

Card 3/3

BASOV, N.G.; BELENOV, E.M.; LETOKHOV, V.S.

Diffraction synchronization of lasers. Zhur. tekh. fiz. 35 no.6:1098-
1105 Je '65.
                                                            (MIRA 18:7)

1. Fizicheskiy institut imeni P.N.Lebedeva AN SSSR, Moskva.

L 6925?-?   EWA(k)/FBD/EWG(r)/EWT(l)/EWP(e)/EWT(m)/EEC(k)-2/EWP(1)/EEC(t)/T/EEC(b)-2/
A(m)-2/EWA(h)   Pm-4/Pi.-4/Po-4/Po-4/Pf-4/Peb/P1-4/P1-4   SCTB/????'
ACCESSION NR: AP5016546   WG/WH   UR/0056/65/048/006/1562/1564

AUTHOR: Basov, N. G.; Zuyev, V. S.; Senatskiy, Yu. V.

TITLE: Q-modulated neodymium glass laser

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 6, 1965,
1562-1564

TOPIC TAGS: laser, glass laser, neodymium laser, Q spoiled laser, stimulated emis-
sion, giant pulse

ABSTRACT: A description is given of a Q-switched neodymium doped glass laser, the
output of which is amplified by a system of three neodymium doped rods with a total
output of 8 J. A prism rotating at a speed of 30,000 rpm was used in the initial
laser system. The 12-cm-long glass rod with a 9-mm diameter contained about 6% of
Nd_2O_3. The flash lamp input was 10 k < J and the duration of the flash, 600 μsec.
The external mirror consisted of an uncoated plane-parallel glass plate. The laser
output consisted of two pulses of approximately equal intensity and of 45 nanosec
duration. The interval between pulses was between 260 and 450 μsec and the total
output was 1.5 J. The output of the first laser was fed into three neodymium glass
rods with an overall length of 32 cm. The same flash lamps were used for excitation

Card 1/2

L 59351-65
ACCESSION NR: AP5016546

of the three rods. Normal generation in the 3-rod system was prevented by arranging the crystal faces at 30' angles to each other. The total output, consisting of two pulses, was 8 .'. The duration of the pulses was between 25 and 43 nanosec. The beam divergenc' did not exceed 6'. A method for decreasing the duration of the pulse and for reducing the number of pulses to one is described. Orig. art. has: 3 figures.

[CS]

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

SUBMITTED: 28Dec64   ENCL: 00   SUB CODE: ELSS

NO REF SOV: 003   OTHER: 002   ATD PRESS: 4042

Card 2/2

L 59527-65   EWA(k)/FBD/EWG(r)/EWT(l)/EEC(k)-2/EFF(n)-2/EWG(m)/EFA(w)-2/T/EEC(b)-2/
EWP(k)/EWA(m)-2/EWA(h)   Pm-4/Pn-4/Pz-6/Po-4/Pf-4/Peb/Pi-4/Pl-4   GTH/IJP(c)

ACCESSION NR: AP5016549

UR/0056/65/048/006/1583/1587

AUTHOR: Ambartsumyan, R. V.; Boyko, V. A.; Zuyev, V. S.; Basov, N. G.; Krokhin, O. N.; Kryukov, P. G.; Senatskiy, Yu. V.; Stoylov, Yu. Yu.

TITLE: Heating of matter by focused laser radiation

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 6, 1965, 1583-1587

TOPIC TAGS: high temperature plasma, laser application, laser radiation, lithium, air

ABSTRACT: In discussing the main factors that limit the heating of matter to high temperatures by laser radiation, the authors point out that in solids the limitations are imposed by the sharp focus that obtains under most experimental conditions, and that in gases the limitation is imposed by the possibility of gas breakdown. In view of these limitations, they conclude, after analyzing the motion of the breakdown boundary in a gas qualitatively, that focusing of laser radiation on the surface of a condensed medium located in vacuum is the most promising method of obtaining a high temperature plasma. In this case the most convenient mode of

L 59527-65
ACCESSION NR: AP5016549

operation is one in which one-dimensional motion of plasma occurs, since three-
dimensional motion leads to rapid reduction in density and a decrease in the re-
lative fraction of the laser radiation absorbed in the plasma. Under these condi-
tions the maximum achievable temperature is determined by the energy loss due to
radiation and thermal conductivity. The authors then report the results of a
spectral analysis of the emission from a plasma produced by focusing the radiation
from a neodymium glass Q-switched laser on the surface of a solid sample of lithium
in vacuum. The laser radiation consisted of two pulses, each with energy approx-
imately 3J and each approximately 40 nsec in length. The estimated obtained tem-
perature in this case is of the order of 20 eV ($2 3 \times 10^5$ deg). In the case of
breakdown produced in air of normal density by a ruby laser pulse of approximately
3J the corresponding temperature cannot exceed 10.5 eV. Orig. art. has: 3 figures
and 3 formulas.   [02]

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

| SUBMITTED: 16Jan65 | ENCL: 00 | SUB CODE: EC, ME |
| NO REF SOV: 009 | OTHER: 003 | ATD PRESS: 4053 |

Card 2/2

BASOV, N.G., laureat Nobelevskoy premii

Semiconductor lasers. Usp. fiz. nauk 85 no.4:585-598 Ap '65.
(MIRA 18:5)

BASOV, N.G.; BELENOV, E.M.; LETOKHOV, V.S.

Finite cross section of the radiation beam from a laser. Dokl.
AN SSSR 161 no.4:799-801 Ap '65.   (MIRA 18:5)

1. Fizicheskiy institut im. P.N.Lebedeva AN SSSR. 2..Chlen-kor-
respondent AN SSSR (for Basov).

BASOV, N.G.; BOGDANKEVICH, O.V.; PECHENOV, A.N.; ABDULAYEV, G.B.; AKHUNDOV, G.A.; SALAYEV, E.Yu.

Radiation in a GaSe single crystal induced by fast electrons.
Dokl. AN SSSR 161 no.5:1059 Ap '65.   (MIRA 18:5)

1. Fizicheskiy institut im. P.N.Lebedeva AN SSSR i Institut
fiziki AN AzerSSR. 2. Chlen-korrespondent AN SSSR (for Basov).

L 3196-66   EWA(k)/FBD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(m)-2/EWA(h)   SCTB/IJP(c)   WG
ACCESSION NR: AP5015414   UR/0020/65/162/004/0781/0784

AUTHOR: Basov, N. G. (Corresponding member AN SSSR); Morozov, V. N.; Orayevskiy,
A. N.

TITLE: Dynamics of a two-mode laser

SOURCE: AN SSSR. Doklady, v. 162, no. 4, 1965, 781-784

TOPIC TAGS: laser, stimulated emission, mode, laser theory, laser cavity

ABSTRACT: A theoretical analysis is made of the operation of a two-mode laser.
Simple substitution is used to obtain an equation containing the polarization and
the electric field from a set of equations for a one-mode laser. The equation ob-
tained can be expanded in terms of the eigenfunction of the field. Two special
cases are considered: 1) eigenfrequencies much greater than the width of each of
the resonance lines and oscillations occurring at both frequencies (nearly bihar-
monic oscillations) and 2) resonance curves overlapping considerably (nearly har-
monic oscillations). In the case of nearly biharmonic oscillations, application of
van der Pol equations to the system of equations obtained by the authors results in
a set of rate equations which, under certain simplifying assumptions, are identical
to those obtained by W. E. Lamb (Physical Review, v. 134, no. 6A, 1964, p. 1429).

Card 1/2

L 3196—66

ACCESSION NR: AP5015414

In the case of nearly harmonic oscillations, application of van der Pol equations leads to a set of equations for slow oscillations. An analysis of the resulting equations shows that the intensity of emission consists of regular undamped oscillations and explains some of the experimentally observed operating regimes. However, the actual regime is much more complex and requires analysis of the interaction of a larger number of modes. Orig. art. has: 5 formulas and 1 figure.
[CS]

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

SUBMITTED: 04Jan65   ENCL: 00   SUB CODE: EC

NO REF SOV: 003   OTHER: 006   ATD PRESS: 4041

Card 2/2

L 4065-66   EWA(k)/FBD/EWT(1)/EWP(e)/EWT(m)/EEC(k)-2/EWP(t)/T/EWP(k)/EWA(h)/EWA(m)-2
ACC NR: AP5027834 SCTB/IJP(c)   WG/WH   SOURCE CODE: UR/0020/65/165/001/0058/0060

AUTHOR: Basov, N. G. (Corresponding member AN SSSR); Ambartsumyan, R. V.; Zuyev, V. S.;
V. S.; Kryukov, P. G.; Letokhov, V. S.

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

TITLE: Velocity of propagation of a powerful light pulse in a medium with population inversion

SOURCE: AN SSSR. Doklady, v. 165, no. 1, 1965, 58-60

TOPIC TAGS: laser, ruby laser, laser pumping, optic pumping

ABSTRACT: The article is a brief advance report of a comprehensive work to be published separately. It was shown that the leading edge of such a pulse does not change materially while propagating within a medium with inverse population. In the case of a ruby medium with usual parameters, the velocity of the pulse maximum on reaching its stationary value was shown to be 17×10^{10} cm/sec, which greatly exceeds the velocity of light. This fact, however, does not contradict the causality principle, since such a propagation takes place as the result of the deformation of the initially weak leading edge, and can continue only to the point of zero intensity which always propagates with the velocity of light in the medium. An amplifier composed of two ruby rods 24 cm long was used for experimental study of the problem. The end faces

Card 1/2   UDC: 621.375.9

L 4965-66

ACC NR: AP5027834

of the rods were cut at the Brewster angle. The total gain for a weak signal was about 50. Both input and output pulses were recorded by the same coaxial photocell arrangements, but the output pulse was made to travel an additional distance so that it reached the photocell 56×10^{-9} sec after the input pulse. The parameters of the input pulse were as follows: energy 1.3 J, pulse width 16×10^{-9} sec. A comparison of oscillograms of weak and strong pulses revealed that no appreciable shortening of the pulse occurred, and that only the time interval between the input and output pulse shortened as the pulse strength increased. The shift in the time interval in this case was 9×10^{-9} sec, which agrees with the theoretical considerations presented above. It follows that amplification of the exponentially growing leading edge of the pulse results not in a shorter pulse, but in an additional shift of the pulse peak. To shorten the pulse, it is necessary to increase the steepness of the leading edge by, say, cutting it off by a shutter, by nonlinear absorption, etc. It is noted further that the shift of the pulse peak with velocity exceeding the velocity of light is accompanied by the shift of the boundary of inverse population and can lead to the emergence of a number of new effects such as that of Cherenkov radiation. Orig. art. has: 1 figure and 2 formulas.
[FP]

SUB CODE: EC, OP/ SUBM DATE: 31Jul65/ ORIG REF: 002/ OTH REF: 002/ ATD PRESS:

4138

Card 2/2