NIKITIN, V. F.

Faculty member, Moscow, Dept. of History. 1991, 134 s.
NIKITIN, V.P.

Occurrence of the black rat in the Far East. Izv. Irk. gos. protivochum. inst. 10:86-87 '52. (MIRA 10:12) (SOVIET FAR EAST—RATS)
NIKITIN, V.P.

Biology of the ratlike hamster. Izv. Irk.gos. protivochum. inst. 10:111-115 '52. (MIRA 10:12) (MARITIME TERRITORY--HAMSTERS)
USHITIN, V. I.

Luskrets

It's not another "geroza." Priroda Al No. , . 1962.

NIKITIN, Viktor Petrovich

[Poultry raising] Ptitsyevodstvo. Isd. 2-oe, dop. i ispr. Moskva,
(Poultry)
MILOVANOV, A.F.; ZHERNOVOV, I.V.; NIKITIN, V.P.

New jerboa species in Turkmenia (Allactaga bobrinskii Kolessn.).
Izv. AN Turk. SSR no.5:97 '58. (MIA 11:12)

1. Turkmeneskaya protivochumnaya stantsiya.
   (Turkmenistan—Jerboas)
NIKITIN, V.S.

Regeneration of the skeletal muscle in white mice after electric injury. Biul. eksp. biol. i med. 51 no.5:107-112 My '61. (MIA 14:3)

(MUSCLE—DEGENERATION AND REGENERATION)
(ELECTRICITY, INJURIES FROM)
NIKITIN, V.S.

(CA 47 no.19:9894 153)
NIKITIN, V.S., byvshiy slesar'.

Infancy of the "Dinamo" plant. Elek. i tepl. tiaga no.11:21-22 №
'57.

л. Zavod "Dinamo."

(Electric locomotives)
SMIRNOV, M.V., kand. tekhn. nauk; KATS, B.A.; inzh.; NIKITIN, V.S., inzh.

Testing of insulation between the turns of the armature winding in d.c. machines. Vest. elektroprom. 33 no. 9: 70-72 3 '62.

(Electric machinery—Windings)
Infrared spectrum of diborontetrahydroxide B sub 2 (OH) sub 4 and boromonoxide (BO) sub x


TOPOLOGY TAGS: infrared spectrum, diborontetrahydroxide, boromonoxide, polymer of boron

ABSTRACT: The study was undertaken to ascertain the frequencies characteristic for the B—B bond in infrared spectra of diborontetrahydroxide and boromonoxide. A white modification of boromonoxide was prepared by heating diborontetrahydroxide to 250-270°C in a vacuum, and a brown modification obtained by further heating to 600-650°C. By hydrolysis of the white boromonoxide with heavy water a deuterium-substituted diborontetrahydroxide was obtained, which served to pinpoint the absorption lines of diborontetrahydroxide. The samples were suspended in vaseline oil or in hexachlorobutadiene and subjected to infrared spectroscopy. For diborontetrahydroxide the line at 1150 cm sup -1 was found to represent the B—B valency oscillation. The wide absorption lines of the white and brown modifica-
Comparative picture of cell localization by TGF-α in the liver and heart of mice with experimental hypercholesterolemia B+H+. Bull. Ecol. Med. '84, No. 56/1, p. 172-75. '83
(Int. '74)

I. F. Dubov'kaya, V. V. Ovchar
obshchey biologii i meditsiny
instituta, 12345678901234567890

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001137020003-4
NIKITIN, V.S.; USKOV, V.I.

A camera devised by the Institute of Mining of the Academy of Sciences for the computation of dust particles. Trudy Inst. gor. dela no.2:171-176 '55. (MLRA 9:3)

(Mine dusts) (Microscopy) (Cameras)
NIKITIN, V.S., gornyy inzhener; USKOV, V.I., gornyy inzhener

Setting up a dust control system in underground crushers. Bro'ba
a sil. 2:180-185 '55. (KIRA 9:5)

1. Institut gornogo dela Akademii nauk SSSR.
(DUST--PREVENTION) (ORE DRESSING)
NIKITION, V.S., gorovy inzhener

New device for sampling in the determination of the dust content of mine air by the gravimetric method. Bor'ba's sil. 3:186-198 '59. (MIRA 12:7) (MINE DUSTS) (FILTERS AND FILTRATION)
NIKITIN, V.S. kand.tekhn.nauk

Improving safe working conditions in pits. Bezop.truda v prom. 
J no.5:12-14 My '59. (MIRA 12:8)

1. Institut gornogo dela AN SSSR. 
(Mining engineering—Safety measures)
NIKITYN, V.S., kand.tekhn.nauk

Calculation of air pollution in pits with a recirculation ventilation system. Nauch. soob. Inst. gor. dela 4:67-73 §0. (MIRA 15:1)
(Mine ventilation)
NIKITIN, V.S., kand. tekn. nauk

Conference on the problem of controlling dust in strip mines.
Trudy Inst. gor. dela 5:131-133 '60.

(Meas. MIRA 14:5)
(Mine dusts—Congresses)
NIKITIN, Vladimir Sergeyevich, kand. tekhn. nauk; CHESNOKOV, Mitrofan
Mitrofanovich, kand. tekhn. nauk; DIDKOVSKII, D.Z., red. izd-va;
SABITOV, A., tekhn. red.; BOL'DYREVA, Z.A., tekhn. red.

[Control of dust and gases in open mine pits] Bor'ba s pyl'iu i
gasami na otkrytkh rasrabortkah. Moskva, Gos. nauchno-tekhn. izd-
(MINE DUSTS)  
(Mine gases)
NIKTIN, V.S.

Principal systems of natural ventilation of open pits, and the sources of contamination of their atmospheres. Uch. zap. Mosk. nauch.-issl. inst. san. i gig., no. 5:31-34 '61. (MIRA 16:7) (MINE VENTILATION) (AIR POLLUTION) (STRIP MINING)
NIKITIN, V.S., kand. tekn. nauk

Ventilation of stopes and development workings in the shortwall mining system. Ugol' 36 no.5 1959-60 p. 75-81. (MIRA 14:5)
(Mine ventilation)
MILESTICH, Anton Fedorovich, kand. tekhn. nauk. Prinimal uchastiye
FROLOV, N.A., kand. tekhn. nauk. NIKTULLIY, V.S., kand. tekhn.
nauk, otv. red.; LUCHKO, V.S., red. izd-va; LEQILINH, L.K.,
tekhn. red.

[Air leaks in mines; calculation, regulation and control of
leaks]Utechki vozduха v shakhтekh; raschet, regulirovanie i
(MIRA 15:9)

(Mine ventilation)
VORONINA, Lidiya Dmitrievna, doktor tekhn. nauk; BASKINOVSKIY, Aleksey Dmitrievich, kand. tekhn. nauk; NIKITIN, Vladimir Sergeevich, kand. tekhn. nauk; LUCHKO, V.S., red.; SABITOV, A., tekhn. red. IL'INSKAYA, G.M., tekhn. red.


(Mine ventilation)
NIKITIN, V.S.

Combination layouts of natural ventilation of open-pit mines.
Gor. i ekon. vop. razrab. ugol'. i rud. mest. no.1:191-204 '62.

(Mine ventilation)
NIKIN, V.S.; SHARUTIN, A.S.; YES'MAN, B.I.; ASKEROV, K.A.

Qualitative characteristics of drilling fluids used for drilling wells in absorption horizons. Azerb. neft. khoz. 41 no.9:16-19 S '62.

(MIRA 16:6)

(0il well drilling fluids)
NIKITIN, V.S., kand.tekhn.nauk; SKOBUNOV, V.V., kand.tekhn.nauk

Turbulent diffusion of dust and poison gases in the air of open-pit mines. Bor'ba s ali, 207-217 '62. (MIRA 16:5)

I. Institut gornogo dela imeni A.A.Skochnskogo.
   (Strip mining)  (Mine dusts)  (Mine gases)
NIKITIN, V.S., kand.tekhn.nauk

Determining the intensity of dust formation sources in open pits.
Nauch. soob. IGD 21:185-195 '63. (MIRA 17:2)
NIKITIN, V.S., kand. tekhn. nauk

Distribution of harmful contaminants in open pits with ventilation by wind. "Ugol" 38 no.6:42-44 Je '63. (MIRA 16:3)

1. Institut gornogo dela im. A.A. Skochinskogo.
   (Mine ventilation)
MIBB, etc. Earn. v. v., etc., etc., etc., etc.

[Lorem ipsum dolor sit amet, etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., etc., e
LUGOVSKII, Sergey Ivanovich; DYMCHUK, Gennadiy Konstantinovich; 
DROBOT, Boris Yakovlevich; AVRAMCHUK, Rostislav Nikiforovich. 
Prinimali uchastiye: I.A. YENKO, V.V.; PAKHITYC, C.H.; 
NIKITIN, V.S., kand. tekhn. nauk, retsenzent; STEBAYCIV, I.A., 
gorn. inzh., otv. red.

[Ventilation of mines and strip mines] Ventiliatsiia shakht i 

(MIRA 17:5)
Study of the dusting and mixing effects of a ... Boruba et al. 6:123-129 1984 (LIA '84)

NIKITIN, V.S., kand. tekh. nauk


1. Institut gornogo dela imeni A.A. Skochinskogo.
Elimination dust during the operation of highly efficient dust machinery in strip mines. (MIRA 1974)

(institut geolog. dela de. A.K. konsak stressed)
NIKTIN, Vladimir Tikhonovich; DRAGUNOVA, Lyudmila Markovna; ZAV'YALOVA, A.N., red.; GERSIMOVA, Ye.S., tekhn. red.


(Industrial management)
IOFFE, Naum Mikhailovich; IVANOY, Vadim Aleksandrovich; NIKITIN, Vasily Vasil'evich; SOLOV'YEV, V.A.; EPSHTETIN, Ya.V.; VINOGRADOV, I.Ye., ed.

ALEKSEEV, A.I.; Prinimali uchastiye: IVANOV, A.D.; LEBEDEV, B.F.;
DARENTSFIKH, P.V.; BABKIN, N.I.; MEL'NIKOV, V.G.; NIKITIN, V.V.;
MUKHAMEDOV, K.A.

Automatic welding of the cylindrical part of a decomposer shell.
Avtom. svar. 14 no.8:78-82 Ag *Cl.

1. Trest "Tralstal'konstruktsiya.
   (Electric welding)
   (Aluminum industry--Equipment and supplies)

[Continuous conveyor methods used in the lot production of composite machines] Fotochno-konveiernye metody v seriino m proizvodstve slozhnykh mashin; iz opyta Leningradskogo zavoda poligraficheskikh mashin. Moskva, Gos. nauchno-tekh. izd-vo mashinostroit. lit-ry, 1961, 130 p. (MIRA 14:9)


(Leningrad—Printing machinery and supplies)
(Factory management)
ANTONOVOI, Nikolay Petrovich; VYGODSKYI, Mark Yakovlevich; NIKITIN, Vladimir
Vasiliyevich; SAKHIN, Aleksandr Iosifovich; RYKIN, A.Z., redactor;
AKHLOKOV, S.N., tekhnicheskiy redaktor

[A collection of problems in elementary mathematics; a manual for
home study] Sbornik zadach po elementarnoi matematike; posobie dla
samoobrasovaniia. Izd. 3-e. Moskva, Gos. izd-vo tekhniko-teoret.
lit-ry, 1956. 532 p.
(Mathematics--Problems, exercises, etc.)
ANTONOV, Nikolay Petrovich; WYGODSKII, Mark Yakovlevich; NIKITIN, Vladimir Vasil'evich; SANKIN, Aleksandr Iosifovich; POLOVINKIN, S.M., red.; ÅKSEL'ROD, I.Sh., tekhn. red.


(Mathematics—Problems, exercises, etc.)
A large number of automobile tires are damaged after a very small mileage because the outer cover is destroyed by contact with some obstacle. In order to study the behavior of the tissue when subjected to such an impact, a pendulum-ram was constructed. The ballistic dynamometer by GUDBRANDT, which is usually used in practice, has a number of essential faults. These faults can be eliminated by separating the holding device from the pendulum. This may be attained in two ways: these impact tests were carried out on the stationary and immobile sample, which is held in a position vertical to the oscillation plane of the pendulum. The essential difference between the method of testing the tissue by pendulum-ram on the one hand and that on the ballistic dynamometer means of a pendulum-ram on the other consists in the fact that, in the first case, the velocity of deformation of the fibre grows during the process of expansion, whereas in the second case it remains nearly constant. The construction scheme and a photo of the pendulum ram is shown. The values obtained for elongation by tearing are more or less approximative values, because the actual amounts of these elongation...
NOWOPOL'SKII, V.I.; NIKITIN, V.V.; SKACHKOV, A.S.

Photoelectric device for measuring power losses in automobile tire rolling by the inertia method in a testing machine. Kauzh. i rez. 20 no. 11:31-35 N '61. (MIRA 15:1)

1. Nauchno-issledovatel'skiy institut shchiny promyshlennosti. (Tires, Rubber—Testing)
NIKTIN, V.V.

Automatic switching over from SPD-5 type of feed. Avtom., telem. i sviaz' 3 no.7:35 Jl '59. (MIRA 12:12)

1. Starshiy inzhener linseyno-apparatnogo zala Dnepropetrovskoy distantsii signalizatsii i svyazi Stalinskoy dorogi.
(Electric circuits)
NIKITIN, V.V., inzhener.

Erecting the antenna tower of the Sverdlovsk television center.  
Stroi.prom.34 no.6:10-13 Je '56. (MLR 9:9)  
(Sverdlovsk--Television--Antennas)
"The Problem of Egyptian Broom Rape (Orobanche Aegyptiacae Fors.), Parasitic on Weedlike Plants of Turkmen SSR," V. V. Nikitin, M. A. Andreyev, P. V. Aleksandrov (Deceased), Turkmen Affiliates, Acad. Sci USSR, Ashkhabad, 3 pp

"Botan Zhur" Vol XXXIII, No 6

Egyptian broom rape has been spreading widely in Turkmen SSR recently, particularly in the Ashkhabad region, and has become one of the most prevalent and harmful parasites of melon and garden crops. Lists weedlike plants which Egyptian broom rape attacks. Notes that cultivated crops are much more susceptible to its ravages than are weedy plants of the same family. Submitted 20 Nov 47.
BLINOVSKYI, K.V.; BORISOVA, A.O.; VASIL'CHENKO, I.T.; MEPPERT, V.V.;
SHISHKIN, B.K.; EMKOV, O.A.; VASIL'YEV, A.O., tekhnicheskiy redaktor;
PETROVA, K.T., tekhnicheskiy redaktor

[Flora of Turkmenistan] Flora Turkmenii. Ashkhabad, Izd-vo Turkmen-

1. Chlen-korrespondent Akademia nauk SSSR (for Shishkin)
   (Turkmenistan--Botany)
Name: NIKITIN, Vasily Vasilyevich
Dissertation: Weed Growth in Turkmeniya
Degree: Doc Biol Sc
Affiliation: Acad Sci Turkmen SSR
Defense Date, Place: 28 Mar 56, Council of the Botanical Inst imeni Komarov
Certification Date: 29 Sep 56
Source: BMVO 6/57
NIKITIN, Vasily Vasil'evich

[Weeds of Turkmenistan] Sornaja rastitel'nost' Turkmenii.
(MIRA 16:1)

(Turkmenistan--Weeds)
NIKITIN, V.V.

Outlook for introducing the villous vetch of Turkmenistan.
Trudy Bot. inst. Ser. 6 no.7:241-243 '59. (MIRA 13:4)

l. AN Turkmenakoy SSR, Ashkhabad.
(Turkmenistan--Vetch)

NIKITCHIN, V. V.

Problem of organizing a highly-efficient feed supply in Turkmenistan. Izv. AN Turk. SSR. Ser. biol. nauk no.1:3-8 '62. (MIRA 15:3)

1. Institut botaniki AN Turkmenskoy SSR,
   (TURKMENISTAN—FORAGE PLANTS)
NIKITIN, V.V.


(TURKMENISTAN--BOTANICAL SOCIETIES)
NIKITYN, V.V.; KOZLOVA, A.O.


1. Institut botaniki AN Turkmanskoy SSR. (TURKMENISTAN—SEDGES) (GERMINATION)
NIKITIN, V.V.; OVEZMURADOV, S.O.

Development of botanical science in Turkmenia and the strengthening of its ties with practice. Izv. AN Turk. SSR, Ser. biol. nauk no.3:7-11 '63. (MIRA 17:1)

1. Institut botaniki AN Turkmenskoy SSR.
NIKITA V.


Inst. of Botanial of Russian, USSR
NIKITIN, V.V., VOGANOV, N.V.

Pereonital ferus sorghum, a new crop for the area of Central Asia.
The author is a botanist at the Institute of Agricultural Industry and Forestry Research of the Turkmen Republic.

NIKITA V. V.,

Institute of Agricultural Industry and Forestry Research, Turkmen Republic.
NIKITIN, V.V.

49 Ja '65.

I. Institut botaniki AN Turkmenskoy SSR, Ashkhabad.
AUTHORS: Berlovich, E. Ye., Bonits, M. P. (Polytechnic Institute, Dresden, Eastern Germany), Nikitin, V. V.

TITLE: Lifetime measurement of the first excited states of Tb$^{159}$ and Yb$^{173}$ by means of a multichannel time analyzer


TEXT: Present paper was read at the 11th Annual Conference on Nuclear Spectroscopy (Riga, January 25 to February 2, 1961). The authors report on a time analyzer built by them, and suggest a method to check their chosen test conditions, i.e., how to avoid the time lag caused by the instrument. It follows from the circuit diagram (Fig. 1) that the instrument consists of a "slow" and a "fast" part. In the present paper, only the fast part is discussed (Fig. 2). The time and amplitude modulated pulses A and B, which can be used to measure the time delay, hit the spiral delay line $Z_0$ (Refs. 9, 10). The crystal diode $D_1$ of the type $A_{2B}$ (D2V) serves as a rectifier. In
Lifetime measurement of ...

a certain delay interval there is a linear dependence of the amplitude between the pulses A and B at the outlet I, which is a function of the magnitude of the delay. The crystal diode D2 serves as coincidence control model. A positive displacement blocks the cathodes of these diodes for certain pulses. The pulse spectrum is via the amplifier passed on to the pulse-height analyzer which records the coincidence curves to be analyzed. The operation of the instrument is demonstrated by the self-coincidence and prompt coincidence curves. A crystal 30 by 30 mm gave the best time resolutions, about 5·10^{-10} sec. The resolution decreased with larger crystals and lower radiation energy. This is a reason for the deviations of the maximum time resolution, which are shown on the coincidence curves, that were found during the determination of the lifetime of the first excited states of Tb^{159} and Yb^{173} with energies of 58 resp. 79 keV. One of the factors, which causes the shift in time of the coincidence curves as a function of the time lag caused by the instrument, is a wrong selection of intensities of the sources to be compared. This selection and also the form of the spectra in the operation range can be controlled easily by means of the "control of
Lifetime measurement of single curves. This method is based on the analysis of single pulses which pass through the blocked diode of the rectifier due to the presence of a parasitic capacity (C) and the finiteness of the reverse resistance of the diode. The following features must be observed in a proper preparation of the experiments: 1) The required energy intervals have to be roughly selected for the source to be examined; 2) The integral intensities to be measured have to be equal to that of the control source; 3) the windows of the side channels have to be adjusted so accurately that position and form of the single pulse are the same for the control source and the one to be examined. During tests these conditions have been fulfilled. The evaluation of the curves obtained (Fig. 6) yielded the following results for the half-life of the 58-kev level of Tb\textsuperscript{159}: \[ T_{1/2} = (1.3 \pm 0.4) \times 10^{-10} \text{ sec}. \] According to Ref. 18 this value was: \[ T_{1/2} < 10^{-9} \text{ sec}. \] The following values have been determined for the half-life of the 79-kev state of Yb\textsuperscript{173}: \[ T_{1/2} = (3.8 \pm 0.5) \times 10^{-11} \text{ sec}. \] The two transitions examined are almost purely magnetic dipole transitions. Table 2 shows a comparison between the authors' data and those of other authors. It is pointed out that the g-
AUTHORS: Berlovich, E. Ye., Gusev, Yu. K., Il'in, V. V., Nikitin, V. V., and Nikitin, M. K.

Lifetime measurement of ... factors for the collective rotation are, according to the authors, calculated to be $\langle g_R \rangle_{\text{Tb}^{159}} = 0.44 \pm 0.10$ and $\langle g_R \rangle_{\text{Yb}^{173}} = 0.35 \pm 0.04$. Within the limits of observation errors, these values agree with estimations of a generalized model ($g_R = Z/A$) for a homogenous charge distribution, which is 0.41 for the first case and 0.4 for the second case. There are 7 figures, 2 tables, and 32 references: 7 Soviet-bloc.

ASSOCIATION: Fiziko-tekhнический институт им. А. Ф. Иоффе Академии наук СССР (Institute of Physics and Technology imeni A. F. Ioffe of the Academy of Sciences USSR)

APPROVED FOR RELEASE: 07/19/2001   CIA-RDP86-00513R001137020003-4"
Probabilities of transitions which excites the 121-kev level, with the gamma quanta resulting from discharge of this level. The gamma spectrum of $^{147}$Lu was recorded by means of NaI(Tl) crystals and an $^{137}$Cs (FELU 33) photomultiplier. The gamma-gamma coincidences of $^{147}$Lu and a comparison with the gamma-gamma coincidences of the $^{60}$Co reference source ($^{60}$Co $\rightarrow$ $^{57}$Co) transition were used to calculate the lifetime of the 121-kev level:

$$T_{1/2} = (3.3 \pm 0.3) \times 10^{-6} \text{ sec}$$

The coincidence of 600 kev gamma rays with the conversion electrons of the 196-kev transition was examined at the 196 kev level. The gamma quanta were recorded by means of a NaI(Tl) crystal. The right-hand branch of the coincidence curve has a pronounced exponential course. It was found that $T_{1/2} = (3.3 \pm 0.3) \times 10^{-6}$ sec.

These results can be brought into agreement with the spectrum of $^{147}$Lu. $^{1/2}$ for the ground state and for the first two excited states. Since the 196-kev transition is a pure E2 transition which excludes the sequence $f_{7/2}$, $h_{9/2}$, $f_{5/2}$, there must be a prohibition which suppresses

Card 2/8
Probabilities of transitions... the M1 component. The results exclude a lifetime of the 121-keV transition in the microsecond range. There are 5 figures and 12 references:

10 Soviet and 2 non-Soviet. The two references to English-language publications read as follows: Ref. 5: Bonitz, M., Berlovich, E., Nucl. Instrum. and Methods, 2, 13 (1961); Bay, Z., Phys. Rev., 77, 419 (1950).

ASSOCIATION: Fiziko-tekhнический институт им. А. П. Иоффе Академии наук СССР (Physicotechnical Institute imenl A. F. Ioffe of the Academy of Sciences USSR)
AUTHORS: Berlovich, E. Ye., Gusev, Yu. K., Il'in, V. V., Nikitin, V. V., Nikitin, M. K.

TITLE: Contribution of collective motion to the lifting of the 1-forbiddenance

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 4, 1962, 967-972

TEXT: Continuing earlier studies (DAN SSSR, 132, 789, 1960; Nucl. Phys. 23, 461, 1961), the authors determined the lifetimes of the M1 transitions of the type $g_{7/2} \rightarrow d_{5/2}$ for the spherical nuclei Eu$^{147,149,151}$ just before the range of great deformations, where the collective motion is strongest. It can be assumed that collective motion affects the probability of 1-forbidden transitions if the number of neutrons is below the critical ($N = 69$) and the nucleus is still spherical. The experiments were made with Gd fractions of Ta targets irradiated with 660-Mev protons in the synchrocyclotron of the OIYaI, a multi-channel time analyzer, a scintillation spectrometer with NaI-crystal and an $\Phi$3Y-33 (PEU-33) Card 1/2.
Contribution of collective ... of the 

multiplier. Results: \( \text{Eu}^{147} \), first excited level 229.5 kev \((d_{5/2})\), 
lifetime \((1.8 \pm 0.2) \times 10^{-10}\) sec; \(M1\) transition to ground state \((d_{5/2})\), 
delay factor \(F = 115\); total internal-conversion coefficient \(\alpha = 0.195\). 

\( \text{Eu}^{149} \), first excited level 150 kev \((g_{7/2})\), lifetime \((3.2 \pm 0.2) \times 10^{-10}\) sec; 
\(M1\) transition to the ground state \((d_{5/2})\), \(F = 78\); \(\alpha = 0.63\). \( \text{Eu}^{149} \), first 
excited level 21.7 kev \((g_{7/2})\), lifetime \((3.4 \pm 0.2) \times 10^{-9}\) sec; \(M1\) transi-
tion to ground state \((d_{5/2})\), \(F = 47\); \(\alpha = 29.4\). The low values of the 
\(F\)-factors and their smooth decrease when approaching the range of 
deformed nuclei, in the nuclear range considered, indicate an increasing 
contribution of collective motion in the real nuclear wave functions, 
leading to progressive weakening of the \(l\)-forbiddance. There are 
4 figures and 1 table.

ASSOCIATION: Leningradskiy fiziko-teknicheskii institut Akademii nauk 
SSSR (Leningrad Physicotechnical Institute of the Academy of 
Sciences USSR)

SUBMITTED: November 11, 1961
A simple method of light separation during quantitative absorption analysis of solutions. L. V. Popov and V. V. Ermakov.

In the paper "alkaline earth metals" from Zavod. Zvezd., 1955, No. 1, p. 6-8, the authors describe a novel method for separating light using a double cell, where one half of the cell is filled with a pure solvent and the other half with the solution to be analyzed. With the aid of two mirrors, a ray passing through the solvent falls on the lower part of an aperture in a spectrograph. A ray passing through the solution goes directly over the first ray and falls on the upper part of the aperture. The upper edge of one mirror plays the role of a diaphragm which separates these rays and produces a sharply defined border on the aperture of the spectrograph. In this way a spectrum for comparison and an absorption spectrum of the solution are studied simultaneously. A double quartz cell, cemented with Glyptal and equipped with external alumina plate on the glass backing and with a sufficiently high reflection coeff in the ultraviolet range of the spectrum arc used. The light source is an arc of a.c. The spectra are photographed with the aid of an IBE-23 quartz spectrograph with aperture width of 0.01 mm. An analysis of sat. solns. of KNO₃, NaNO₃, Ca(NO₃)₂, and KI is made. Error in analysis comprises 0-3% of the fixed conen. The method can be used for analysis of single-component systems.
Nikitin, V.V.

Comparing the frequencies of quartz and molecular oscillators.
Izv.vys.ucheb.zav.; radiofiz. 1 no.2:190-191 '58.

1. Physioeskiy institut in P.N. Lebedeva AN SSSR.
(Oscillations)
AUTHORS: Basov, N.G., Nikitin, V.V., and Orayevskiy, A.N.

TITLE: Investigation into the dependence of the frequency of molecular generators on various parameters. Part I (Theory, line J = 3, K = 2)

PERIODICAL: Radiotekhnika i elektronika, v. 6, n. 5, 1961, 796-805

TEXT: The work presented in this article was undertaken in order to explore the possibility of utilizing a molecular generator as an absolute frequency standard having an accuracy of about 10^-10. In order to determine the type of construction required and its operation, a detailed account of how its frequency depends on the various parameters has been undertaken. Several attempts to evaluate the influence of various factors in the oscillation frequency have been made by N.G. Basov, and A.M. Prokhorov (Ref. 1: Uspekhi fiz.
Investigation into the ... 

nauk 1955, 1, 7, 485) and by K. Shimoda, T.C. Wang and C.H. Townes (Ref. 2: Phys. Rev. 1956, 5, 102, 5, 1308), the dependence of the frequency of the molecular generator on the resonant frequency of the resonator being explained in Ref. 2 (Op.cit.). It was shown that the irregularities of beam emission along the resonator introduce frequency drift: The influence of the non-resolved components of the hyperfine structure was shown by K. Shimoda (Ref. 3: J. Phys. Soc. Japan 1957, 12, 1006; 1958, 13, 939); the dependence of the frequency drift of the molecular generator based on the hyperfine structure on the voltage of the sorter and on the beam intensity has been explained by N.G. Basov and A.N. Orayevskiy (Ref. 4: Radio-tekhnika i elektronika, 1959, 4, 7, 1185). The results discussed cannot be taken, however, as final since none of the authors take into account the real velocity spread of molecules. First the influence of various parameters, including the velocity spread of molecules has been analyzed. Starting with
Investigation into the...

\[ \frac{\nu'}{\nu} = 2Q \frac{\omega_0 - \omega}{\omega} \quad (1) \]

given in Ref. 1 (Op.cit.) for the oscillations frequency of a molecular generator where

\[ \nu = \nu' + i\nu'' \]

is the average complex polarization of the molecular beam, \( \omega \) - is the required frequency, \( \omega_0 \) - the self resonant frequency of the resonator having the quality factor \( Q \), it is shown that this equation, provided \( \nu \) is properly evaluated, must take into account all factors affecting the frequency and its stability. These, state the authors, are listed in Ref. 4 (Op.cit.). After several mathematical transformations and assumptions, the Eq. (1) for two levels is derived as

\[ \omega = \omega_1 \left[ 1 + \frac{\omega_0 - \omega_1}{\omega_1} \frac{Q}{Q_1} (0 + \Delta) \right] \quad (6) \]
Investigation into the ...

where

\[
G = \frac{\sum_{\mathcal{m}} |d_{\mathcal{m}}|^2 \gamma_{\mathcal{m}}^{-1} J_\mathcal{m}^2}{\sum_{\mathcal{m}} |d_{\mathcal{m}}|^2 \gamma_{\mathcal{m}}^{-1} J_\mathcal{m}^2} ; \quad \Delta = \frac{\sum_{\mathcal{m}} \eta_{\mathcal{m}} |d_{\mathcal{m}}|^2 \gamma_{\mathcal{m}}^{-1} J_\mathcal{m}^2}{\sum_{\mathcal{m}} |d_{\mathcal{m}}|^2 \gamma_{\mathcal{m}}^{-1} J_\mathcal{m}^2}
\]

and \( \omega_\lambda \) is such that \( \omega_\mathcal{m} = \omega_\lambda + \eta_\mathcal{m} \); \( \omega_\mathcal{m} \) — frequency of the molecular transition; \( d_{\mathcal{m}} \) — matrix element of the dipole moment \( d_{\mathcal{m}} = d_0 \lambda_\mathcal{m} \) where \( d_0 \) — the dipole moment, \( \lambda_\mathcal{m} \) determines \( d_{\mathcal{m}} \) on quanta numbers characterizing the given transition;

\[
\lambda_{\mathcal{m}} = \frac{\lambda_{\mathcal{m}}}{\eta}; \quad \gamma = \frac{\alpha}{\eta};
\]

\( \zeta \) — the field amplitude in the resonator; \( \Theta \) — the average transient time of molecules through the resonator. \( J_\mathcal{m}^S \) and \( J_\mathcal{m}^0 \) are given by
Investigation into the...

\[
J_m^a = \int_0^\infty f(\theta) \left( 1 - \frac{\sin \tau_m \theta}{\tau_m \theta} \right) d\theta.
\]

\[
J_m^c = \int_0^\infty f(\theta) \frac{1 - \cos \tau_m \theta}{\tau_m \theta} d\theta.
\]

where \( f(\theta) \) - time distribution of molecules in resonator. Functions \( G \) and \( \Delta \) have been evaluated using an electronic computer and are represented graphically for the spectral line of ammonia \( \text{N}^{14}\text{H}_3 \) \( J = 3, K = 3 \). The rest of the theoretical results are based on N.G. Basov, G.L. Strakhovskiy, and I.V. Cheremiskin (Ref. 5: Radiotekhnika i elektronika 196), 6, 6) and given as graphs. Fig. 3 shows the dependence of frequency on the pressure \( p \) in the molecular beam source with factor \( 3 \) compensated for line \( J = 3, K = 3, \text{N}^{14}\text{H}_3 \). The pressure \( p \) is given in relative units. Fig. 4 shows the dependence...
of frequency on the voltage at the sorter. Effect No. 3 is compensated for the line $J = 3, K = 3 \text{N}^{14}\text{H}_3$. Fig. 5 is the same as Fig. 4 but apparently for $J = 3, K = 2 \text{N}^{14}\text{H}_3$. (Abstractor's note: This would seem to be an error. The graph shows the detuning $\Delta f$ as function of pressure $p$ in the source.) The experimental verification of the theoretical results was carried out on a molecular generator using the line of the inversion transition of ammonia $\text{N}^{14}\text{H}_3$ $J = 3, K = 2$ which has no quadrupoles of the hyperfine structure. Three exactly similar generators were used each having two molecular beams running in opposition. The schematic diagram of the generator is shown in Fig. 7. In it a - sources of molecular beams; 1 - quadruple condensors, c - resonator; d - diaphragms cooled by liquid nitrogen. The resonator was made of invar, excited in $E_{010}$ mode, the length of the resonator was 11.2 cm which corresponded to the transit width of the line of 1 Kc/s, $q - 9000$, timed within a few megacycles. Sorting of molecules according to their energy le-
vels was achieved using quadruple condensers having a length of 15 cm. A diaphragm was used to increase the beam intensity. The aperture of the diaphragm was 0.6 cm. The diaphragm was cooled by liquid nitrogen the molecule beam was obtained by a grid having square holes 0.05 × 0.05 mm², spaced 0.05 mm from each other. The signal from two molecular generators was applied to a balanced mixer of a superheterodyne receiver, the local oscillator of which was stabilized by a cavity resonator. The IF was 60 Mc/s, the pass band of the IF amplifier 2 Mc/s. At the output, the difference frequency of the two generators determined from a Lissagian figure was compared with the frequency of an audio generator which in turn, by using a crystal controlled generator could have the frequency adjusted and measured with an accuracy of 0.1 to 1 c/s. The pressure within the source was measured by a pressure tube LT-2 (LT-2). The overall tuning accuracy of the molecular generator achieved by adjustments of its various parameters was around 3c/s. The experimental results are given in the form of graphs. It is
Investigation into the 

stated in conclusion that a molecular generator, having two similar and opposite beams working at a line without a hyperfine structure and having a symmetrical construction, can be used as an absolute standard of frequency time with an accuracy of 10^{-10}. There are 10 figures and 6 references: 3 Soviet-bloc and 3 non-Soviet-bloc. The references to the English-language publications read as follows:


ASSOCIATION: Fizicheskii institut im P.N. Lebedeva AN SSSR (Institute of Physics im. P.N. Lebedev, AS USSR)

SUBMITTED: June 17, 1960

Card 8/40.
AUTHORS: Nikitin, V.V., and Orayevskiy, A.N.

TITLE: Investigating the frequency tuning of a molecular oscillator by modulating the radiation line by means of an external magnetic field

PERIODICAL: Radiotekhnika i elektronika, v. 7, no. 5, 1962, 859 - 865

TEXT: A theoretical and experimental investigation of the alternative tuning method by means of the external magnetic field is presented, applied to a maser using the line $J = 3, K = 2 \text{ N}^{14}\text{H}_2$ and two equal and opposite molecular beams. The physical principle of magnetic tuning, relying on a split of the spectral line, is explained, and basic formulas are given for the frequency of oscillation for the simpler case of two identical energy levels and a single spectral line in the absence of a magnetic field. Corresponding expressions follow for the more general condition of two spectral line components, in terms of resonator natural frequency, Q-factors of Card 1/2.
NIKITIN, V. V.

An oscillator operating on two opposing beams of $^{15}$H$_3$ ammonia molecules. Radiotekh. i elektron. 8 no.1:153-157 Ja '63. (MIRA 16:1)

(Masers)
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.; MARKIN, Ye.P.; NIKITIN, V.V.

Some characteristics of an optical maser operating on a Ne and He mixture with a $\lambda = 3.39$ micron. Radiotekh. i elektron., 8, no.12: 2084-2086 D '63.

1. Fizicheskiy institut im. P.N.Lebedeva AN SSSR.
AUTHOR: Markin, Ye. P.; Nikitin, V. V.

TITLE: Xenon-helium laser at $\lambda = 3.50$ microns

SOURCE: Optika i spektroskopiya, v. 17, no. 6, 1964, 953-954

TOPIC TAGS: gas laser, xenon helium laser, laser output

ABSTRACT: As reported in earlier papers by W. R. Bennett (Appl. Optics Suppl. No. 1, on Opt. Masera, 24-61, 1962) and N. G. Basov and others (Radioelektronika 8, 2084, 1963), the stimulated emission in a xenon-helium laser is noted for the $3d_e - 2p_g$ xenon line at $\lambda = 3.50$ $\mu$m. According to R. A. Parenzani and D. L. Bobroff (Appl. Phys. Letts, 2. 99, 1963), the gain for this line corresponds to 50 $\text{db/m}$. In order to derive the optimum conditions for maximum output, the authors of the present paper have investigated (in June 1963) the power output of a xenon-helium laser at $\lambda = 3.50$ and 3.36 $\mu$m as a function of the following factors: the diameter of the discharge tube, the pressure of the gas mixture, the pumping power, the length of the gas discharge, and others. Experiments were performed with a laser described in an earlier paper by the authors and N. G. Basov (Optika i Spektroskopiya, 15, 436, 1963). Plane, dielectric- and metal-coated mirrors, and three
discharge tubes with diameters of 8, 12, and 20 mm were used. Although the maximum laser power was observed for tubes with pressures within the 1.7—2 mm Hg range, and in the case of λ = 3.36 µ and an 8-mm tube operated at a pressure of 0.7 mm Hg, the operation of a laser which incorporates 8 and 12 mm tubes was stable within a wide range of pressures from 0.2 to 20 mm Hg and up. Stable operation is also reported for a 2—3 cm discharge at 1 watt pumping power. In the case of λ = 3.50 and 3.36 µ and a 12-mm tube, the maximum power was developed when the Xe-He mixture was under 2 mm Hg pressure and the pumping power was approximately 50 watts. The laser output increases linearly with the length of discharge (from approximately 300 mm). The partial pressures of Xe and He were in the ratio of 1:100, respectively. "The authors thank V. P. Shchedrin for his help." Orig. art. has: 3 figures.
TITLE: A semiconductor GaAs1-xPx junction laser

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

ABSTRACT: A GaAs0.85P0.15 pulsed injection laser operating at 77K is described. The monocrystalline solid solution of GaAs0.85P0.15 was prepared by epitaxial growth (sandwich method). The p-n junction was formed at a depth of 26 μ by diffusing zinc at 850°C for 2.5 hr into a polished 6.5 μ thick wafer of GaAs0.85P0.15. Coherent emission was observed at 7120 Å at a threshold current density of 3900 amp/cm². 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.
GaAs junction laser with a nonuniform distribution of injected current

SOURCE: Fizika tverdogo tela, v. 7, no. 10, 1965, 3128-3130

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...
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 $\lambda \approx 8430$ Å was gradually shifted toward higher
frequencies by 50 cps. When $I_1$ was further increased, generation was achieved at
$\lambda \approx 8450$ Å while coherent emission at $\lambda \approx 8430$ Å decreased and finally disappeared.
At the same time the maximum of the line (half width $\approx 30$ Å) was shifted by $\approx 2$ Å
toward the longer wavelengths. A similar quenching effect at $\approx 8430$ 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]
Fig. 1. Emission spectra near the threshold

1 - Current densities in both parts of the dual diode structure are equal, $I_1 = 19$ amp; $I_2 = 34$ amp.

2 - Current densities in the two parts are not equal, $I_1 = 0$, $I_2 = 34$ amp.
Interaction between optically coupled GaAs diode lasers

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 1%. 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...
(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 (PTT, 7, 3128, 1965). The quenching effect is potentially applicable in computer technology (high-speed optical keying). Orig. art. has: 1 figure.
BABOV, N.G.; ZAHRAROV, Z.A.; NIKITIN, V.V.; SHERNOV, A.A.


In Institute of Theoretical and Experimental Physics, Russian Academy of Sciences, Moscow.
TITLE: Investigation of a gas-mixture laser


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-
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 μ 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. Lukanim, B. I. Prokopov, B. I. Belov, P. S. Titov, and A. K. Suchkov for a discussion of the results and help with the calculations. Orig. art. has: 16 figures and 13 formulas.
The effect of injection current on the temporal characteristics of a GaAs laser

In an investigation of the temporal characteristics of a GaAs laser the radiative delay time ($\tau_r$) 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 $\tau_r$ on injection current indicates that the value of $\tau_r$ 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
A method of measuring the inertia of semiconductor lasers

ABSTRACT: A new method is proposed for measuring the delay time (inertia) between the laser diode emission and the injection current, which makes it possible to determine the upper frequency limit of the laser and the lifetime of the minority carriers. The time delay is determined by fixing the time of the leading edge of the injection pulse and the instant of appearance of laser emission. These times are displayed on a cathode ray screen as marks on a time base. The equipment consists of two current pulse oscillators, trigger generator, a blocking pulse circuit, a sweep generator, an optical system, a calibrated cable, and an electron optical transducer. The injection pulse signal is carried by the calibrated cable to a pair of deflection plates in the transducer. The laser emission is focused on the photostage of the transducer, producing a beam of electrons, which are accelerated through the transducer tube. This beam is de-
selected by the sweep generator so as to form the timed base line. The distance from
the beginning of this line and the injection pulse is the delay time or inertia. The
error of measurement is calculated to be 5 \times 10^{-11} \text{ sec}. This error can be decreased to
10^{-11} \text{ sec} by taking better account of the travel time of the electrons in the beam and
improving the resolution time of the transducer. A delay time of 6 \times 10^{-11} \text{ sec} was mea-
sured for a GaAs laser. Orig. art. has: 2 figures.
ABSTRACT: This article is a continuation of earlier research to develop materials for semiconductor lasers over a broad optical range (see Fig. 1). Indium arsenide–antimonide single crystals were grown by the Czochralski method, using equipment described elsewhere (T. F. Ollon, H. L. Goldstein, Appl. Phys. Lett., 2, 170, 1963). The parameters of the crystals, containing $\approx 2\%$ As, are shown in Table 1. The density of dislocations in the crystals was $5 \times 10^3 - 1 \times 10^4$ cm$^{-2}$. Semiconductor diode lasers were prepared from the crystals by diffusion of Zn at 1023K over a period of 40 min. A Fabry-Perot type resonator was achieved by cleaving and polishing the $<110>$ surfaces to within 5–7 min of arc. Using apparatus described in detail in the article, the laser emission spectra were investigated as a function of the injection current through the p-n junction at 77K. Line narrowing and a 200 Å shift of the intensity
Table 1. Parameters of the crystals

<table>
<thead>
<tr>
<th>Compound</th>
<th>$T$, °C</th>
<th>Concentration of electrons, $n_e$, cm$^{-3}$</th>
<th>Electron mobility, $\mu$, cm$^2$/V·sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>InAs</td>
<td>300</td>
<td>$3.4 \cdot 10^{14}$, $3.0 \cdot 10^{14}$</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>77</td>
<td>$3.1 \cdot 10^{14}$, $1.2 \cdot 10^{14}$</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>300</td>
<td>$3.2 \cdot 10^{14}$, $1.6 \cdot 10^{14}$</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>77</td>
<td>$3.0 \cdot 10^{14}$, $1.5 \cdot 10^{14}$</td>
<td>33</td>
</tr>
</tbody>
</table>

Fig. 1. Dependence of the width of forbidden gap on the lattice constant.

maximum (at 3.19 µ) were observed at the injection current of 1.5 amp. Stimulated emission occurred at current densities of 800—1000 amp/cm$^2$. A multimode structure was observed at currents exceeding the threshold by 1.5 times, with the mode spacing and halfwidth being 20 and 15 Å, respectively. This agrees satisfactorily with the
theoretical results of Ollon et al. Diodes prepared from various parts of the bar but with identical resonator length, emitted at different wavelengths. This can be explained by the uneven lengthwise distribution of arsenic due to a small coefficient of segregation. The maximum red shift of radiation was ≈500 Å. Orig. art. has: 1 table and 5 figures.