# Soviet and Japanese Aerospace Literature

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## Soviet Aerospace Literature
## This month: *Energy Research—Nuclear, Solar, and Electromagnetic Sources of Power*

**A88-52784 Stimulated undulator emission from an inhomogeneous electron beam (Vynuzhdennoe onduliatornoe izluchenie neodnorodnogo elektronnogo puchka).** IU. I BOGDANOV, *Moskovskii Universitet, Vestnik, Seriia 3 - Fizika, Astronomiia* (ISSN 0579-9392), Vol. 29, May-June 1988, pp. 92-94. 6 Refs.

The linear operating mode of a high-gain free-electron laser is examined, taking the transverse inhomogeneity of the electron beam into account. Conditions for the appearance of electromagnetic-radiation channeling by the electron beam are analyzed.

**A87-35799 The synthesis of the power transmission channel for a satellite solar power station (K voprosu o sinteze trakta peredachi energii solnechnoi kosmicheskoi elektrostantsii /SKES/).** V. A. VANKE, S. K. LESOMA and A. V. RACHNIKOV, *Radiotekhnika i Elektronika* (ISSN 0033-8494), Vol. 32, March 1987, pp. 655-658. 6 Refs.

The problem of sidelobe reduction for the microwave power transmission channel of a satellite solar power station is considered. Discrete amplitude distributions of electric field strength with respect to the radius of the transmitting antenna are plotted which provide for sidelobe levels not greater than 0.13 microW/sq cm and not greater than 5 microW/sq cm. It is shown that the sidelobe level can be reduced to below the EMC standard in the case of amplitude and radius fluctuations of the discrete amplitude distribution with a normalized rms error not exceeding 1 percent and a rms phase error not exceeding 0.5.

**A88-48300 The structure of thermal waves in a high temperature flare plasma (Struktura teplovykh voln v vysokotemperaturnoi vspyshechnoi plazme).** A. G. KOSOVICHEV, *Pis'ma v Astronomicheskii Zhurnal* (ISSN 0320-0108), Vol. 14, June 1988, pp. 569-576. 18 Refs.

Thermal waves which were observed in a high-temperature plasma (Te of about 10 to the 7th K, Ne of about 10 to the 10th/cu cm) during solar flares are simulated numerically with attention given to the effects of heat flux saturation and ion heating. When the time of thermal energy release into the plasma is less than about 1 sec, the thermal wave is a travelling temperature pulse with a steep front. In the case of gradual heating, a thermal wave with a monotonic temperature profile is formed. The observed thermal-wave velocities of 900-1600 km/s are obtained when 3 x 10 to the 30th ergs of energy are released during 7-10 sec.

**A88-44987 Analysis of gain limitation in an amplitron (K analizu sryva usileniia v amplitrone).** G. I. CHURIUMOV, *Radiotekhnika i Elektronika* (ISSN 0033-8494), Vol. 33, June 1988, pp. 1237-1240. 6 Refs.

Computer simulation is used to investigate the undesirable phenomenon of gain limitation in an amplitron. The effects of the following factors are examined: space charge forces, secondary electron emission, and the phase deviation of the electron spoke and the HF wave. It is shown that gain limitation is connected with the phase shift of the electron spoke with respect to the maximum of the decelerating phase of the HF field.

**A88-28250 Optimization of the parameters of a solar photoelectric system exposed to cosmic rays (Optimizatsiia parametrov solnechnoi fotoelektricheskoi ustanovki, podverzhennoi vozdeistviiu kosmicheskoi radiatsii).** O. F. ZAITSEV, *Geliotekhnika* (ISSN 0130-0997), no. 6, 1987, pp. 23-28. 7 Refs.

A model and an algorithm are developed for the optimization of the performance characteristics of concentration-type solar photoelectric systems consisting of planar solar arrays, concentrator reflecting films, and supporting structures. The model and the algorithm make it possible to accurately predict the parameters of concentration-type photoelectric systems at the design stage. It is shown that, under conditions of considerable radiation-induced damage, the performance of such systems can be improved by using low-potential concentration systems and discrete reservation of output power.

**A88-10203 The dynamics of the motion and radiation from electrons during axial quasi-channeling (Dinamika dvizheniia i izlucheniia elektronov pri aksial'nom kvazikanalirovanii).** F. F. KOMAROV, A. F. KOMAROV, and M. KH. KHOKONOV, *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki* (ISSN 0044-4510), Vol. 93, July 1987, pp. 41-53. 23 Refs.

The spectral characteristics of radiation from relativistic electrons axially quasi-channeled in thick single crystals are investigated. In the peak region, the spectral radiation intensity of the channeled electrons exceeds that of the quasi-channeled ones by several times; this is due to the rapid diffusion of the quasi-channeled electrons over the transverse energies. The main contributors to the hard region of the spectrum are the superbarrier electrons.

**A89-14704 Autodyne effect in a diffraction-radiation generator (Avtodinnyi effekt v generatore difraktsionnogo izlucheniia).** G. P. ERMAK, A. B. LEBEDEV, and B. K. SKRYNNIK, IN: *Millimeter-wave and submillimeter-wave electronics* (A89-14701 03-33). Kiev, Izdatel'stvo Naukova Dumka, 1988, pp. 18-30. 13 Refs.

Theoretical and experimental results are presented on a diffraction-radiation generator (DRG) in the autodyne operating mode. Nonlinear nonstationary equations are derived for the dynamics of the DRG under the effect of an external microwave signal. Engineering formulas are obtained which are suitable for calculating the external Q of the DRG open cavity, the load coupling coefficient, the autodyne response, and the autodyne gain factors in the case of internal and external detection.

**A88-38466 Analysis of the beam-lamination effect in high-gain and low-gain TWTs (Analiz deistviia effekta rassloeniia puchka v LBV s bol'shim i malym usileniem).** N. IA. ABRAMOVA, L. F. BELIAKOVA, and G. F. FILIMONOV, 11 Refs.

The beam-lamination effect in TWTs is analyzed in the case of one-dimensional charge motion with allowance for dynamic defocusing. It is shown that, for powerful Coulomb forces and rigid beam focusing, the lamination reduces the efficiency of multisectional tubes, while dynamic defocusing improves the efficiency and can neutralize the lamination effect.

**A88-55369 Parametric investigations of the hollow cathodes for ion thrusters.** N. V. MASLIANYI, V. F. PRIDANTSEV, V. F. PRISNIAKOV, and A. V. KHITKO, *IAF, 39th International Astronautical Congress,* Bangalore, India, Oct. 8-15, 1988. 8 pp. 7 Refs. (IAF Paper 88-260)

The paper presents the results of parametric investigations of the cesium hollow cathodes with diameter of 0.005 m working in self regime under consumed capacity of 15W and electron current up to 2A. The influence of unit temperature, initial heating capacity, and type of the propellant, upon emission characteristics of the film cathode is analyzed. Several discharge regimes under the change of cesium mass flow rate from 10 to the -6th to 10 to the -8th kg/s have been found. Redistribution of plasma parameters inside the cathodes cavity and matching the cathodes geometrical parameters and cesium mass flow rate considerably improves the energetic efficiency of cathodes. This provides cathodes time start 0.001 s and work stability under any discharge current.

**A89-13358 Radiative acceleration of fast particles in a strong quantizing magnetic field (Radiatsionnoe uskorenie bystrykh chastits v sil'nom kvantuiushchem magnitnom pole).** V. N. TSYTOVICH, *Radiofizika* (ISSN 0021-3462), Vol. 31, no. 8, 1988, pp. 912-920. 7 Refs.

An analysis is made of the formation of the relativistic power spectra of charged particles under radiative acceleration in a strong quantizing magnetic field. This approach is used to examine mechanisms of X-ray emission from pulsars (e.g., the pulsar in the Crab Nebula).

**A88-52753 The dynamics of high-energy charged particles in solar magnetic traps (O dinamike zariazhennykh chastits vysokoi energii v solnechnykh magnitnykh lovushkakh).** IU. M. VOITENKO, A. N. KRISHTAL', and A. K. IUKHIMUK, *Kinematika i Fizika Nebesnykh Tel* (ISSN 0233-7665), Vol. 4, July-Aug. 1988, pp. 18-22. 9 Refs.

The dynamics of high-energy protons accelerated during solar flares and trapped by the flare-loop magnetic field is considered. The cyclotron frequency of the ions oscillating between the magnetic mirrors depends on the velocity of the particles; this dependence leads to the development of potential disturbances. It is found that the trapping efficiency depends on the stability of high-energy protons captured by a trap with a dense coronal plasma.

**A88-40241 Features of the polar cap aurorae in the Southern Polar Region.** O. A. TROSHICHEV, M .G. GUSEV, S. V. NIKOLASHKIN and V. P. SAMSONOV, *Planetary and Space Science* (ISSN 0032-0633), Vol. 36, May 1988, pp. 429-439. 33 Refs.

The data of the all-sky camera and photometer at Vostok station in the Antarctic nearpole region have been used for analysis of the auroral features in the Southern Polar Cap. It is shown that the sun-aligned arcs appear in the polar cap with a delay-time of about an hour relative to the northward turning of the IMF and that they can remain for many hours provided that the IMF is invariable. The distribution of these aurorae in the dayside polar cap displays a theta-shaped pattern which is clearly separated from the latitude-oriented arcs in the auroral oval. Disappearance of the sun-aligned arcs after the southward turning of the IMF occurs much faster: in 10-15 min. The observation of the polar cap arcs immersed in a wide band of diffuse luminescence implies that the sun-aligned arcs should be located within the theta-aurora transpolar band. It is concluded that the distribution of the aurorae in the polar cap, auroral oval, and in the day-side cusp requires a closed structure for the magnetosphere. The convection pattern corresponding to a closed magnetosphere suggests the formation of closed cavities with a stagnation plasma regime in the distant tail of the magnetosphere.

**A88-31991 Output power and gain at the 5.4-micron laser transition in pure neon (Moshchnost' generatsii i usilenie na lazernom perekhode 5,4 mkm v chistom neone).** S. A. BOIKO and A. I. POPOV, *Kvantovaia Elektronika* (ISSN 0368-7147), Vol. 15, Jan. 1988, pp. 115-117. 10 Refs.

The output power and gain at the 5.4-micron laser transition (3p1-3s1) in pure neon (active element length, 60 cm) are determined experimentally for various neon pressures and discharge currents. The results obtained indicate that pure-neon lasers emitting at 5.4 microns can be advantageously used for the analysis of microscopic concentrations of nitrogen oxide.

**A88-37565 Self-consistent model of the quiet solar corona with a wave source of energy (Samosoglasovannaia model' spokoinoi solnechnoi korony s volnovym istochnikom energii).** I. V. CHASHEI and V. I. SHISHOV, *Astronomicheskii Zhurnal* (ISSN 0004-6299), Vol. 65, Jan.-Feb. 1988, pp. 157-166. 18 Refs.

A self-consistent spherically symmetric model of the solar corona is considered in which the heating source is connected with the linear damping of MHD waves propagating away from the strongly turbulent chromosphere. The corona regime is shown to be fully determined by a single parameter: the induction of the coronal magnetic field.

**A88-10243 A study of a thermionic converter with a working medium source based on graphite intercalation compounds with cesium and rubidium (Issledovanie TEP s istochnikom rabochego tela na osnove sloistykh soedinenii grafita s tseziem i rubidiem).** B. I. ERMILOV and A. G. KALANDARISHVILI, *Zhurnal Tekhnicheskoi Fiziki* (ISSN 0044-4642), Vol. 57, June 1987, pp. 1198-1200. 5 Refs.

Experimental results are presented for thermionic converters with a working medium source based on cesium-intercalated graphite with various amounts of rubidium. In particular, it is shown that the addition of 1-4, 3-6, and 4-8 mass pct of rubidium to C8Cs, C10Cs, and C24Cs, respectively, makes it possible not only to retain the maximum initial electrical power of the converter but also to significantly reduce the effect of the source container temperature on the output electrical characteristics of the converter. With a further increase in rubidium concentration to 6-10 percent, the maximum electrical power of thermionic converters decreases by 25-30 percent.

**A88-44008 Two-photon ionization of the calcium atom (Dvukhfotonnaia ionizatsiia atoma kal'tsiia).** D. T. ALIMOV, A. N. BEL'KOVSKII, M. I. GAISAK, O. I. ZATSARINNYI, V. I. LEND'EL et al. *Ukrainskii Fizicheskii Zhurnal* (ISSN 0503-1265), Vol. 33, May 1988, pp. 658-663. 16 Refs.

The single-electron ionization of the calcium atom is investigated experimentally and theoretically. Experimental data on the dependence of the probability of two- and three-photon ionization on laser emission intensity and absolute cross sections of these processes at 18790, 28185, and 29700/cm are presented, as are results of calculations of integral and differential two-photon ionization cross sections in these frequency ranges. The resonance structure of the ionization cross sections associated with the self-ionization states is determined. The theoretical and experimental two-photon ionization cross sections are found to be in satisfactory agreement.

**A88-44930 Drift effects of solar cosmic rays in the interplanetary field (Effekty dreifa solnechnykh kosmicheskikh luchei v mezhplanetnom magnitnom pole).** E. V. KOLOMEETS and V. N. SEVOST'IANOV, *Geomagnetizm i Aeronomiia* (ISSN 0016-7940), Vol. 28, May-June 1988, pp. 360-367. 10 Refs.

The effect of the drift of fast charged particles in the IMF on the space-time and energy characteristics of the distribution function of solar cosmic rays (SCRs) is investigated on the basis of a numerical solution of the diffusion and kinetic equations for SCR propagation. It is shown that curvilinear and gradient drifts of high-energy protons produce a large change in the intensity time profiles and a significant softening of the SCR proton energy spectra at energies above 1 GeV. It is suggested that the observed delay in the arrival time of high-energy protons at the earth relative to the flare explosive phase may be due to particle drift in the IMF.

**A89-14801 Self-focusing and nonlinear refraction in the high-latitude ionosphere in the case of energy transmission by a microwave beam (Samofokusirovka i nelineinaia refraktsiia v vysokoshirotnoi ionosfere pri peredache energii puchkom SVCh-radiovoln).** P. IA. GOLOV and A. N. KOCHUBEI, *Radiotekhnika i Elektronika* (ISSN 0033-8494), Vol. 33, Sept. 1988, pp. 1793-1796. 12 Refs.

A theoretical analysis is made of the self-focusing of high-power microwave beams as they are transmitted from a satellite solar power station through the high-latitude ionosphere. It is shown that nonlinear distortions of the beam in the high-latitude ionosphere are less pronounced than in the midlatitude ionosphere.

**A88-33849 An information system for power management at an autonomous facility (Informatsionnaia sistema upravleniia raspredeleniem elektroenergii na avtonomnom ob'ekte).** G. M. UL'IASHCHENKO, *Priborostroenie* (ISSN 0021-3454), Vol. 31, March 1988, pp. 34-37.

The paper is concerned with the use of hierarchical computer networks for the automatic control of power distribution systems. The principal requirements for such systems are formulated on the basis of an analysis of the existing power distribution systems. A hierarchical information system designed for power managment at an atonomous facility is then examined. The discussion covers system architecture, the operating algorithm of a local microprocessor, and a brief description of the software used.

**A88-41406 Foundations of the theory, construction, and operation of space nuclear power systems (Russian book) (Osnovy teorii konstruktsii i ekspluatatsii kosmicheskikh laEU).** ARKADII ALEKSANDROVICH KULANDIN, SERGEI VLADIMIROVICH TIMASHEV, VLADIMIR DMITRIEVICH ATAMASOV, BORIS MATVEEVICH BORZILOV, PETR VASIL'EVICH GERASIMENKO et al. *Leningrad, Energoatomizdat,* 1987, 328 pp. 44 Refs.

The theoretical part of this work addresses such issues as the design of nuclear reactors, heat release in space, thermoelectric and thermionic converters, and gas-turbine and steam-turbine nuclear power plants. The part dealing with the construction of space nuclear power systems examines questions of assembly, the strength analysis of reactor components, vibrations of turbogenerator converters, the construction of spacecraft radiation protection, and the construction of refrigerator-radiator elements. The part dealing with operational characteristics considers testing with simulation of the actual operating conditions in space, and the assurance of nuclear and radiation safety.

**A88-17800 Mathematical analysis of the operating modes of a catalytic reactor for thermochemical conversion of solar energy (Matematicheskii analiz rezhimov raboty kataliticheskogo reaktora termokhimicheskogo preobrazovaniia solnechnoi energii).** V. B. SKOMOROKHOV, V. I. ANIKEEV, and V. A. KIRILLOV, *Geliotekhnika* (ISSN 0130-0997), no. 4, 1987, pp. 13-17. 7 Refs.

The process of the steam conversion of methane in one of the possible implementations of a catalytic reactor for converting solar energy to the products of the steam conversion of methane is investigated theoretically. The mathematical model of the process is based on equations of thermal balance in a catalyst layer and in the counter-flow heat exchanger; equations of material balance for each component; continuity, state, and momentum equations; and algebraic relations for heat transfer through the walls. Optimum process conditions are determined.

**A88-50733 A high-power argon laser in a longitudinal magnetic field (Moshchnyi argonovyi lazer v prodol'nom magnitnom pole).** A. A. APOLONSKII, S. A. BABIN, V. I. DONIN, and A. V. NIKONOV, *Kvantovaia Elektronika* (ISSN 0368-7147), Vol. 15, May 1988, pp. 922-932. 28 Refs.

The output characteristics of an Ar(+) laser and the plasma parameters of a high-current discharge placed in an external magnetic field are studied experimentally. The physical reasons for the increase in power and efficiency are determined. In the lasing saturation regime with respect to the discharge current, the increase in the laser power and efficiency amounts to 10-15 and 20-25 percent, respectively; it is due to the longitudinal redistribution of gas in the discharge during field superposition.

**A87-41736 Selection of a suitable correcting engine unit for an earth satellite (Vybor ratsional'nogo tipa korrektiruiushchei dvigatel'noi ustanovki ISZ).** M. A. KUZ'MIN and IU. N. CHILIN, *Kosmicheskie Issledovaniia* (ISSN 0023-4206), Vol. 25, Mar.-Apr. 1987, pp. 204-215.

The paper describes a method for defining the efficient utilization of chemical and electrojet engines for the orbit correction of a satellite that uses solar energy as its power source. Dimensionless parameters are proposed which define the suitability of using electrojet engines from the viewpoint of minimum mass of the power system. The effect of the satellite operating conditions and the parameters of the power-system components on the selection of the correcting engine unit is examined.

**A89-14711 Packaged clinotrons which operate continuously in the short-wave part of the millimeter and submillimeter ranges (Paketirovannye klinotrony nepreryvnogo deistviia korotkovolnovoi chasti millimetrovogo i submillimetrovogo diapazonov).** E. E. LYSENKO, O. F. PISHKO, and S. A. CHURILOVA, IN: *Millimeter-wave and submillimeter-wave electronics* (A89-14701 03-33). Kiev, Izdatel'stvo Naukova Dumka, 1988, pp. 91-94. 5 Refs.

The paper describes the development of packaged clinotrons for continuous operation in the short-wave part of the millimeter and submillimeter ranges using magnetic focusing systems made of samarium-cobalt-base magnetic materials. The packaged construction is characterized by low mass and small size. The main operating characteristics and parameters of these devices are presented.

**A89-14707 Theory of an M-type orotron with an emitter in the interaction space (Teoriia orotrona M-tipa s emitterom v prostranstve vzaimodeistviia).** M. B. TSEITLIN, E. A. MIASIN, and L. M. NUTOVICH, IN: *Millimeter-wave and submillimeter-wave electronics* (A89-14701 03-33). Kiev, Izdatel'stvo Naukova Dumka, 1988, pp. 56-61. 8 Refs.

The paper develops the theory of an M-type orotron with a cathode in the interaction space. The main characteristics of the device at wavelengths of 3.2 cm and 8 mm are calculated. The feasibility of realizing an efficient pulsed M-type orotron with a cathode in the interaction space is demonstrated.

**A88-39887 Small-signal gain in CO2-lasers pumped by a self-sustained discharge (Koeffitsient usileniia slabogo signala v CO2-lazerakh pri nakachke samostoiatel'nym razriadom).** V. V. APOLLONOV, G. G. BAITSUR, I. G. KONONOV, K. N. FIRSOV, and V. A. IAMSHCHIKOV, *Kvantovaia Elektronika* (Moscow) (ISSN 0368-7147), Vol. 15, March 1988, pp. 506-508. 18 Refs.

Small-signal gain alpha was investigated in CO2-lasers excited by a self-sustained cavity discharge (SSCD) at pump energy densities up to 700 J/l atm. SSCD initiation by an accelerated electron beam and by preliminary filling of the discharge gap with electrons under conditions of a delayed voltage front is examined. It is shown that this process provides for a more uniform pumping of the active medium than does UV preionization under short-voltage-front conditions. The maximum value of alpha in the discharge was found to exceed 5/m; a value of 8.2/m was obtained.

**A88-39883 Characteristics of the ionization of the active medium of a TE CO2-laser by high-power picosecond IR pulses (Osobennosti ionizatsii aktivnoi sredy TE CO2-lazera moshchnym pikosekundnym impul'som IK izlucheniia).** A. V. NOVIKOV and V. D. TARANUKHIN, *Kvantovaia Elektronika* (Moscow) (ISSN 0368-7147), Vol. 15, March 1988, pp. 490-496. 12 Refs.

The paper presents a numerical study of a model of the transient ionization of the active medium of a TE CO2-laser by high-power picosecond IR pulses. Variations in the electron energy distribution within the pulse duration are examined, and an analysis is made of the constants of electron avalanche development upon exposure to IR pulses of different duration and energy for gas mixtures of different composition. Criteria are defined for considering these constants as an unambiguous function of the instantaneous radiation intensity.

**A88-37666 Spectrum of nuclear reactor electron antineutrinos and verification of the theory of electrically weak interaction (Spektr elektronnykh antineitrino iadernogo reaktora i proverka teorii elektroslabogo vzaimodeistviia).** S. N. KETOV, V. I. KOPEIKIN, L. A. MAKAELIAN, and S. V. TOLOKONNIKOV, *Pis'ma v Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki* (ISSN 0370-274X), Vol. 47, Feb. 25, 1988, pp. 177-180. 10 Refs.

The statistics for 78,000 of registered reverse beta decomposition events at a nuclear power station reactor have been used to determine the energy spectrum of electron antineutrinos. Knowledge of this spectrum is required for the experimental verification of the theory of electrically weak interaction in the little-known electron antineutrino spectrum. 'Recommended' sections of interaction between electron antineutrino and deuteron in the neutral and charged current channels are presented.

**A88-36212 Mechanism for the formation of a sharp plasma boundary during solar-wind stagnation inside cometary atmospheres (O mekhanizme formirovaniia rezkoi plazmennoi granitsy pri stagnatsii solnechnogo vetra vnutri kometnykh atmosfer).** A. A. GALEEV and I. KH. KHABIBRAKHMANOV, *Pis'ma v Astronomicheskii Zhurnal* (ISSN 0320-0108), Vol. 14, March 1988, pp. 267-271. 11 Refs.

Electron losses due to dissociative attachment to neutral water molecules during solar-wind stagnation near comet atmospheres are considered. It is found that such losses can result in a sharp decrease in electron temperature at a specified neutral gas density from 2 eV to about 0.1 eV. It is suggested that this is the mechanism responsible for the formation of the sharp plasma boundary between the solar wind loaded by cometary ions and the cometary stagnation plasma above the contact surface. The results are relevant to Comet Halley.

**A88-44988 Two-dimensional effects in efficiency-optimized multicavity klystrons (Dvumernye effekty v optimizirovannykh po KPD mnogorezonatornykh klistronakh).** A. V. AKSENCHIK and A. A. KURAEV, *Radiotekhnika i Elektronika* (ISSN 0033-8494), Vol. 33, June 1988, pp. 1240-1249. 7 Refs.

A system of relativistic nonlinear two-dimensional equations for multicavity klystrons is formulated taking the total field of the electron beam into account. An analysis is made of the effects of the stratification and mixing of the beam components, dynamic pulsations, and current settling on the interaction processes and the limiting values of klystron efficiency. Beam space-charge forces are shown to play a significant role in high-power relativistic klystrons.

**A87-34193 Solar cells based on heterojunctions in semiconductors (Solnechnye elementy na osnove geteroperekhodov v poluprovodnikakh).** F. A. AKHMEDOV, *Geliotekhnika* (ISSN 0130-0997), no. 1, 1987, pp. 3-7. 6 Refs.

Several versions of solar cells are examined in which the efficiency of solar energy conversion can be increased by using heterojunctions and special design features. In particular, it is shown that a two-electrode solar cell with two-sided sensitivity can be fabricated by using a narrow-band material with a p-n junction on one side and an isotypic heterojunction on the other side. The sensitivity of the solar cell under illumination from the side of the isotypic heterojunction does not differ significantly from its sensitivity under direct illumination (from the side of the p-n junction) due to the effect of the reflecting action of the potential barrier.

**A88-45440 Emission of electrons with an energy of 4.5 GeV in a thick diamond single crystal.** R. O. AVAKIAN, A. E. AVETISIAN, R. A. ASATRIAN, G. A. VARTAPETIAN, K. R. DALLAKIAN et al. *Pis'ma v Zhurnal Tekhnicheskoi Fiziki* (ISSN 0320-0116), Vol. 14, May 26, 1988, pp. 892-896. 7 Refs.

The angular-spectral characteristics of 4.5-GeV electron emission in a 10-mm-thick diamond single crystal are investigated experimentally under conditions of axial and planar channeling. It is found that, in the case of channeling in the (110) plane, the integral emission yield increases practically linearly with crystal thickness. The observed high angular density of the integral emission yield under conditions of axial channeling suggests that the 111-line orientation can be used for generating highly directional high-intensity photon beams.

**A89-14812 Investigation of the frequency properties of Gunn diodes with a nonuniform temperature distribution in the sample (Issledovanie chastotnykh svoistv diodov Ganna s neodnorodnym raspredeleniem temperatury v obraztse).** IU. V. ARKUSHA, A. A. DROGACHENKO, and E. D. PROKHOROV, *Radiotekhnika i Elektronika* (ISSN 0033-8494), Vol. 33, Sept. 1988, pp. 1947-1950. 5 Refs.

Experimental results are presented concerning the nonuniform temperature distribution in the sample on the energy characteristics of Gunn diodes with an active-region length of 2.5 microns. It is shown that, for an anode temperature greater than the cathode temperature, the oscillation efficiency is less than in the case of a uniform temperature distribution. Conditions leading to an increase in the oscillation efficiency as compared with the uniform-distribution case are also examined.

**A88-36076 Acceleration of electrons in an intense laser field and a constant transverse magnetic field (Uskorenie elektronov v sil'nom lazernom i postoiannom poperechnom magnitnom poliakh).** V. V. APOLLONOV, A. I. ARTEM'EV, IU. L. KALACHEV, A. M. PROKHOROV, and M. V. FEDOROV, *Pis'ma v Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki* (ISSN 0370-274X), Vol. 47, Jan. 25, 1988, pp. 77-79.

A technique for electron acceleration in a transverse magnetostatic field using high-power focused laser radiation is proposed. A necessary connection between the magnetic field strength and the laser-radiation parameters is indicated. The acceleration efficiency using the proposed method is found to be very high; no 'saturation' of the method is observed at intensities up to 10 to the 16th W/sq cm.

**A88-50671 Possible variants of microwave-beam structure for satellite solar power plants (O vozmozhnykh variantakh struktury SVCh-puchka solnechnykh kosmicheskikh energosistem).** V. A. VANKE, S. K. LESOTA, and A. V. RACHNIKOV, *Radiotekhnika i Elektronika* (ISSN 0033-8494), Vol. 33, July 1988, pp. 1531-1536. 10 Refs.

An analysis is made of the maximum efficiency of the microwave-beam transmission channel in a satellite solar power system that can be realized for a discrete 10-step amplitude distribution of the transmitting-antenna field. High-efficiency variants of the channel structure are found which are characterized by a high mean field intensity on the receiving antenna and an increased overall level of transmitted power for fixed values of maximum power density on the transmitting and receiving antennas.

**A88-44929 Comparison of data on proton fluxes at the earth with results on the diagnostics of solar proton flares according to radio bursts (Sopostavlenie dannykh o potokakh protonov u zemli s rezul'tatami diagnostiki solnechnykh protonnykh vspyshek po radiovspleskam).** V. V. FOMICHEV and I. M. CHERTOK, *Geomagnetizm i Aeronomiia* (ISSN 0016-7940), Vol. 28, May-June 1988, pp. 353-359. 11 Refs.

A method for estimating the parameters of proton fluxes with energies exceeding 10, 30, and 60 MeV near the earth according to radio-burst data is applied to events occurring during 1970-1980. It is shown that the recognition of proton flares on the basis of this approach leads to a greater frequency of correct recognition than previous approaches. Proton flux parameters (the maximum intensity and the time characteristics) calculated using the proposed approach are found to agree well with satellite data.

**A88-31981 Nitrogen laser pumped by microwave pulses (Azotnyi lazer, vozbuzhdaemyi SVCh-impul'sami).** V. A. VAULIN, V. N. SLINKO, and S. S. SULASHKIN, *Kvantovaia Elektronika* (ISSN 0368-7147), Vol. 15, Jan. 1988, pp. 61, 62. 5 Refs.

Experimental data are presented on the energy parameters of a nitrogen laser (wavelength, 337.1 nm) pumped by a high-power nanosecond microwave pulse. The measurements were carried out for a specific pump power of 0.4-1.6 MW/cu cm, a gas pressure of 3-30 mm Hg, and an active element length of 2--300 cm. Expressions for the lasing efficiency as a function of the microwave discharge power input and active element length are presented. The maximum efficiency is 0.06 percent; the peak lasing power is 12.5 kW.

**A88-26040 Depression of natural power fluctuations and shot noise in a power-stabilized laser (Depressiia estestvennykh fluktuatsii moshchnosti i drobovogo shuma v lazere, stabilizirovannom po moshchnosti).** IA. A. FOFANOV, *Radiotekhnika i Elektronika* (ISSN 0033-8494), Vol. 33, Jan. 1988, pp. 177-179. 9 Refs.

The feasibility of using photodetector-pump feedback to reduce the natural-power-fluctuation (NPF) level of laser radiation as well as the shot-noise level of phtotodetection is studied experimentally for an He-Ne laser. It is shown that the NPF level is reduced in the feedback operating band to the shot-noise level. Current fluctuations of the photodetector which is a component of the feedback system falls below the shot-noise level.

**A87-47444 An analysis of the efficiency of solar energy conversion in a closed-loop thermochemical cycle based on the catalytic vapor conversion of methane (Raschet effektivnosti preobrazovaniia solnechnoi energii v zamknutom termokhimicheskom tsikle na osnove kataliticheskoi parovoi konversii metana).** V. I. ANIKEEV, S. K. BAIMUKHANOV, V. A. KIRILLOV, and V. N. PARMON, *Geliotekhnika* (ISSN 0130-0997), no. 3, 1987, pp. 3-8. 9 Refs.

A method is presented for the theoretical evaluation of the energy efficiency of a closed-loop thermochemical cycle for the conversion of solar energy to the energy of the products of the endothermic catalytic reaction of the vapor conversion of methane. Calculations indicate that the solar energy conversion efficiency of such a cycle can be as high as 50 percent.

**A88-50769 High-temperature solar energy systems for spacecraft power and propulsion units (Russian book) (Solnechnye vysokotemperaturnye kosmicheskie energodvigatel'nye ustanovki).** OLEG IVANOVICH KUDRIN, *Moscow, Izdatel'stvo Mashinostroenie,* 1987, 248 pp. 22 Refs.

The work covers such topics as solar-energy concentrators, concentrator-receiver systems in solar-energy propulsion units, selective absorption as a way to enhance the efficiency of solar energy conversion and the Stirling engine as a solar enery converter. The development of high-temperature solar energy systems for spacecraft power and propulsion units is investigated in detail, with particular attention given to results of ground-based testing.