U-MATRIX APPROACH IN THE INVESTIGATION OF THE LOW-x BEHAVIOUR OF THE NUCLEAR STRUCTURE FUNCTION $F_{2A}(x, Q^2)$

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The U-matrix method is applied to build the amplitude for virtual photon absorption by nuclei which satisfies unitarity. This amplitude is utilized to obtain the expression for the structure function F_{2A}, which is convenient to perform analytic calculations. Profile functions of nuclei with the Gauss, Woods-Saxon, and constant density distributions are considered. It is shown that effects of quark-antiquark pair rescattering in a nucleus cause the change of a power-like behavior of F_{2A} to a logarithmic one at small x. Numerical estimations are given.

THE MODEL OF XENON OSCILLATIONS IN NUCLEAR REACTORS

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A model of xenon-iodine oscillations in a nuclear reactor is considered with the account of the feedback in power and xenon. The genetic closeness of the initial dynamic equations to the equations of the three-molecule model of 'chemical oregonator" is shown. The local analysis of the system stability is carried out.

THE FOKKER − PLANCK EQUATION FOR A FLUX IN THE PRECIPITATE SIZE SPACE

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The problem of finding a flux in the precipitate size space is formulated. Uniqueness of the solution of the corresponding kinetic equation is provided by two conditions. One condition is imposed on the first difference at infinity. In addition, the solution is normalized with a weight factor. This factor is given by the equilibrium distribution function to the minus one power. A formal solution of the problem is found in the continuum approximation. The asymptotic behaviour for time tending to infinity is established. The relaxation time to a stationary solution is introduced for a given precipitate size. This time is estimated from the convergence radius of the Laplace image decomposed in the variable conjugated to the time one. Nucleation of a new phase is treated for a supersaturated solid solution.

SPATIAL STRUCTURE OF COHERENT OSCILLATION OF $Sn_2P_2S_6$ IN A RING-LOOP OSCILLATOR

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The bistable oscillation of $Sn_2P_2S_6$ in a ring-loop oscillator is discovered either with the lowest-order TEM_{00} mode or with one or several high-order transversal modes. The region of bistable operation covers a certain area of angular detuning of the cavity including the case of the perfectly aligned cavity. The threshold of excitation of high-order modes is shown to be larger than that of the principal TEM_{00} mode.

AMPLIFICATION OF LIGHT IN A WATER SOLUTION OF $LiCl^-Tl^+$

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The experimental investigations of light amplification in a water solution of $LiCl^- Tl^+$ in the semiconfocal cavity under pumping by the fourth harmonic of a Nd^{3+} -laser are performed. The narrowing of the spectrum and formation of the directivity diagram are observed. The light gain, estimated at the maximum of the luminescence spectrum, is about $\sim 0{,}026$ cm^{-1}. The reason for limitation of the gain is the pumping induced loss produced by formation of ion-radicals Cl_2^-. To get generation, it is necessary to use pumping intensities below the gain saturation intensity and low temperatures.

SOME PECULIARITIES OF THE CORRESPONDENCE BETWEEN EXPERIMENTAL DETERMINISTIC MUELLER AND JONES MATRICES

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Theoretically, it is known that there exists a reciprocal correspondence between the Mueller and Jones matrix formalisms for deterministic objects. However, in practice, it is mostly failed to determine a Jones matrix corresponding to an experimental Mueller matrix of the deterministic object. The reason for such a situation is a presence of experimental errors of Mueller matrix measurements. In essence, now in the literature on polarimetry, there are no any systematic study of the measurement error effect on results of analysis of information containing in a Mueller matrix. In the paper, the method of finding a deterministic Mueller matrix, closest (the difference between its elements do not exceed a value of the average measurement error) to the initial experimental one and for which the correspondent Jones matrix could be found, is offered. The measurem'/n a possibility of transformation of the measured

deterministic Mueller matrix into a Jones one for consequent detailed analysis is investigated. The correspondent analytic expressions of transfer of an experimental deterministic Mueller matrix into a Jones matrix are obtained.

SIZE EFFECTS IN TEM INVESTIGATIONS, ABSORPTION AND RAMAN SCATTERING SPECTRA OF CdSSe NANOCRYSTALS EMBEDDED INTO GLASS MATRICES

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TEM, optical absorption and Raman scattering measurements for the determination of the average sizes and composition of CdSSe quantum dots in glasses are described. The method's posibilities are compared.

TRANSITIONAL RADIATION OF A MODULATED ELECTRON STREAM THAT FALLS OBLIQUELY ON THE SHARP BORDER OF PLASMA

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Transitional radiation of electromagnetic waves by the plane current wave of an electron stream, that falls on the border of a half-space filled with cold homogeneous isotropic plasma, is calculated in the given current approximation. The current density vector and wavevector are directed arbitrarily. In the most general case, the *s*-polarized component of transitional radiation appears in addition to the *p*-polarized one. Radioemission is increased when the leaking wave on the vacuum-plasma border is excited by the beam or when the electron stream is relativistic.

THE INFLUENCE OF NONEQUILIBRIUM FACTORS ON THE DECAY OF ELECTRIC ARC PLASMA. 3. THE ROLE OF RADIATION AND PLASMA EXPANSION

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The interrelation of the pressure gradient as one of the factors of plasma nonequilibrium and the basic processes at the dense high-ionized plasma was investigated. The role of the self absorbtion of resonanse radiation in this processes was investigated too. In this connection the influence of expansion due to pressure gradient on the decay of pulse electric arc plasma in argon was determined. Saha $^-$ Eggert equition is generalized to the typical in electric arc situation of the simultaneous presence at the plasma of the atomic particles in LTE and ionic component in PLTE. The criterion of recombination nonequilibrium of expanding high density plasma is obtained. As was shown the role of the radiation transfer is ambiguous dependly on the temperature difference ΔT_r along free path of radiation. In a case of $\Delta T_r \ll T$ the self absorption is stabilizing factor. In other case the overpopulation of the resonance level of plasma forming particles at the absorbing area or its underpopulation at the radiating area may take place.

MICROSCOPIC AND PHENOMENOLOGICAL TREATMENT OF NEMATIC-CHOLESTERIC MIXTURES

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A new microscopic approach to the description of nematic and cholesteric liquid crystals is suggested. The approach is based on the similar one which is used in the theory of multicomponent alloys and takes into account the orientational ordering of molecules. The density of free energy of a mixture is derived using model molecular potentials. The dependence of the inverse pitch of a helix on the concentration of the cholesteric component is derived which is in agreement with the experimental results. It is shown that a spinodal decomposition of the mixture takes place with spatial exfoliation of the components at the critical temperature being in the range of the existence of a mesophase. The concentrational heterogeneity causes deformations of the director field and, in the most simple case, leads to a periodic modulation of the inverse pitch of the cholesteric helix.

EFFECT OF EVAPORATION OF GaAs CRYSTAL COMPONENTS IN VACUUM STIMULATED BY CURRENT

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By using the mass-spectrometry method, we have shown that the evaporation of GaAs crystals depends considerably on a state of their electron subsystem. The results obtained demonstrate that one can govern the evaporation of components and, therefore, the crystal composition and electric properties by electric current passing through a crystal, in particular.

TRANSPORT, MAGNETIC, AND MAGNETORESISTIVE PROPERTIES OF OXYGEN-DEFICIENT $La_{1-x}Ca_xMnO_{3-\delta}$ ($\delta \approx 0.08$, $x = 0.15 \div 0.30$) POLYCRYSTALLINE SAMPLES

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We study the ac magnetic susceptibility, electric- and magnetoresistance of oxygen-deficient $La_{1-x}Ca_xMnO_{3-\delta}$ ($\delta \approx 0.08$) polycrystalline samples in the vicinity of the antiferromagnet-ferromagnet concentration transition ($x \approx 0.225$). Transport and magnetic properties are investigated in the temperature range $77 - 295$ K, the magnetoresistance being measured in field of up to 10 kOe. The electronic phase diagram of the $La_{1-x}Ca_xMnO_{3-\delta}$ system is constructed in the plane x-T, and the influence of oxygen nonstoichiometry on double and indirect exchanges in the Mn-O-Mn chain is analyzed.

EQUILIBRIUM CONCENTRATIONS OF DEFECT LEVELS
IN $Pb_{1-x}Sn_xTe$ FILMS

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The equilibrium concentrations of donor and acceptor levels in $Pb_{1-x}Sn_xTe$ films are calculated as a function of the precipitation temperature. The calculation is carried out on the basis of electro-physical relations within the model of a single dominant one-charge defect. For the first time, the band parameters of semiconductor films are determined on the basis of experimental technological data. These parameters agree with those of voluminous samples. This proves the accuracy of the chosen model of the energy levels and charge states of defects. It is determined that the concentration of defects for small and large tin concentrations is equal to and by $1 - 3$ orders higher than the concentration of free charge carriers, respectively. For the first time, it is detected that, in the deposition process, the concentration of basic free charge carriers is constant in the temperature range from 420 to 620 K.

PLASTICITY AND STRENGTH OF $CdWO_4$ AND $ZnWO_4$
SCINTILLATION SINGLE CRYSTALS

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The regularities of high-temperature plastic deformation and resistance of $ZnWO_4$ ¤ $CdWO_4$ single crystals to the action of local loads at low temperatures are investigated. The study is based on various methods such as deformation by bending, 'spreading-out" of dislocation packages, one-axial compression, and the microhardness indentation technique. We establish the temperature range in which linear defects of the structure are originated and begin to move. The operative slip system depending on a crystal orientation with respect to the compression direction are determined and causes for high brittleness of tungstates

$ZnWO_4$ and $CdWO_4$ with anisotropic mechanical characteristics are analyzed.

THE PARTICULARITY OF CALCULATIONS OF THE BAND
STRUCTURE CHARACTERISTICS FOR TRANSITION
METALS ON THE BASIS OF SCATTERING THEORY

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On the basis of the electron-ion interaction potential constructed within the framework of scattering theory, the band structure characteristics of transition and rare-earth metals are studied. The results of calculations of the cohesive energy of crystal structures are better than analogous results obtained with the well-known elecron-ion interaction potentials.

NEW METHOD OF STUDYING
JOINT CLUSTERING-CONVERSION
RELAXATION IN SOLID HYDROGENS

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A new method of studying joint clustering-conversion relaxation in weak solutions of spin-nuclear modifications of hydrogens $J = 1$ in lattices with $J = 0$ is proposed. By this method, the tunneling mobility in deuterium with an extremely narrow tunneling band $\Delta \sim 10^{-9}$ K is found at helium temperatures.

QUANTUM DOT SITUATED UNDER THE SURFACE
OF A SOLID

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The local field method is used to consider the characteristic features of optical properties of a quantum dot situated under the surface of a solid. The influence of the interface on the shift and line broadening is studied. It is shown that the Lamb shift caused by the interaction between the particle and the surface is about 10% whereas the same shift caused by nonpointness of the particle is about 1%.

COMPREHENSIVE INVESTIGATION OF GEOMETRIC
DISORDER OF GaAs SURFACES
BY COMPLEMENTARY METHODS

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GaAs rough surfaces with quite different morphology prepared by chemomechanical polishing and wet anisotropic etching are considered as various geometric disordered systems. To describe locally qualitative and quantitative properties of a surface relief, atomic force microsopy and profilometry are used. By treatment of a large set of data, statistical parameters are also determined. Influence of the geometric disorder on the scattering of electromagnetic waves are studied experimentally within a wide spectral region from X-ray to far infrared light. Crystal structure perfection on the anisotropically etched subsurface layer is confirmed by attenuated total reflection (ATR) and Raman scattering measurements. Unusual intensive surface polariton lines for a surface of the dendrite morphology are observed in ATR as well as in Raman spectra.

ENERGY SPECTRUM OF A CHARGED PARTICLE NEAR THE SURFACE OF A COMPLEX SPHERICAL HETEROSTRUCTURE IN VIEW OF NONINERTIAL POLARIZATION

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We found a common form of the potential energy of a charged particle considering polarizable charges of the interfaces of spherical multilayered system like $CdS/\beta\text{-}HgS/CdS/H_2O$ and analyzed the potential energy as a function of distance (r) of the charge from the beginning of the coordinate system, when $r < a$, $a < r < b$, $b < r < c$, $c < r$ (a, b, c are the radii of spherical interfaces). On the basis of the potential found, we solved Schrodinger's equation and determined the energy of the charged particle outside a complex quantum dot.

INVESTIGATION OF THE EFFECT OF ANOMALOUS TEMPERATURE DEPENDENCE OF THE (0001) PLANE CONDUCTIVITY IN CdSe CRYSTALS

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The effect of anomalous temperature dependence of the (0001) plane conductivity (ATDC) is investigated in CdSe crystals with various resistivity ($\rho = 10^3 \div 10^9 \, \Omega \cdot$, m). The value of ' anomalous" conductivity which appears in a thin near-surface layer under cooling is found to be independent on crystal bulk conductivity. The influence of annealing on the ATDC effect is investigated, and it is proved that a specific structure of the (0001) plane surface is responsible for the effect.

MAGNETO-OPTICAL BISTABILITY OF SEMICONDUCTORS

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The influence of an external magnetic field on the process of exciton absorption in semiconductors is investigated. It is shown that a diamagnetic shift of the exciton level causes arising the states with extremely small crystal absorptive characteristics. The calculation of the dependence of crystal transmitting power on the intensity of an external magnetic field is carried out, and magneto-optical bistability for a fixed laser radiation frequency of obtained.

ELECTRON SPECTRUM FOR AN ELECTRON-DEFORMATION POTENTIAL WELL CAUSED BY THE EDGE DISLOCATION

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In the frames of the model of deformation potential with regard for electron-deformation interaction, the electron spectrum localized on the edge dislocation is calculated.