Scientific seminar

Invited papers

*** February 10, 2016 at 15:00**

Dr. Lebed' A.A. Parametric resonant interference effect in the scattering of ultrarelativistic electrons in the field of two pulsed laser waves

The case of electron ultrarelativistic energy and the case of the field of two strong laser waves were under consideration. The interference kinematical region was determined, where emission-absorption processes of photons of the each of the waves occur in correlated manner. Comparative analysis was performed for the resonant cross section in the interference region and the cross section in absence of an external field. It was shown that resonant cross section of electron-electron scattering in the field of two strong pulsed waves can exceed the field-free cross section in few orders of the magnitude.

*** February 17, 2016 at 15:00**

Dr. Nedoreshta V.N. Resonant two-photon emission of an electron in the field of a pulsed laser wave

We present a theoretical investigation of the resonant two-photon emission of an electron in the in the field of a pulsed laser wave. The resonance kinematics of the process is defined. The probability is obtained. It is demonstrated that the resonant probability decreases if the wave has pulsed character.

*** February 24, 2016 at 15:00**

Dr., Starodub S.S. The influence of external pulsed field of two perpendicular laser wave on the interaction of the classical electrons

The interaction of two nonrelativistic electrons in the pulsed field of two laser waves, propagating perpendicular to each other is investigated. The possibility of compensation of the oscillations in the relative distance of electrons in a significant slowdown in the separation of the particles is shown. An opportunity not only to slowdown the relative velocity of the electrons, but also to increase it is obtained.

*** March 2, 2016 at 15:00**

Dr. Voroshilo O.I. Calculating of the probability of the 2nd order resonant processes

A method for obtaining the probability of the 2nd order resonant processes for the electron (positrons) intermediate state in the low-intensity electromagnetic wave.

*** March 9, 2016 at 15:00**

Lebedinsky S.V. High-Gradient Acceleration

It will going to look at what happens when you operate an rf structure at high-gradient and high-power. High-power behavior is not described by a nice, clear theory, with proofs and theorems. Instead what we have is picture emerging from the fog. It will be described the current understanding of how RF structures behave at high-power. And for describing it Physics of breakdown will covered.

*** March 16 2016 at 15:00**

Dr. Lysenko O.B. Formation of an electron-positron pair by a photon in the two pulsed electromagnetic waves

It is shown that the formation of an electron-positron pair by a photon in the two pulsed light waves takes place in different kinematic regions: interference and noninterference. Studied in detail the interference region of pair formation, which explicitly manifests interference waves in the pairing process. Expressions are obtained for the differential probability of formation of electron-positron pair in the general case as well as for the differential probability in the case of circularly polarized waves.

*** March 23, 2016 at 15:00**

Musienko I.I. Calculating the probability of electron transition of metal into a vacuum under the influence of the electric field in formalism Fowler - Nordheim

The report considers a method of finding the electron emission current by means of the transmission coefficient of the potential barrier.

*** March 30 2016 at 15:00**

Helemelya A.V. Energy losses of the ion in an electron gas in a strong magnetic field

Within the framework of the quantum-field method, the expression for the dielectric susceptibility of the electron gas is presented in the form of a series in the case of a strong magnetic field. Energy losses of the ion are numerical calculated. Results of numerical calculations are compared with experiments and numerical calculations in the framework of classical approximations.

*** April 6, 2016 15,000**

Nikishkin I.I. Computer simulation of antiproton beam in the electron cooling problem

Computer simulation of antiproton beam by means PIC method, using the electrostatic approximation. Analysis of the characteristics of the beam in the

context of electron cooling (temperature, emittance). The using of algorithms of numerical solution of the Poisson equation.

*** April 13, 2016 at 15:00**

Dyachenko M.M. Resonance effects during propagation of photons in the magnetic field

The process of propagation of arbitrary photon polarization have been investigated in a strong magnetic field. The general amplitude of the process of photon propagation has been calculated and the probability has been found in the lowest Landau levels approximation (resonance and non-resonance cases). The comparison of these expressions shows a significant excess of probability in the resonant case. It has been shown that the polarization of final photon is almost always independent on the polarization of initial photon. The threshold and resonance conditions of the process of two-photon pair production have been found. The resonance cross section of the process has been obtained in the LLL-approximation. It has been shown that the resonance cross section of the process has the highest order of magnitude for the positive projections of the magnetic moments of the electron and positron and anomalous linear polarization of the hard photon.

*** April 20, 2016 at 15:00**

Dr. Levitskaya E.A. Parametric interference effect in spontaneous bremsstrahlung (SB) of an electron scattered by a nucleus in the field of two pulsed laser waves

SB of an electron scattered by a nucleus in the field of two pulsed waves is studied theoretically. The process kinematics is studied in detail: resonance conditions (the phenomenon when an intermediate electron falls on mass surface), and conditions of the parametric interference effect (the phenomenon of correlated emission and absorption of field's photons by an initial electron) are defined. The analytical expressions for the amplitude and cross section of non-resonant process are derived. A significant effect of the field of two pulsed waves on the process is shown; the estimation of the obtained cross section relatively to the cross section in the absence of an external field is carried out.

*** April 27, 2016 at 15:00**

Dr. Novak A.P. Ionization in asymmetric heavy ion collisions

Phenomenological calculation of K-shell ionization in an asymmetric heavy ion collision has been carried out. Numerically obtained solutions of the Dirac equation in the two-center potential have been used. The process probability has been obtained by approximate solution of the coupled channels equations. The research is carried out in collaboration with SPARC@FAIR.

*** 11 May 2016 at 15.00**

Dr. Denisenko O.I. Resonance annihilation of ultrarelativistic electron pair in the light field

This report discusses the resonant two-photon annihilation of an electron-positron pair in the field of a circularly polarized moderately strong light wave. The process is described by the two pairs of the Feynman diagram having the lines in intermediate stages either electron or positron. Due to the influence of the external field the resonant process can be effectively split into few processes of the first order in the fine structure constant: a single photon annihilation of an electron-positron pair in the field of external wave and the positron (electron) scattering with the emission of spontaneous photon taking into account the nature of intermediate particle.

*** 18 May 2016 at 15.00**

Dr. Kulmentev A.I. Review report.

*** 25 May 2016 at 15.00**

Dr. Kravchenko S.M. Features of friction force behavior of electron cooling in the magnetization electron flow

Friction force caused by binary collisions in magnetized plasma is calculated by the method of successive approximations. The trajectory of a particle is assumed linear, and the Larmor radius of the electrons equal to zero.

*** June 1, 2016 at 15:00**

Dr. Lebed' A.A. Production of electron-positron pair in collisions of electron with a laser pulse

The study of the production process of electron-positron pairs by a high-energy electron in the collision with a laser pulse is continued. The case when the laser-pulse duration is much larger than the characteristic oscillation time of the wave amplitude was considered. Resonant kinematics of electron-positron pair production was defined. The transition amplitude was obtained and investigated in both the resonant and the nonresonant case.

*** June 8, 2016 at 15:00**

Dr. Kholodov R.I. Spin-polarization effects in QED processes in strong magnetic fields. Continuation

The effects of the influence of polarization of initial photons at spins of final electrons (positrons) and vice versa the effects of the influence of spins of initial particles at polarization of final photons are studied in the processes of quantum electrodynamics of the second orders in resonance conditions in the strong magnetic field.