## Main field of study: 011200 Physics

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**Laser field interaction with an electromagnetically induced periodic structure in an optically thin medium**

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This paper examined and modeled solutions for two fundamental aspects of the theory of the interaction of light with matter.

The first aspect is the influence of laser radiation on matter. Within this aspect of the problem has been studied the spatial localization of an atomic populations of a substance on a scale smaller than the wavelength of the optical radiation by the intense laser beam. The problem was solved in the one dimension for the classical three-level Λ - systems and four-N - system. Also results were obtained for the two-dimensional spatial localization of the atom in the internal state of the inverted Y - system.

The second aspect is the impact of pre-"cooked" medium on the incident laser field. In this aspect considered the problem of the spatial redistribution of light on the electromagnetically induced spatial structures in an optically thin medium, the so-called electromagnetically induced gratings (EIG). It was shown that for a medium with the tripod - configuration of the quantum levels may get 10% efficiency of energy transfer to the maximum of the first order, and have been studied conditions that may increase this efficiency.

# List of publications

1. Гордеев М.Ю., Ефремова Е.А., Рождественский Ю.В. Пространственная локализация трех – и четырехуровневых квантовых систем // Сборник трудов Международной конференции и семинаров. Т.1. «Оптика-2011» Т.2. «Терагерцовая оптика и спектроскопия», «Оптические метаматериалы, фотонные кристаллы и наноструктуры» Т.3. Школа по метаматериалам и наноструктурам. Санкт-Петербург. 17-21 октября 2011

2. Гордеев М.Ю., Ефремова Е.А., Рождественский Ю.В. Численное моделирование дифракционной картины на амплитудно-фазовых решетках населенностей в четырехуровневых схемах // Сборник трудов Международной конференции «Фундаментальные проблемы оптики – 2012». Санкт-Петербург. 15-19 октября 2012.

3. M. Gordeev, E. Efremova, Yu. Rozhdestvensky Electromagnetically induced grating in a medium with tripod configuration of levels // Technical program of 15th International Conference on Laser Optics, 25-29 June 2012, St. Petersburg, Russia.

4. M. Gordeev, E. Efremova, Yu. Rozhdestvensky Numerical investigation of electromagnetically induced grating for tripod scheme // Book of abstract, The 23d International Conference on Atomic Physics, 23-27 July 2012, Palaiseau, France