Such crystals include natural crystals and artificial three-dimensional periodical structures. In VFEL while relativistic electron beam passing through such photonic crystals in conditions of dynamical diffraction quasi-Cherenkov parametric radiation appears and obeys to special law [Baryshevsky V.G., Feranchuk I. D. Phys. Lett. A. 102 (1984), 141]. This law is valid for all wavelength ranges and substantially differs from its analogues in other electronic devices such as traveling wave tubes, backward-wave tubes, free electron lasers and other. Different sides of chaotic dynamics of such generation are investigated. The complicated root to chaos in VFEL is demonstrated starting with the generation threshold.

Laser pulse control of DCl^+ photofragmentation

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The prospects of the control of deuterium chloride ion (DCl+) photofragmentation with the laser field generated by two time-shifted interfering femtosecond laser pulses is investigated theoretically. The analysis performed by means of computer simulation within the Schroedinger wave function formalism. The calculations provide evidence that the ratio of product ion yields Cl^+ versus D^+ can be manipulated by appropriate choice of laser pulse parameters, in particular central laser wavelength, pulse duration, intensity and chirp. The analysis of time dependent populations reveals competition between intra- and inter - electronic state excitation, enabling the understanding of quantum control at the molecular level.

On some peculiarities in transition from de Sitter's to Minkowski model: iteration procedure in the radial equation for a scalar particle

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Though the problem of Hawking radiation in de Sitter space-time, in particular details of penetration of a quantum mechanical particle through the de Sitter horizon, has been examined intensively there is still some vagueness in this subject. The present paper aims to clarify the situation. A known algorithm for calculation of the reflection coefficient $R_{\varepsilon j}$ on the background of the de Sitter space-time model is analyzed. It is shown that the determination of $R_{\varepsilon j}$ requires an additional constrain on quantum numbers $\varepsilon R/\hbar c >> j$, where R is a curvature radius. When taking into account this condition, the value of $R_{\varepsilon j}$ turns out to be precisely zero. It is shown that the basic instructive definition for the calculation