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Ion-Channeled Electron Radiation

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Researches of the last years showed that interaction of intense ultrashort laser impulses with plasma can be a source of compact bunches of electrons as well as of powerful high- energy electromagnetic radiation. Due to the high gradient of the field of a laser, impulse electrons can be accelerated till the speeds close to the light velocity. Plasma waves being formed behind a laser impulse degenerate in a cavity, free of plasma electrons and capable to trap the electrons accelerated by a laser impulse. It should be underlined that this cavity moves with a speed of the laser impulse, forming in this way a continuous potential to bound the electrons under successful acceleration. In other words the cavity becomes an infinite ion-channel for an electron.

In this work we have studied the electron motion in continuous ion-channel and the processes of electromagnetic radiation by ion-channeled electron. Both classical and quantum cases in approach of a scalar electron are considered.

Primary author: Dr DIK, Alexey (PN Lebedev Phys Institute, Moscow)

Co-authors: Dr LIGIDOV, Azamat (National Research Nuclear University (MEPhI)); Prof. DABAGOV, Sultan (INFN Laboratori Nazionali di Frascati)

Presenter: Dr DIK, Alexey (PN Lebedev Phys Institute, Moscow)

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