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Channeling, Dechanneling and Focusing of Charged Particle beams in Hollow Laser Beams

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It is given a short discussion of the existing publications [1] devoted to the analytical and numerical study of the motion of electrons in various laser fields as well as a consideration of the complicated expressions of the laser fields and relatively simple expressions which are satisfactory approximations corresponding to the measured intensity profiles of really existing beams. Then developing the considerations of [2] the trajectories of high energy electrons in laser hollow beams (HB) with simple Gaussian intensity distribution and radial and azimuthal polarizations are calculated numerically by solving the equations of motion. It is shown that depending on the parameters of the particle and laser beams the particles can be captured (channeled) in HB, thrown away (dechanneled) from HB and focused at certain distances. The obtained results can find some applications for handling of moderate energy and high energy particle beams.

References

1. C. Varin et al, Appl.Sci. 3, 70-93,2013.
2. X. Artru, K.A. Ispirian, M.K. Ispiryan, Particle Refraction, Reflection and Channeling by Laser Beams, ArXiv.0707.0148, 2007.

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