Abstract Submitted
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Acceleration of proton bunches by petawatt chirped radially-polarized laser pulses YOUSEF SALAMIN, Department of Physics, American University of Sharjah, United Arab Emirates, BENJAMIN GALOW, JIAN-XING LI, CHRISTOPH KEITEL, Max Planck Institute for Nuclear Physics, Heidelberg, Germany — Results from theoretical investigations will be presented which show that protons can be accelerated from rest to a few hundred MeV by a 1 PW chirped radially-polarized laser pulse of several hundred femtosecond duration and focused to a waist radius comparable to the radiation wavelength. Single-particle calculations are supported by many-particle and particle-in-cell simulations. Compared with laser acceleration by a similar linearly-polarized pulse, the gained energies are less, but have better beam quality. For a suitable initial phase, a particle bunch gets accelerated by the axial component E_z of the laser pulse and, initially focused by the transverse electric field component E_r. Beam diffraction finally sets in due to the particle-particle Coulomb repulsion, after interaction with the pulse ceases to exist.

Yousef Salamin
Department of Physics, American University of Sharjah

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