Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Laser-generated proton bunches from chirped laser-plasma interaction BENJAMIN GALOW, Max-Planck-Institute for nuclear physics, Saupfercheckweg 1, 69029 Heidelberg, Germany, YOUSEF SALAMIN, Department of Physics, American University of Sharjah, POB 26666, Sharjah, United Arab Emirates, TATYANA LISEYKINA, Department of Physics, University of Rostock, 18051 Rostock, Germany, ZOLTAN HARMAN, JIAN-XING LI, CHRISTOPH KEITEL, Max-Planck-Institute for nuclear physics, Saupfercheckweg 1, 69029 Heidelberg, Germany — Detailed single- and many-particle calculations are carried out for the acceleration of protons employing linearly-polarized plane-wave and tightly-focused chirped laser pulses of several ten to several hundred femtosecond durations, petawatt peak powers and relativistic peak intensities of the order of $10^{21} - 10^{22}$ W/cm^2 [1,2]. Analytic and numerical methods of calculation are used in the single-particle cases (in vacuum), and particle-in-cell (pic) simulations (underdense plasma) are employed in the many-particle investigations, without and with electromagnetic particle-particle interactions, respectively. Feasibility of generating ultra-intense (10^7 particles per bunch) and phase-space collimated beams of protons is demonstrated. Interaction of the protons with the quasi-static part of the laser pulse allows the particles to gain sufficient kinetic energy (around 250 MeV) required for such applications as hadron cancer therapy.

[1] B. J. Galow, Y. I. Salamin, T. V. Liseykina, Z. Harman, and C. H. Keitel, Phys. Rev. Lett. **107**, 185002 (2011)
[2] Y. I. Salamin, J.-X. Li, B. J. Galow, Z. Harman, and C. H. Keitel, submitted (2012)

Benjamin Galow
Max-Planck-Institute for nuclear physics,
Saupfercheckweg 1, 69029 Heidelberg, Germany

Date submitted: 31 Jan 2012 Electronic form version 1.4