

Simulation of Particle Acceleration off Laser Irradiated Micro-Plasma

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We report on updates on the comprehensive processing of PIC simulations on HPC systems at LRZ using tools for the data management of large parameter studies of physics simulations. Our example study uses a Particle-In-Cell code by Prof. Ruhl et al (LMU) to explore the laser plasma interaction and ensuing particle acceleration of polystyrene or hydrogen micro-targets in the micrometer range. The related experiments (Hilz, Ostermayr et al) use a Paul trap to levitate the targets in a vacuum (or controlled gas filled surroundings) and irradiate them by an ultra-short relativistically strong laser pulse. The atoms in the targets are ionized completely by the electric fields of the pre-pulse and they act as so-called mass limited targets (MLT) for acceleration of ions (predominantly protons) to energies up to hundreds of MeV. We explore the optimization of the near critical relativistic density targets, by examining the interplay between RPA and Coulomb explosion. We examine the possibility of different regimes of accelerated protons when using higher laser pulse energies, as available now at ELI-NP and different pulse parameters

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Sitzung Einordnung: Session 3 - Short Pulse 1