ID de Contribution: **23** Type: **Oral presentation**

Sophisticated studies of laser-driven ion acceleration with SMILEI code

mercredi 8 novembre 2023 11:50 (25 minutes)

Particle-in-cell (PIC) code SMILEI enables various approaches and options how to initialize numerical particles or track them during simulation run. These features of SMILEI were employed for several studies of laser-driven ion acceleration with the aim to study ion acceleration mechanisms or interpret experimental results. The possibility to start the simulation with particles'positions and weights defined in external HDF5 file for each particle was used for the interpretation of experimental results on multi-MeV alpha particle source via proton-boron fusion [V. Istokskaia et al., Comm. Physics 6, 27 (2023)]. In this study, hydrodynamic (HD) simulations with FLASH code were firstly used to calculate densities of preplasma created by picosecond prepulse. Then, Python script was developed to create macroparticles for PIC simulation with various numbers and numerical weights in cells depending on the density of plasma in each cell. This approach of variable numbers and weights of numerical particles at the same time enables to model laser pulse interaction with plasma in a large range of densities in the simulation box in a reasonable computational time. The particle tracking including accelerating fields experienced by ions with relatively high final energies was used in 3D simulation of laser-driven ion acceleration from near critical Gaussian plasma density profile [J. Psikal et al., Plasma Phys. Control. Fus. 63, 064002 (2021)]. Here, the tracking was realized in two subsequent simulation runs as it is impossible to track all particles due to their huge numbers in 3D simulation. In the first run, ID numbers of high energy ions were recorded at the end of simulation. After their random selection, low number of particles was tracked from the beginning of their acceleration in the repeated (second) simulation run from a restart point.

Author: PSIKAL, Jan (FNSPE CTU in Prague & ELI-Beamlines)

Orateur: PSIKAL, Jan (FNSPE CTU in Prague & ELI-Beamlines)

Classification de Session: Contributed talks