Teaching plasma physics with the open-source PIC code SMILEI

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SMILEI [1,2] is an open-source, collaborative Particle-In-Cell (PIC) code co-developed by plasma physicists and high-performance computing (HPC) specialists. Thanks to its user-friendly (Python) interface, built-in diagnostics and visualization tools, SMILEI can be used not only for research but also as a teaching platform.

Over the last years, various practical trainings have been proposed to students at the Bachelor, Master and post-graduate levels. These exercises address numerical analysis, high-performance computing, and of course plasma physics: streaming instabilities, collisionless to collisional processes, laser-plasma interaction, particle acceleration, QED processes under extreme light conditions, astrophysics, etc.

This poster gives an overview of the various topics taught with the SMILEI PIC code as well as of the open-access material (online tutorial and lecture notes, input files and post-processing tools, virtual machines) offered to the plasma community to introduce - in a practical and interactive way - plasma physics and numerical simulation to students.

[1] Derouillat et al., *SMILEI: A collaborative, open-source, multi-purpose particle-in-cell code for plasma simulation*, Comp. Phys. Comm. 222, 351 (2018); www.maisondelasimulation.fr/smilei.

[2] Beck et al., Adaptive SIMD optimizations in particle-in-cell codes with fine-grain particle sorting, https://arxiv.org/abs/1810.03949.