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Interactive, Extensible PIC Simulations with a Python Interface

BENJAMIN RAGAN-KELLEY, UC Berkeley AS&T, JOHN VERBONCOEUR, Electrical & Computer Engineering, Michigan State University — Particle-in-Cell (PIC) simulations of plasmas are used for a wide variety of systems, and can range significantly in scale. There are many informative simulations that can be run at interactive speeds, and good tools for interacting with simulations are important for facilitating science. By wrapping simulation code in Python, we gain the use of a full programming language as the simulation interface. This quickly gives us the tools for defining new diagnostics in-flight, enabling more natural investigation of the system. The Python interface also allows very powerful interaction between codes, facilitating iterative approaches for finding target simulation parameters, and working with other simulation codes. The toolset is also developed with parallel simulations in mind, allowing for aggregation of subdomain diagnostics from different nodes.

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