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Modelling any kind of ”smoothed” laser beams with Smilei

Wednesday 19 March 2025 17:00 (25 minutes)

Optical smoothing is a technique used to smooth out the laser focal spot of kJ/nanosecond class laser beams in Inertial Confinement Fusion experiments. Instead of being a perfect Gaussian or near-Gaussian beam with a well defined temporal envelope, the laser light is the result of a complicated interference pattern constituted of many intense spots -called speckles- moving and or blinking during the pulse duration.
We will explain different optical smoothing techniques such as Smoothing by Spectral Dispersion, Induced Spatial Incoherence with continuous spectrum (broadband) beams and with multi-colour beams. The qualitative and quantitative description of such light beam will be directly linked with the mathematical representation done in Smilei. We will also address the challenges encountered in the simulation process and introduce the different applications of optical smoothing for laser-plasma interactions.

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