MATTER AND TECHNOLOGIES

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X-ray radiation transport in GPU accelerated Particle In Cell simulations

Ultra-high-intensity laser pulse interactions with solid density targets are of central importance for modern accelerator physics, Inertial Confinement Fusion(ICF) and astrophysics. In order to meet the requirements of real-world applications, a deeper understanding of the underlying plasma dynamics, including plasma instabilities and acceleration mechanisms, is needed. X-ray radiation plays a substantial role in plasma physics, either as an integral part of a physical system itself or as a useful diagnostic, hence it should be included in computational models.
Therefore, we bring a Monte Carlo based X-ray radiation transport module into our Particle In Cell simulation framework PIConGPU. It allows, among others, for Thompson scattering, e.g. for small-angle X-ray scattering (SAXS), and Faraday effect calculation for X-ray polarimetry - as online, in-situ diagnostics.

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