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**Multiscale Coupling of Monte Carlo Binary-Collision-Approximation Codes with Particle-in-Cells for Plasma-Material Interaction** DAVIDE CURRELI, KYLE LINDQUIST, DAVID N. RUZIC, CPMI, Department of Nuclear, Plasma and Radiological Engineering, University of Illinois at Urbana-Champaign, Urbana 61801 USA — Techniques based on Monte Carlo Binary Collision Approximation (BCA) are widely used for the evaluation of particle interactions with matter, but rarely coupled with a consistent kinetic plasma solver like a Particle-in-Cell. The TRIM code [Eckstein; Biersack and Haggmark, 1980] and its version including dynamic-composition TRIDYN [Moller and Eckstein, 1984] are two popular implementations of BCA, where single-particle projectiles interact with a target of amorphous material according to the classical Carbon-Krypton interaction potential. The effect of surface roughness can be included as well, thanks to the Fractal-TRIM method [Ruzic and Chiu, 1989]. In the present study we couple BCA codes with Particles-in-Cells. The Lagrangian treatment of particle motion usually implemented in PiC codes suggests a natural coupling of PiC's with BCA's, even if a number of caveats has to be taken into account, related to the discrete nature of computational particles, to the difference between the two approaches and most important to the multiple spatial and temporal scales involved. The break down of BCA at low energies (unless the projectiles are channeling through an oriented crystal layer [Hobler and Betz, 2001]) has been supplemented by Yamamura's semi-empirical relations.

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