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Ab initio approach to the ion stopping power at the plasma-solid interface MICHAEL BONITZ[1], NICLAS SCHLÜNZEN, LASSE WULFF, JAN-PHILIP JOOST, Institute for Theoretical Physics and Astrophysics, Kiel University, KARSTEN BALZER, Computing Center, Kiel University — The energy loss of ions in solids is of key relevance for many applications of plasmas, ranging from plasma technology to fusion. Standard approaches are based on density functional theory or SRIM simulations, however, the applicability range and accuracy of these results are difficult to assess, in particular, for low energies. Here we present an independent approach that is based on ab initio nonequilibrium Green functions theory, e.g. [1,2] that allows to incorporate electronic correlations effects of the solid. We present the first application of this method to low-temperature plasmas, concentrating on proton and alpha-particle stopping in a graphene layer. In addition to the stopping power we present time-dependent results for the local electron density, the spectral function and the photoemission spectrum [3] that is directly accessible in optical, UV or x-ray diagnostics.

[1] M. Bonitz, Quantum Kinetic Theory, Teubner 1998, 2nd ed. Springer 2016
[2] K. Balzer and M. Bonitz, Lect. Notes Phys. Vol. 867 (2013).
[3] M. Eckstein and M. Kollar, Phys. Rev. B 78, 245113 (2008).

[1]http://www.itap.uni-kiel.de/theo-physik/bonitz/

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