Stopping power in warm dense targets from first principles

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Recent experimental advances enabled the precise measurement of the stopping power of fusion products in warm dense targets. Time-dependent density functional theory coupled with Ehrenfest molecular dynamics is the standard method to predict stopping power in cold targets. We assess its ability to reproduce these experimental measurements in warm dense targets[1], illustrate the computational challenges with this method, and introduce an alternative framework based on time-dependent density functional theory coupled with average-atom models. Our approach facilitates the prediction of the stopping power in future experiments from first principles and advances our empirical and phenomenological understanding of transport properties in this technologically challenging thermodynamic regime.

REFERENCES

[1] A. D. Baczewski, L. Shulenburger, M. P. Desjarlais, S. B. Hansen, and R. J. Magyar, Phys. Rev. Lett. **116**, 115004 (2016).