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Dynamics of quantum equilibration, dissipation and fluctuation in nuclear collision[1] SAIT UMAR[2], Vanderbilt University, CEDRIC SIMENEL[3], Australian National University, KYLE GODBEY[4], Texas AM University — The equlibration processes are studied in collisions of atomic nuclei. We provide a general, systematic method to investigate the timescales of equilibration, dissipation, and fluctuation mechanisms through the use of a time-dependent, fully microscopic theory. Despite direct comparisons between wildly different systems spanning light and heavy nuclei at a range of collision energies, common timescales were found for each of the studied quantities. The longest process by far is mass equilibration, with a general equilibration time of 2×10^{-20}s. Timescales for neutron-to-proton equilibration, mass fluctuation build up, kinetic energy dissipation, and angular momentum dissipation however are found to be on the order of 10^{-21}s, an order of magnitude faster than that of mass equilibration. This vast separation implies the relative independence of dissipation mechanisms on mass equilibration, and that the primary generator of dissipative effects is fast nucleon exchange between interacting fragments. 1. C. Simenel, K. Godbey, and A. S. Umar, Phys. Rev. Lett. 124, 212504 (2020).

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[2]Physics and Astronomy, Vanderbilt University, Nashville, TN, 37235, USA
[3]Department of Theoretical Physics and Department of Nuclear Physics, Research School of Physics and Engineering, The Australian National University, Canberra ACT 2601, Australia
[4]Cyclotron Institute Texas AM University, TAMU 3366 College Station, TX 77843-3366 USA

Sait Umar
Vanderbilt University

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