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Failure of local FDT in fluctuation-induced interactions. DIEGO DALVIT, Los Alamos National Laboratory, FRANCESCO INTRAVAIA, Max-Born Institute, Germany, RYAN BEHUNIN, Yale University, CARSTEN HENKEL, University of Postdam, Germany, KURT BUSCH, Humboldt University, Germany — In the study of non-equilibrium fluctuation-induced interactions (e.g., quantum friction, near-field heat transfer, and non-equilibrium Casimir forces) the local fluctuation-dissipation theorem (FDT) is widely used without much justification. Here, we report the failure of the local FDT in a specific example of quantum friction of an atom moving at constant velocity above a surface. A generalized non-equilibrium FDT is derived, which contains a contribution akin to the local FDT and an additional one corresponding to a velocity-dependent current term. We show that in the low-velocity limit the frictional force arising from the current term is of the same order of magnitude as that predicted by the local FDT, which underestimates the total force by almost 50 percent.

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