Abstract Submitted
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Quantum Friction in Different Regimes[1] JULIANE KLATT, STEFAN BUHMANN, Albert-Ludwig University, Freiburg, Germany — Quantum friction is the velocity-dependent force between two polarizable objects in relative motion, resulting from field-fluctuation mediated transfer of energy and momentum between them. Due to its short-ranged nature it has proven difficult to observe experimentally. Theoretical attempts to determine the precise velocity-dependence of the quantum drag experienced by a polarizable atom moving parallel to a surface arrive at contradicting results. Scheel[2] and Barton[3] predict a force linear in relative velocity v – the former using the quantum regression theorem and the latter employing time-dependent perturbation theory. Intravaia,[4] however, predicts a v^3 power-law starting from a non-equilibrium fluctuation-dissipation theorem. In order to learn where exactly the above approaches part, we set out to perform all three calculations within one and the same framework: macroscopic QED. In addition, we include contributions to quantum friction from Doppler shift and Röntgen interaction, which play a role for perpendicular motion and retarded distances, respectively, and consider non-stationary states of atom and field.

[1]DFG Emmy-Noether Program
[2]S. Scheel and S. Y. Buhmann, Phys. Rev. A **80** (2009).
[3]G. Barton, New J. Phys. **12** (2010).
[4]F. Intravaia et al., Phys. Rev. A (2014).

Juliane Klatt
Albert-Ludwig University, Freiburg, Germany

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