

Abstract Submitted
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Non-contact friction and the relaxational dynamics of surface defects JIAN-HUANG SHE, ALEXANDER V. BALATSKY, Los Alamos National Lab — When a cantilever oscillates near a sample surface, it experiences a dissipative force. Such non-contact friction is of great practical importance to the ultrasensitive force detection measurements. Previous theories predict the friction coefficient to be six orders of magnitude smaller than the experimental value. Here, inspired by the recent experiments reported in *Phys. Rev. Lett.* 105, 236103 (2010), we propose two new mechanisms to explain the magnitude, as well as the distance, temperature and frequency dependence of the friction. We assume that the surface defects couple to the cantilever tip either in the spin or charge channel, and their relaxational dynamics gives rise to the observed behavior of both the friction coefficient and the induced spring constant. Nice agreement is found with the experiments.

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