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Diffusion of a Plasmon-Exciton Polaron[1] CHARLES CHERQUI, DAVID DUNLAP, Department of Physics and Astronomy, University of New Mexico, ANDREI PIRYATINSKI, Center for Nonlinear Studies, Los Alamos National Lab — We consider the motion of an exciton constrained to a quasi-one-dimensional geometry in the vicinity of a metal interface. For weak coupling, the metal causes damping of the center of mass motion, leading to a decrease in the exciton diffusion constant. This can be modeled as non-contact dielectric friction between an oscillating dipole and a substrate, where the frictional force is related to the response of the metal through the fluctuation dissipation theorem [1]. When the exciton frequency is in the neighborhood of the plasma resonance, the interaction can no longer be described by linear response theory, for the exciton and plasmon form a quasiparticle, an exciton-plasmon polaron. We calculate the transmission and reflection coefficients for the exciton-plasmon polaron in the neighborhood of a metal interface, as well as the diffusion rate and radiative lifetime versus coupling strength.

[1] Seppe Kuehn, John A. Marohn, and Roger F. Loring, 110(30) J. Phys. Chem. B, (2006) 1425

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