## Abstract Submitted for the MAR08 Meeting of The American Physical Society

Transport in ultrathin gold films decorated with magnetic Gd atoms MICOL ALEMANI, ERIK HELGREN, ADDISON HUGEL, FRANCES HELLMAN, Physics Department, University of California, Berkeley, 366 Le Conte, Berkeley, CA, 94720 — We have performed four-probe transport measurements of ultrathin Au films decorated with Gd ad-atoms. The samples were prepared by quench condensation, i.e., sequential evaporation on a cryogenically cooled substrate under UHV conditions while monitoring the film thickness and resistance. Electrically continuous Au films at thickness of about 2 mono-layers of material are grown on an amorphous Ge wetting layer. The quench condensation method provides a sensitive control on the sample growth process, allowing us to tune the morphological and electrical configuration of the system. The ultrathin gold films develop from an insulating to a metallic state as a function of film thickness. The temperature dependence of the Au conductivity for different thickness is studied. It evolves from hopping transport for the insulating films, to a ln T dependence for thicker films. For gold films in the insulating regime we found a decreasing resistance by adding Gd. This is in agreement with a decreasing tunneling barrier height between metallic atoms. The Gd magnetic moments are randomly oriented for isolated atoms. This magnetic disorder leads to scattering of the charge carriers and a reduced conductivity compared to nonmagnetic materials.

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