Spin-dependent lifetimes of hot electrons in $3d$ ferromagnets

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The spin-dependent lifetimes of electrons excited to energies of a few hundred meV above the Fermi energy E_F—so-called hot electrons—of the $3d$ ferromagnets Fe, Co and Ni have been investigated experimentally and theoretically for more than a decade. They are of high technological relevance through the associated giant magneto-resistance effect and are of fundamental interest—some of the underlying microscopic physical processes are not yet fully understood. The first and up to now only spin-resolved two-photon photoemission (SR-2PPE) measurements have been performed in Refs. [1,2], where thin metal films were grown on Cu(100) and the surfaces were covered with Cs to lower the work functions.

We present bichromatic infrared pump and ultraviolet probe SR-2PPE data that give experimental access to smaller energies above E_F and thereby extend the experimental data range, without the need of Cs adsorption. We find good agreement with the previously measured data [1,2] in the overlapping energy range and discuss discrepancies with recent *ab-initio* calculations. A possible reason for the discrepancies are spin-flip exchange-scattering processes that we could observe on the clean, i.e. Cs-free, Co surface.

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