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Measurement by antilocalization of interactions between InAs surface electrons and magnetic surface species[1]
YAO ZHANG, R.L. KALLAHER, V. SOGHOMONIAN, J.J. HEREMANS, Virginia Tech — Weak-antilocalization (WAL) low-temperature magnetotransport measurements are sensitive to electron quantum coherence, and can be used as a sensitive probe of surface quantum states. We experimentally study interactions between surface electrons and local magnetic moments on InAs by comparing WAL on patterned InAs accumulation layers where rare earth ions or Co^{2+}, Co-phthalocyanine, Fe^{3+}, and Fe-phthalocyanine were deposited, with those where no magnetic species were deposited. The magnetic species modify the magnetic spin-flip scattering, which carries information about magnetic interactions, and modify the spin-orbit (SO) scattering, identified via the WAL signal and characterized over temperature. Experiments indicate a mostly temperature-independent magnetic spin-flip scattering, except for Ho^{3+}. The SO scattering also displays a weak temperature dependence, and is increased by the heavy ions, Co^{2+} and Co-phthalocyanine, while suppressed by ferromagnetic Fe^{3+} and Fe-phthalocyanine, in agreement with the expected absence of the WAL in ferromagnets.

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[X] Prefer Oral Session
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