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Spin-dependent quantum interference within a single Co nanostructure D. SANDER, H. OKA, S. WEDEKIND, G. RODARY[1], L. NIEBERGALL, P. IGNATIEV, V. STEPANYUK, J. KIRSCHNER, Max Planck Institute of Microstructure Physics, Halle, Germany — We present results of a combined experimental and theoretical study of spin-polarized electron confinement on individual nm small Co islands on Cu(111). Spin-polarized low-temperature STM in magnetic fields is used to identify and prepare parallel (P) and anti-parallel (AP) states of the magnetization orientation between a Co island and the magnetic tip of the STM. We find a pronounced spatial modulation of the differential conductance within one island, which is ascribed to electron confinement. The analysis of these modulation patterns for P and AP magnetization states between tip and island reveals a strong variation between both states. Maps of the asymmetry of the differential conductance, (GAP-GP)/(GAP+GP), show strong spatial variations, where the contrast depends on the gap voltage. These results are ascribed to a spatial modulation of the spin-polarization within the Co islands. In conjunction with theory we conclude that the modulation of the spin- polarization, and its variation with energy, can be described by the relative magnitudes of the spin-resolved density of states, where the spatial modulation is mainly due to electron confinement of majority electrons.

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