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Spin-filtering in nickel-oxide atomic junctions RAN VARDIMON, MARINA KLIONSKY, OREN TAL, Weizmann Institute of Science, OREN TAL GROUP TEAM — Generating a highly spin-polarized current governed by electrons of a single spin type is of central importance for realization of nanoscale spintronics. We report on the detection of up to 100% spin-polarized currents across nickel-oxide atomic junctions formed between two nickel electrodes under cryogenic vacuum conditions. The degree of spin polarization is probed by analyzing the quantum shot noise resulting from the discrete statistics of electron transport. In sharp contrast to the insulating character of bulk nickel-oxide, our results can be explained by the emergence of a local half-metallic electronic structure, stemming from the distinct orbital hybridization of the low-coordinated junction atoms. These findings illuminate new directions for spin transport manipulations by atomic-scale material design.

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