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Tailoring the chiral magnetic interaction between two individual atoms[1] J. WIEBE, Institute for Nanostructure and Solid State Research, Hamburg University, A. A. KHAJETOORIANS, Institute for Molecules and Materials, Radboud University, Nijmegen, M. STEINBRECHER, Institute for Nanostructure and Solid State Research, Hamburg University, M. TERNES, Max Planck Institute for Solid State Research, Stuttgart, M. BOUHASSOUNE, M. DOS SANTOS DIAS, S. LOUNIS, Peter Grünberg Institut and Institute for Advanced Simulation, Forschungszentrum Jülich and JARA, R. WIESENDANGER, Institute for Nanostructure and Solid State Research, Hamburg University — Chiral magnets are a promising route toward dense magnetic storage technology due to their inherent nano-scale dimensions and energy efficient properties. Engineering chiral magnets requires atomic-level control of the magnetic exchange interactions, including the Dzyaloshinskii-Moriya interaction, which defines a rotational sense for the magnetization of two coupled magnetic moments. Here we show that the indirect conduction electron mediated Dzyaloshinskii-Moriya interaction between two individual magnetic atoms on a metallic surface can be manipulated by changing the interatomic distance with the tip of a scanning tunneling microscope. We quantify this interaction by comparing our measurements to a quantum magnetic model and ab-initio calculations yielding a map of the chiral ground states of pairs of atoms depending on the interatomic separation. The map enables tailoring the chirality of the magnetization in dilute atomic-scale magnets.

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