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Spatially anisotropic Kondo effect formed from individual Co atoms on silicene/ZrB_2 TOBIAS GILL, BEN WARNER, HENNING PRÜSER, London Centre for Nanotechnology, UCL, UK, NICOLAE ATODIRESEI, VASILE CACIUC, Forschungszentrum Jülich, Germany, ANTOINE FLEURENCE, School of Materials Science, JAIST, Japan, STEFAN BLÜGEL, Forschungszentrum Jülich, Germany, YUKIKO YAMADA-TAKAMURA, School of Materials Science, JAIST, Japan, CYRUS HIRJIBEHEDIN, London Centre for Nanotechnology, UCL, UK —
Highly correlated electron interactions play a crucial role in determining the physics of high-T_c superconductors, heavy fermions systems, and frustrated magnetism. The Kondo effect, where the spin of a magnetic impurity is screened by a cloud of electrons via many-body exchange scattering, is often used as a model to investigate the fundamentals of more complex correlated effects. Scanning Tunneling Microscopy (STM) can probe Kondo scattering at the atomic scale in real space and has been used to show that the correlated properties of the Kondo effect formed from single magnetic atoms is highly sensitive its electronic environment. Here we present a spatially anisotropic Kondo effect formed from individual Co atoms on the surface of the two-dimensional (2D) material silicene grown on ZrB_2. It is found that unlike in the case of magnetic atoms on metal surfaces the Kondo resonance is asymmetrically distributed across the Co atom in two lobes that align with the symmetry of the silicene surface. These investigations highlight how the use of electronically unusual 2D materials can be used to probe new aspects of highly correlated physics, a result that will help to better understand the complex processes involved.

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