

PHYSICS DEPARTMENT COLLOQUIUM

“Surprises in the Kondo physics of single-molecule transistors”

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The Kondo effect, in which a localized spin interacts via tunneling with an electronic bath, is arguably the simplest and most studied many-body problem in physics. Interest in Kondo physics has undergone a resurgence with the observation of Kondo resonances at the atomic scale via the scanning tunneling microscope, in highly tunable semiconductor quantum dot systems, and recently in single-molecule transistors (SMTs). We present electronic transport measurements on SMTs incorporating individual transition metal complexes, and find two surprising results: very high Kondo temperatures, and Kondo temperatures nearly independent of gate voltage, in sharp contrast to simple theoretical expectations. We discuss possible explanations for these unexpected results, as well as prospects for future single-molecule physics experiments.

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