

Spin excitations and many particle effects in molecules studied with scanning probe methods.

Scanning probe microscopes and, in particular, the scanning tunneling microscope have been shown to be very powerful tools for the investigation of magnetism at the atomic and molecular scale.

In my talk I will discuss recent results on the high spin ($S=10$) prototypical molecular magnet manganese-12-acetate-16 [1] and an all organic radical with $S=1/2$ [2]. In these molecules we were able to detect the quantum magnetism by inelastic spin-flip excitations [3]. Furthermore, we detect many particle effects which we address to a Kondo screening of the localized spin by the substrate electrons. I will show that the results can be well understood by employing third-order scattering theory using a Kondo Hamiltonian [4] which also allows to get a deeper insight into spectroscopic features measured on single atoms.

[1] S. Kahle et al., *Nano Lett.* **12**, 518 (2012).

[2] Y. Zhang et al., accepted for *Nature Comm.*

[3] A. Heinrich et al., *Science* **306**, 466 (2004).

[4] J. Kondo, *Prog. Theor. Phys.* **32**, 37 (1964).