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Classical Computation in Quantum Nanostructures: A Long Road to an Uncertain Future

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We have extended the spectroscopic abilities of the scanning tunneling microscope to include the measurement of spin-excitation spectra, making it possible to measure the g-value of single atoms. Utilizing spin-excitation spectroscopy as our primary tool, we are now capable of extracting exchange coupling energies, anisotropy energies, and information on the ground and excited state spin configurations of nanometer-scale structures. These experiments are playing an integral role in our efforts to engineer the "energy landscape" of a system of spins in order to achieve nanometer-scale binary logic circuits that operate using only the spin degree of freedom.

Work done in collaboration with Cyrus Hirjibehedin, Andreas Heinrich, Christopher Lutz, Jay Gupta, and Bruce Melior.