Nanomechanics and Nanomagnetism

I will discuss the development of nanomechanical transducers as sensitive sensors and scanning probes. Specifically, I will focus on how such devices can be used to investigate nanomagnetic systems and what new insights they can provide. The presentation will start from the fundamental principles of mechanical force sensors. I will then introduce with conventional ‘top-down’ processed cantilever sensors and progress toward state-of-the-art ‘bottom-up’ sensors, such as nanotubes and nanowires. Experiments on a variety of magnetic systems will be presented, including on nanometer-scale ferromagnets, materials hosting magnetic skyrmions, and nanometer-scale ensembles of nuclear spins. Finally, I will discuss mechanical sensors in the context of other sensitive techniques for measuring and imaging magnetism on the nanometer-scale.