

Colloquium

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Novel states of matter with ultracold magnetic lanthanides

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Ultracold atomic physics is now poised to enter a new regime, where far more complex atomic species can be cooled and studied. Magnetic lanthanide atoms with their large magnetic moment and large orbital angular momentum are extreme examples of such species. In fact, ultracold gases of magnetic lanthanides provide the opportunity to examine strongly correlated matter, creating a platform to explore exotic many-body phases such as quantum ferrofluids, quantum liquid crystals, and supersolids. Experimental advances in trapping and cooling magnetic Dy and Er atoms are paving the way towards these goals.

I, first, examine recent experimental advances with magnetic lanthanides that provided a paradigm shift in ultracold atomic and molecular physics, necessitating new ways of looking at the fundamental interactions between atoms in the quantum regime. Then, I will discuss our theoretical studies of these complex atoms to bridge the enormous conceptual gap between simple atoms and complex molecules, potentially providing a natural test bed to explore complex scattering dynamics in a controlled environment.

Monday, March 6, 2017 at 3:00pm
SERC, Room 116
Refreshments served at 2:45pm