"Laser Cooling of Tm Atoms"

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Laser cooled species are finding more and more applications in moderns physics. Being the base of various precision measurements ranging from metrological standards to search of drift of fundamental constants, cold atoms are also now becoming powerful platform for quantum simulation of complicated interactions and new quantum materials. While originally most of laser cooling and BEC activity was concentrated on alkali atoms, rare earth elements are attracting more and more attention these days. Their large magnetic monument as well as sharp optical transitions attract the attention from the precision measurement and simulation communities. Such elements as Yt, Dy, Er were already cooled to BEC temperatures. Thulium also belongs to a group of rare-earth atoms and has hollow submerged electronic f-shells. The single stable isotope thulium-169 possesses a magnetic moment of 4 Bohr magnetrons in ground state, which exceeds the magnetic moment of alkali atoms by a factor of 10. This feature opens the opportunity to study long-range dipole-dipole and quadruple interactions between atoms as well as magnetic properties like spontaneous magnetization in the quantum regime. After loading ultracold thulium atoms into an optical lattice, one can obtain a unique two- or three-dimensional many-body quantum system with strong magnetic interactions. Therefore thulium atoms could provide a powerful platform for quantum simulation. In this talk I will describe our achievements and laser cooling of thulium atom.

Dr. Alexey Akimov received both his master and Ph.D degrees the from Moscow Institute of Physics and Technology (in 2000 and 2003, respectively). He is currently a group leader and a principal investigator in the Russian Quantum Center, Moscow, Russia, where he served as an acting director in 2010-2012. He is also a senior research scientist in the Lebedev Physics Institute, and a visiting research scientist in Harvard. Alexey's research interests include solid state quantum emitters, quantum interfaces, nanoscale sensors, integrated photonic and plasmonic structures, laser cooling and trapping, quantum optics, laser spectroscopy, quantum information and quantum simulations. He has several high profile publications, including papers in Science and Nature.

Hosted by: Vlad Shalaev