

Colloquium

SFB 956

Conditions and Impact of Star Formation

04 November 2019

Monday 3:00 pm

Physikalische Institute Köln

Lecture Hall III

Zùlpicher StraÙe 77 | 50937 Köln

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Quasiparticle Approach to Molecules Rotating in Quantum Solvents

Recently we have predicted a new quasiparticle - the angulon - which is formed when a quantum impurity (e.g. a molecule, atom, or electron) exchanges its angular momentum with a many-particle environment (such as lattice phonons or collective excitations in a liquid) [1,2]. Soon thereafter we obtained strong evidence that angulons are formed in experiments on molecules trapped inside superfluid helium nanodroplets [3].

In my talk, I aim to introduce the concept of angulon quasiparticles and to demonstrate how complex problems of far-from-equilibrium many-body dynamics can be simplified using this concept. In addition, I will describe novel physical phenomena that arise in molecules interacting with superfluid helium [1,5,6], as well as possible connections between matrix isolation spectroscopy and non-equilibrium magnetism.

[1] R. Schmidt, M. Lemeshko, Phys. Rev. Lett. 114, 203001 (2015)

[2] R. Schmidt, M. Lemeshko, Phys. Rev. X 6, 011012 (2016)

[3] M. Lemeshko, Phys. Rev. Lett., 118, 095301 (2017); Viewpoint: Physics 10, 20 (2017)

[4] B. Shepperson, A. A. Sondergaard, L. Christiansen, J. Kaczmarczyk, R. E. Zillich, M. Lemeshko, H. Stapelfeldt, Phys. Rev. Lett. 118, 203203 (2017)

[5] E. Yakaboylu, M. Lemeshko, Phys. Rev. Lett. 118, 085302 (2017)

[6] E. Yakaboylu, A. Deuchert, M. Lemeshko, Phys. Rev. Lett. 119, 235301 (2017)

