PHYSIK

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gemeinsam mit Theoretisch-Physikalischem Kolloquium

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The angulon quasiparticle: from molecules in superfluids to ultrafast magnetism

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Recently we have predicted a new quasiparticle - the angulon - which is formed when a quantum impurity (such as an electron, atom, or molecule) exchanges its orbital angular momentum with a many-particle environment (such as lattice phonons or a Fermi sea) [1,2].

Soon thereafter we obtained strong evidence that angulons do exist, and are formed in experiments on molecules trapped inside superfluid helium nanodroplets [3]. The angulon theory thereby provided a simple explanation for experimental data accumulated during the last two decades. Moreover, casting the many-particle problem in terms of angulons amounts to a drastic simplification and allows to tackle previously intractable problems related to quantum dynamics [4].

In this presentation we will introduce the angulon concept and discuss novel physical phenomena [1,5,6] arising from the angular momentum exchange in quantum many-particle systems. We will describe the applications of angulons to modern experiments on quantum impurities and on 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)

Gäste sind herzlich willkommen.

Die Dozenten der Theoretischen Physik

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