Quasiparticle approach to far-from-equilibrium dynamics of molecules in helium nanodroplets

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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 [4,5]. In addition, I will describe novel physical phenomena that arise in molecules interacting with superfluid helium, as well as possible connections between matrix isolation spectroscopy and non-equilibrium magnetism.

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