



Physical Sciences Seminar

Quantum mechanics & quantum field theories of atoms and molecules

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Host: Mikhail Lemeshko

Firstly we explore quantum electrodynamics with chiral molecules. We propose a method to separate enantiomers using chiral dependent Casimir-Polder potential between chiral metamaterials and chiral molecules. We further discuss the study of the energy difference between chiral enantiomers induced by weak interactions, and its potential relationship to the fundamental mystery of chiral molecules, i.e., homochirality. Secondly we move to the topic of quantum mechanics of a composite quasiparticle. Here we study how the correlation between its internal states (i.e., relative degrees of freedom) and external state (i.e., centre of mass degrees of freedom) affects its interaction with an impurity and causes phenomena such as creation of bound states in the continuum. Furthermore, we discuss the application of the model to the study of the effect of decoherence due to the internal states of the quasiparticle on its Anderson localization. [1] F. Suzuki, T. Momose and S. Y. Buhmann, A Stern-Gerlach separator of chiral enantiomers based on the Casimir-Polder potential. Phys. Rev. A. 99, 012513 (2019). [2] F. Suzuki, M. Litinskaya and W. G. Unruh, Scattering of a composite quasiparticle by an impurity on a lattice. Phys. Rev. B. 96, 054307 (2017).

Thursday, August 29, 2019 02:00pm - 03:00pm

Heinzel Seminar Room / Office Bldg West (I21.EG.101)



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