

Dynamics of Quantum Impurities in Bose Condensates

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Recent progress in investigation of cold atomic gases in optical lattices made it possible to focus on the dynamics of isolated quantum impurities. Such impurities may be created by e.g. spin flipping of one or few particles and may be selectively accelerated by magnetic or gravitational fields. The talk will review dynamics of such quantum impurities, moving through a Bose condensed media. The main aspects of the dynamics include: Cherenkov radiation by supersonic particles, as well as Raman scattering of thermal phonons by subsonic particles, which results in friction and dissipation. Another aspect, associated with the non-linearity of the media, is formation of polarons, which modify dispersion relation of the impurities. Dynamics of such polarons under the influence of force, applied to the impurity, is the central topic of the talk.