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## Dynamical quantum Cherenkov transition of fast impurities in quantum liquids (ONLINE presentation)

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The challenge of understanding the dynamics of a mobile impurity in an interacting quantum many-body medium comes from the necessity of including entanglement between the impurity and excited states of the environment in a wide range of energy scales. In this talk, I will discuss the motion of a finite mass impurity injected into a three-dimensional quantum Bose fluid as it starts shedding Bogoliubov excitations. We uncover a transition in the dynamics as the impurity's velocity crosses a critical value which depends on the strength of the interaction between the impurity and bosons as well as the impurity's recoil energy. We find that in injection experiments, the two regimes differ not only in the character of the impurity velocity abatement, but also exhibit qualitative differences in the Loschmidt echo, density ripples excited in the BEC, and momentum distribution of scattered bosonic particles. The transition is a manifestation of a dynamical quantum Cherenkov effect, and should be experimentally observable with ultracold atoms using Ramsey interferometry, RF spectroscopy, absorption imaging, and time-of-flight imaging.

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