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The nonlinear enhancement of fractal structure in the escape dynamics of Bose condensates KEVIN MITCHELL, BOAZ ILAN, University of California, Merced — Theoretical predictions for the escape of ultracold and Bose-condensed atoms from a double-Gaussian optical trap have shown that novel self-similar fractal features could be visible within the escape data. These predictions were based on modeling the quantum evolution by ensembles of classical trajectories. This talk presents recent results on the full quantum simulation of this escape process. These simulations show the clear influence of quantum interference on the escape data. However, quantum effects do not destroy our ability to resolve the fractal behavior, verifying the robustness of the classical analysis. Furthermore, full numerical solutions of the Gross-Pitaevskii equation show that a negative scattering length (focusing nonlinearity) can enhance our ability to resolve fractal features in the classical phase space.

Kevin Mitchell
University of California, Merced

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