

Spectral Pattern of a Complex Potential Guide

Tuesday 22 May 2018 14:00 (15 minutes)

Introduction of an absorption boundary to an atom guide enriches the guide's transport properties. However, if the initial wave packet contains broad energy spectrum that includes scattering states, a complex boundary essentially changes the composition of the system's energy-eigen spectrum. Our study focuses on finding a pattern of energy spectra that governs the evolution of the system. In this work, we investigate eigen-energy of a particle traversing a finite square well by varying the slope of the absorption boundary. We find that the steepness of the slope selectively filters out high energy eigen-states without shifting them, thus the low-pass filter. Furthermore, it forces eigen-states with high energy to have very narrow spectral linewidths.

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Session Classification: A15: Atomics

Track Classification: Atomic Physics, Quantum Physics, Molecular and Chemical Physics