

Direct observation of a Coherent Back and Forward Scattering in a shaken Bose gas

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The quantum kicked rotor is a fundamental model of chaotic dynamics, where the unbounded classical diffusion in momentum is suppressed. This effect, known as dynamical localization, is the momentum space analogue of Anderson localization, a well-known phenomenon arising from quantum interference effects in the presence of spatial disorder.

Both localization effects exhibit distinct peak signatures in reciprocal space. The Coherent Back-Scattering (CBS) peak serves as a marker of weak localization and has been observed in numerous systems. In contrast, the recently predicted Coherent Forward Scattering (CFS) peak[1] is a hallmark of strong (Anderson) localization, but has only been observed indirectly[2] until now. In this talk, I will present the recent experimental observation of the coherent forward scattering peak with ultra-cold atoms[3].

References

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- [2] Hainaut, C., Manai, I., Clément, JF. et al. *Nat Commun* 9, 1382 (2018).
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