

Exploring the physics of disorder with a Bose-Einstein condensate with tunable interaction

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Abstract

We will report on ongoing experiments on the interplay of disorder and interactions performed with a Bose-Einstein condensate in quasiperiodic lattices. Tuning the atom-atom interaction via a broad Feshbach resonance allows to explore various regimes. For vanishing interaction we observe Anderson localization [1], while an increasing repulsion drives the system first into an insulating Anderson glass regime and finally into a BEC regime, where long range coherence is recovered [2].

References

- [1] G. Roati, C. D'Errico, L. Fallani, M. Fattori, C. Fort, M. Zaccanti, G. Modugno, M. Modugno, and M. Inguscio, *Nature* **453**, 896 (2008).
- [2] B. Deissler, M. Zaccanti, G. Roati, C. D'Errico, M. Fattori, M. Modugno, G. Modugno, M. Inguscio, *Nat. Phys.*, in press..