

## **Quantum walks with neutral atoms**

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Cold atoms undergoing quantum walks in a deep optical lattice are coherently delocalized on a very large Hilbert space lattice. With electric quantum walks of single atoms transport phenomena including spin orbit coupling, Bloch oscillations or Anderson like localization are realized in a single experiment. Physical insight into the 'quantumness' of the system is obtained by an analysis of decoherence phenomena and non-invasive measurements. Controlled interaction of exactly two quantum walkers remain a daunting but highly attractive experimental challenge.