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Photon-assisted tunneling in an optical superlattice SYLVAIN NASCIMBENE, Max-Planck-Institut fur Quantenoptik, MONIKA AIDELSBURGER, MARCOS ATALA, YU-AO CHEN, STEFAN TROTZKY, IMMANUEL BLOCH, QUANTUM OPTICS GROUP TEAM — We will present recent experimental results on photon-assisted tunneling of ultracold atoms in double-well potentials created by an optical superlattice. By shaking periodically the trapping potential, single atoms are transferred from one lattice site to another when the driving frequency matches the energy difference between wells. In the case of two atoms per double well, resonance conditions are modified by interactions and lead to the appearance of new features such as fractional photon resonances. We will also present the extension of this study to 1D gases, namely the study of ac-driven tunneling between neighbouring tubes, which is closely related to the observation of Shapiro steps in ac-driven Josephson junctions. Finally we will show that this technique can be used as a powerful probe of the spectral function of 1D gases, with the advantage of the absence of interaction effects in the final state.

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