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Low-Dimensional Fermi Gases HENNING MORITZ, ETH Zurich, KENNETH GÜENTER, THILO STÖFERLE, MICHAEL KÖHL, TILMAN ESSLINGER — Optical lattices are a powerful tool to create novel many-body quantum systems with ultracold atoms. They allow to study the role of interactions in the system in reduced dimensions. We have observed two-particle bound states of atoms confined in a one-dimensional matter waveguide. These bound states exist irrespective of the sign of the scattering length, contrary to the situation in free space. The strongly interacting one- dimensional Fermi gas which we create in an optical lattice represents a realization of a tunable Luttinger liquid. In a spin-polarized Fermi gas interacting via a p-wave Feshbach resonance the strong confinement allows us to restrict the asymptotic scattering states. When aligning the spins along (or perpendicular to) the axis of motion in a 1D gas, scattering into channels with the angular momentum projection of —m —=1 (or m=0) can be completely suppressed.

Henning Moritz
ETH Zurich

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