

Abstract Submitted
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Quantum degenerate Bose-Fermi mixture of chemically different atomic species with widely tunable interactions¹ JEE WOO PARK, CHENG-HSUN WU, IBON SANTIAGO, Massachusetts Institute of Technology, TOBIAS TIECKE, Harvard University, SEBASTIAN WILL, PEYMAN AHMADI, MARTIN ZWIERLEIN, Massachusetts Institute of Technology — We have created a quantum degenerate Bose-Fermi mixture of ^{23}Na and ^{40}K with widely tunable interactions via broad interspecies Feshbach resonances. Over thirty Feshbach resonances between ^{23}Na and ^{40}K were identified, including p -wave multiplet resonances. The large and negative triplet background scattering length between ^{23}Na and ^{40}K causes a sharp enhancement of the fermion density in the presence of a Bose condensate. As explained via the asymptotic bound-state model (ABM), this strong background scattering leads to wide Feshbach resonances observed at low magnetic fields. Our work opens up the prospect to create chemically stable, fermionic ground state molecules of ^{23}Na - ^{40}K where strong, long-range dipolar interactions would set the dominant energy scale.

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