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**Fermion-Mediated Interactions Between Bosons in a Quantum Degenerate  $^{133}\text{Cs}$ - $^6\text{Li}$  Bose-Fermi Mixture** GEYUE CAI, KRUTIK PATEL, BRIAN DESALVO, CHENG CHIN, James Franck Institute, Enrico Fermi Institute, Department of Physics, University of Chicago — We observe fermion-mediated interactions between bosonic atoms of  $^{133}\text{Cs}$  embedded in a degenerate Fermi gas (DFG) of  $^6\text{Li}$  atoms. The mediated interaction is the spinless analog of the RKKY (Ruderman-Kittel-Kasuya-Yosida) mechanism. Deep in quantum degeneracy, the strong mass imbalance and the different quantum statistics between two species lead to the Bose-Einstein Condensate (BEC) that is fully immersed in the DFG. From in situ imaging of the mixture, we observe an effective attraction between bosons and the formation of Bose-Fermi solitons, in full consistency with the predictions. In addition, we perform a measurement of the BEC's dipole oscillation near an interspecies Feshbach resonance. The interspecies interactions modify trapping frequency and damping rate of the BEC in the presence of the DFG.

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