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Breathing Mode of a BEC Repulsively Interacting with a Fermionic Reservoir[1] ISABELLA FRITSCHE, BO HUANG, RIANNE S. LOUS, COSETTA BARONI, JOOK T. M. WALRAVEN, Institute for Quantum Optcis and Quantum Information, Austrian Academy of Science, EMIL KIRILOV, Institute for Experimental Physics and Center for Quantum Physics, University of Innsbruck, RUDOLF GRIMM, Institute for Quantum Optcis and Quantum Information, Austrian Academy of Science, JOOK T. M. WALRAVEN COLLABORATION — We investigate the fundamental breathing mode of a small-sized elongated 41K Bose-Einstein condensate coupled to a large 6Li Fermi sea. This two-species system presents a Feshbach resonance at 335 G between the two lowest Zeeman states of the constituents, which we use to tune the interspecies scattering. We observe a signifcant frequency up-shift of the breathing mode when the mixture undergoes phase separation at strong repulsion. The maximum shift, which occurs in the full phase-separation limit, depends essentially on the atom number ratio of the components. Our interpretation of the experimental observations consist of two models that are valid in different regimes of the interaction strength. We describe the weakly interacting regime by assuming an adiabatic response of the Fermi sea, whereas for the fully phase-separated mixture we consider single fermion trajectories. These two complementary models capture the observed features over the full range of interest.

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