Quantum Decay in Coupled Bosonic Systems GEORGE CRAGG, Massachusetts Institute of Technology, ARTHUR KERMAN, Massachusetts Institute of Technology — For species having negative s-wave scattering lengths, atomic condensation is impossible above some critical number of atoms. Using a Feshbach resonance to create a coupling to a molecular state of the system enables the effective scattering length, $a$, to be tuned to positive values, where it is believed to then result in stability. In spite of being in the positive scattering length regime, we have found that a collapsing ground state remains. In addition, we obtain an excited state which exhibits the expected low-density dependencies, but where the imaginary part of the chemical potential quantifies the time of decay into collective phonon excitations of the collapsing ground state. Consequently, this leads to a unique decay rate dependency on both the scattering length and the density, $\sim a^{5/2} \rho^{3/2}$, which can be experimentally tested. Using our predicted rate, there is good agreement with the overall lifetime observed in $^{85}$Rb.