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**Stability of Bosonic atomic and molecular condensates near a Feshbach Resonance** SOURISH BASU, ERICH MUELLER, Laboratory of Atomic and Solid State Physics, Cornell University, Ithaca, New York 14853 — Fermions near a Feshbach resonance exhibit a smooth crossover between a Bose-Einstein condensed state of molecules and a BCS superfluid of Cooper pairs. We study the analogous problem in Bosons, where there is a possibility of a phase transition between a molecular condensate (MC) and an atomic condensate (AC). We show that on the molecular side of the resonance at low densities, a MC-AC continuous transition is precluded by the AC state having a negative compressibility [cond-mat/0507460]. Instead, there is a mechanical collapse to a liquid-like state, analogous to a first order phase transition. We predict that sufficiently high densities (beyond those currently achieved in experiments) will push the system beyond its tricritical point and allow a continuous MC-AC phase transition.

Sourish Basu  
Laboratory of Atomic and Solid State Physics, Cornell University, Ithaca, New York 14853

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