

Abstract Submitted
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Phase diagram of a Bose gas near a wide Feshbach resonance LAN

YIN, Peking University — The phase diagram of a homogeneous Bose gas with a repulsive interaction near a wide Feshbach resonance is studied at zero temperature. The Bose-Einstein-condensation (BEC) state of atoms is a metastable state. When the scattering length a exceeds a critical value depending on the atom density n , $na^3 > 0.035$, the molecular excitation energy is imaginary and the atomic BEC state is dynamically unstable against molecule formation. The BEC state of diatomic molecules has lower energy, where the atomic excitation is gapped and the molecular excitation is gapless. However when the scattering length is above another critical value, $na^3 > 0.0164$, the molecular BEC state becomes a unstable coherent mixture of atoms and molecules. (<http://arxiv.org/abs/0710.5318>)([cond-mat/0710.5318](http://arxiv.org/abs/0710.5318))

Lan Yin
Peking University

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