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Interacting Bose Gases Near Four Spatial Dimensions SHAOJIAN JIANG, WUMING LIU, Institute of Physics, Chinese Academy of Sciences, GORDON SEMENOFF, FEI ZHOU, Department of Physics and Astronomy, University of British Columbia — Recently, interacting Bose gases at large positive scattering lengths can be experimentally investigated on the upper branch of a Feshbach resonance, which motivated more theoretical work. We proposed a new perspective to this problem by turning to 4 spatial dimensions, and established a controllable expansion near 4 spatial dimensions based on a $4-\epsilon$ analysis. Solving for the chemical potential shows the existence of a critical scattering length, at which the chemical potential reaches a maximum value and the many-body instability sets in. This is consistent with the result obtained by one of the authors (F.Z.) and his collaborators in 3 dimensions.

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