

Abstract Submitted  
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**Non-perturbative predictions for cold atom Bose gases with tunable interactions** BOGDAN MIHAILA, Los Alamos National Laboratory, FRED COOPER, Santa Fe Institute, CHIH-CHUN CHIEN, Los Alamos National Laboratory, JOHN F. DAWSON, University of New Hampshire, EDDY TIMMERMANS, Los Alamos National Laboratory — We discuss a theoretical description for dilute Bose gases as a loop expansion in terms of composite-field propagators by rewriting the Lagrangian in terms of auxiliary fields related to the normal and anomalous densities. We demonstrate that already in leading order this non-perturbative approach describes a large interval of coupling-constant values, satisfies Goldstone's theorem, yields a Bose-Einstein transition that is second-order, and is consistent with the critical temperature predicted in the weak-coupling limit by the next-to-leading order large-N expansion.

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