



**Conference on Many-Body-Localization:
Advances in the Theory and Experimental Progress
Trieste, 10 - 14 July 2017**

FISCHER, Uwe Robert

Dept. of Physics and Astronomy
1 Gwanak-ro, Gwanak-gu
08826 Seoul
Republic of Korea

TALK

Phase-fluctuating condensates are fragmented: An experimental benchmark for self-consistent quantum many-body calculations

We study zero-temperature quantum phase fluctuations in harmonically trapped one-dimensional interacting Bose gases, using the self-consistent multiconfigurational time-dependent Hartree method. In a regime of mesoscopic particle numbers and moderate contact couplings, it is shown that the phase-fluctuating condensate is properly described as a fragmented condensate. In addition, we demonstrate that the spatial dependence of the amplitude of phase fluctuations significantly deviates from what is obtained in Bogoliubov theory. Our results can be verified in currently available experiments. They therefore provide an opportunity both to experimentally benchmark the multiconfigurational time-dependent Hartree method, as well as to directly observe, for the first time, the quantum many-body phenomenon of fragmentation in single traps.
