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Title: PT-symmetry breaking transition in a flowing Bose-Einstein condensate

Abstract: We use the Bogoliubov theory of a weakly interacting Bose gas to analyze a dilute Bose-Einstein condensate (BEC) flowing around a ring in the presence of disorder that breaks the rotational symmetry. The rotating state can undergo energetic and dynamical instabilities depending on the flow speed and the strength (and sign) of the interatomic interactions. We find that the instabilities, which lead to the excitation of Bogoliubov quasiparticles, are associated with a PT symmetry breaking transition. This work is part of an attempt to extend non-Hermitian quantum mechanics to quantum field theory.

References:

1. S. Baharian and G. Baym, Phys. Rev. A **87**, 013619 (2013).

2. J. Mumford, E. Turner, D.W.L. Sprung, and D.H.J. O'Dell, Phys. Rev. Lett. **122**, 170402 (2019).

3. S. Sundaram, C. P. Burgess, and D. H. J. O'Dell, J. Phys.: Conf. Ser. **2038**, 012024 (2021).