Abstract Submitted
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Symmetry breaking and symmetry restoration for bosonic gases in rotating traps: Rotating boson molecules and Gross-Pitaevskii vortex structures.[1] IGOR ROMANOVSKY, CONSTANTINE YANNOULEAS, UZI LANDMAN, School of Physics, Georgia Institute of Technology — We recently introduced a new variational wave function for strongly repelling bosons in two-dimensional rotating traps.[2] The approach consists of constructing a single permanent out of displaced Gaussian orbitals that break the rotational symmetry and of subsequent symmetry restoration via projection techniques, thus taking into account correlations beyond the mean field. In our approach, the bosons are localized and form rotating boson molecules (RBMs). The projected wave functions of the RBMs do not violate the circular symmetry; nevertheless, they exhibit crystalline patterns in their intrinsic frame of reference. Gross-Pitaevskii (GP) vortex solutions are also known to break the circular symmetry. Here, we apply projection techniques to restore the broken-symmetry GP solutions. We find that the spectral decomposition of the GP vortex solutions are drastically different from that of the RBMs. The RBM spectra, however, are in agreement with exact diagonalization results in the lowest Landau level.

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[2]Phys. Rev. Lett. **97**, 090401 (2006); **93**, 230405 (2004)

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