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Rapidly rotating strongly-correlated few bosons[1] LESLIE O. BAKSMATY, CONSTANTINE YANNOULEAS, UZI LANDMAN, School of Physics, Georgia Institute of Technology — A small number, $N \leq 11$, of bosons in a rapidly rotating harmonic trap, interacting via a contact potential or a Coulomb repulsion, is studied via an exact diagonalization in the lowest Landau level. For both low and high fractional fillings, the bosons localize and form rotating boson molecules (RBMs) consisting of concentric polygonal rings. As a function of the rotational frequency and regardless of the type of repulsive interaction, the ground-state angular momenta grow in specific steps that coincide with the number of localized bosons on each concentric ring. Comparison of the conditional probability distributions (CPDs) for both interactions suggests that the degree of crystalline correlations appears to depend more on the fractional filling ν than on the range of the interaction. The RBMs behave as nonrigid rotors, i.e., the concentric rings rotate independently of each other. At filling fractions $\nu < 1/2$, we observe well developed crystallinity in the CPDs (two-point correlation functions). For larger filling fractions $\nu > 1/2$, observation of similar molecular patterns requires consideration of even higher-order correlation functions.

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