# Effects Beyond Center-of-Mass Separability in a Trapped Bosonic Mixture: Exact Results

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The properties of trapped Bose-Einstein condensates (BECs) at the limit of an infinite number of particles draw much attention [1-12]. There are rigorous results for the ground state and, under some conditions, on the dynamics with time-independent Hamiltonians. In the first part of the work, generalizations to time-periodic (Floquet) many-boson systems are presented. To this end, a solvable many-body model of a generic driven mixture of trapped BECs is devised, and its properties are investigated. In particular, we show that the quasi-energy per particle computed at the limit of an infinite number of particles does not coincide with the mean-field value at this limit unless the relative center-of-mass coordinate of the two BECs is not activated by the driving forces [13]. In the second part of the work, an application is discussed. We investigate the imprinting of angular momentum and its fluctuations when steering a BEC by driving an interacting bosonic impurity embedded in it, and the resulting modes of rotations [13]. Finally, in the third part of the work, a static solvable many-body model with center-of-mass inseparability is introduced, and the combined effects of interactions and trapping on the energy, system's stability, densities, condensation of intra-species and separability of inter-species reduced density matrices, as well the position—momentum uncertainty product, are elucidated [14].

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