Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Quantum Hall states in rapidly rotating two-component Bose gases SHUNSUKE FURUKAWA, MASAHITO UEDA, Dept. of Physics, University of Tokyo — Ultracold atomic gases under rapid rotation offer interesting analogues of quantum Hall systems with variable statistics and spins of constituent particles. Here we study strongly correlated phases of two-component (or pseudo-spin-1/2) Bose gases under rapid rotation by means of exact diagonalization. As the ratio of the inter-component contact interaction $g_{\uparrow\downarrow}$ to the intra-component one g increases, the two components are expected to be entangled to form novel ground states. For $g_{\uparrow\downarrow} = g$, we find the formation of gapped spin-singlet states at the filling factors $\nu = k/3 + k/3$ (the $k/3$ filling for each component) with integer k. In particular, we present numerical evidences that the gapped state with $k = 2$ is well described as a non-Abelian spin-singlet (NASS) state, in which excitations feature non-Abelian statistics. Furthermore, we find the phase transition from the product of composite fermion states to the NASS state by changing the interaction ratio $g_{\uparrow\downarrow}/g$. Reference: Phys. Rev. A 86, 031604(R) (2012).

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Date submitted: 09 Nov 2012 Electronic form version 1.4