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Singlet Mott State Simulating the Bosonic Laughlin Wave Function BIAO LIAN, SHOU-CHENG ZHANG, Stanford University — We study properties of a class of spin singlet Mott states for arbitrary spin S bosons on a lattice, with particle number per cite $n = S/l + 1$, where l is a positive integer. We show that such a singlet Mott state can be mapped to a bosonic Laughlin wave function on the sphere with a finite number of particles at filling $\nu = 1/2l$. Bosonic spinons, particle and hole excitations in the Mott state are discussed, among which the hole excitation can be mapped to the quasi-hole of the bosonic Laughlin wave function. We show that this singlet Mott state can be realized in a cold atom system on optical lattice, and can be identified using Bragg spectroscopy and Stern-Gerlach techniques. This class of singlet Mott states may be generalized to simulate bosonic Laughlin states with filling $\nu = q/2l$.

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