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Harnessing gauge fields for maximally entangled state generation
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— We study the generation of entanglement between two species of bosons living on a ring lattice, where each group of particles can be described by a d-dimensional Hilbert space (qudit). Gauge fields are exploited to create an entangled state between the pair of qudits. Maximally entangled eigenstates are found for well-defined values of the Aharonov-Bohm phase, which are zero-energy eigenstates of both the kinetic and interacting parts of the Bose-Hubbard Hamiltonian, making them quite exceptional. We propose a protocol to reach the maximally entangled state (MES) by starting from an initially prepared ground state. Also, an indirect method to detect the MES by measuring the current of the particles is proposed.

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