

Abstract Submitted
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Preparation of two-particle total hyperfine spin-singlets via spin-changing interactions SUNGKIT YIP, CHAO-CHUN HUANG, Institute of Physics, Academia Sinica, MING-SHIEN CHANG, IAMOP, Academia Sinica — For (hyperfine-)spin-1 or spin-2 bosons in a one-dimensional optical lattice in the regime of one particle per site, we have shown [1] that there is a large (interaction) parameter regime where the system has dimerized ground states. Using a period-two superlattice, these dimerized states can be adiabatically transformed to a collection of singlet pairs, or vice versa. Here we describe, starting from two hyperfine spin-1 or 2 particles both with $m_F = 0$, how spin-changing dynamics under the influence of spin dependent interaction and quadratic Zeeman field can generate two-particle singlets, thus allow us to in principle create these exotic dimerized states. These spin-1 or 2 singlet pairs may also have quantum information science applications.

[1] Pochung Chen, et al, Phys. Rev. A 85, 011601(R) (2012)

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