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A spinor boson AB chain . GREIS JULIETH CRUZ REYES, Universidad Santo Tomas, ROBERTO FRANCO, JERESON SILVA VALENCIA, Universidad Nacional de Colombia, UNIVERSIDAD SANTO TOMAS COLLABORATION, UNIVERSIDAD NACIONAL DE COLOMBIA COLLABORATION — Recent research is focused on superlattices arising from optical lattices, which allow a tunable environment. Experimentally bosons present transitions from superfluid to Mott insulator by changing the energy offset in the unit cell [Nat. Commun. 5:5735 (2014)]. Many studies displayed that ground state of spinless boson systems on superlattices present superfluid, Mott insulator and an additional CDW phase created by the energy shift between the sites into the unit cell [Phys. Rev. A 83, 053621 (2011)]. The first confinement methods were magnetic traps, which freezes the spin; with optical lattices the grade of freedom of spin plays an important role. We consider bosons with spin S=1 on a superlattice made by two sites with energy offset per unit cell (AB chain). The Hamiltonian that describes the system is the Bose-Hubbard model with the superlattice potential (W) and the exchange interaction (V) parameters. This model supports CDW, Mott insulator and superfluid phases. For W near to U, with V=0, Mott phase disappears, but for V increasing, a new CDW appears due to the spin interaction, while the half-integer CDW decrease. These results are widely different from spinless boson, where the CDW phases are stables.

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