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Phase diagrams of spinor bosons in two-leg ladders.¹ JERESON SILVA VALENCIA, ROBERTO FRANCO, Universidad Nacional de Colombia, MARCOS SERGIO FIGUEIRA, Universidade Federal Fluminense — In the last, years different experimental groups have reported the realization of atomic ladders in the presence of a homogeneous flux [Nat. Phys. 10, 588 (2014)]. These experiments have motivated theoretical calculations on 2-leg ladders with spinless bosons under magnetic fields [PRB 91, 140406(R) (2015)]. In this paper, we consider spinor boson atoms with spin $S=1$, such as Rb and Na. Gases of these atoms can be described by the spinor Bose-Hubbard Hamiltonian which has three terms: the kinetic energy, local density-density interaction and local spin-dependent term. Using DMRG, we study $S=1$ bosons on 2-leg ladders, taking into account both antiferromagnetic and ferromagnetic spin interaction. When both legs are ferromagnetic or antiferromagnetic, we obtained Mott insulator and superfluid phases, similar to the one-dimensional case, but the insulator areas decrease due to the additional kinetic term. The even-odd asymmetry is still observed in the antiferromagnetic case. However, when the local spin interaction has a different sign on each leg, charge density waves for densities $3/2$ and $5/2$ appear. The Mott insulator phase for density 1 (2) correspond to the antiferromagnetic-leg (ferromagnetic-leg).

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