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Numerical Study of a Multiorbital Hubbard Model for the Two-Leg Ladder $BaFe_2S_3$ High-Tc Superconductor Using the Density Matrix Renormalization Group NIRAVKUMAR PATEL, The University of Tennessee, Knoxville, Tennessee 37996, USA, ALBERTO NOCERA, GONZALO ALVAREZ, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, USA, RYOTARO ARITA, RIKEN, 2-12-1 Hirosawa, Wako, Saitama 351-0198, Japan, ELBIO DAGOTTO, The University of Tennessee, Knoxville, Tennessee 37996, USA — Iron based high-Tc superconductors have attracted considerable attention because of its unconventional superconducting properties. Here, we analyze the magnetic and pairing characteristics of the recently discovered two-leg ladder material $BaFe_2S_3$ that becomes superconducting by applying pressure [1], using a two-orbital Hubbard model studied via the Density Matrix Renormalization Group technique. The hopping parameters, which spans up-to the 2^{nd} nearest-neighbor rungs, were obtained from the ab-initio downfolded band structure at ambient and high pressures [2]. The magnetic phase diagram at a realistic Hund coupling $J/U = 0.25$ is presented varying the Hubbard U, at select values of the electronic fillings. At half-filling, we find a robust magnetic order in excellent agreement with experiments [1] i.e. antiferromagnetic (ferromagnetic) along the leg (rung) directions. We also discuss a possible tendency for this system to form a paired bound state of holes in a small but finite window of Hubbard U. The symmetries of this tentative paired ground state will be discussed.

[1] Hiroki Takahashi et al., *Nature Materials* ***14****, 1008 (2015)*
[2] Ryotaro Arita et al., *Phys. Rev. B* ***92****, 054515 (2015)*

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