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Pursuit of a spin Bose-metal phase in Hubbard-type models on the two-leg triangular strip RYAN V. MISHMASH, UCSB, IVAN GONZALEZ, CESGA, ROGER MELKO, University of Waterloo, OLEXEI I. MOTRUNICH, Caltech, MATTHEW P.A. FISHER, UCSB — Motivated by recent experiments on the organic materials κ-$(ET)_2Cu_2(CN)_3$ and $EtMe_3Sb[Pd(dmit)_2]_2$, we numerically investigate the Mott metal-insulator transition in a system of interacting, itinerant electrons at half-filling on the two-leg triangular strip (i.e., zigzag chain). Previous work [1] has revealed that an exotic "spin Bose-metal" (SBM) phase with three gapless modes is stabilized on the zigzag strip in a pure spin model of Heisenberg exchange supplemented with four-site cyclic ring exchange, a model appropriate for describing weak Mott insulators near the Mott transition. Indeed, a physically appealing picture of the realized SBM phase is to view it as a particular Mott insulating instability out of a two-band metal of interacting electrons. Guided by this idea, we perform large-scale DMRG calculations across the Mott transition in various Hubbard-type models (e.g., with on-site repulsion, longer-ranged repulsion, and/or explicit spin exchange terms). We focus on the successes and failures of describing the insulating phase near the transition within the SBM framework. Finally, the implications of our findings to the full 2D triangular lattice will be discussed.

[1] D. N. Sheng *et al.*, PRB **79**, 250112 (2009).

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