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Hole binding in Mott antiferromagnets: A DMRG study ZHENG ZHU, Institute for Advanced Study, Tsinghua University, Beijing, 100084, China, HONG-CHEN JIANG, Department of Physics, University of California, Berkeley, CA 94720, USA, D.N. SHENG, Department of Physics and Astronomy, California State University, Northridge, CA, 91330, USA, ZHENG-YU WENG, Institute for Advanced Study, Tsinghua University, Beijing, 100084, China — The binding of injected holes in antiferromagnets is studied based on the density matrix renormalization group (DMRG) simulation for the t-J model on square ladders. It is shown that the binding strength is substantially enhanced in a spin background with a short-range spin correlation, in contrast to that with a quasi-long-range spin correlation. However, it is further found that the enhanced pairing strength diminishes once the phase string effect in the hopping term of the t-J ladders is switched off and a coherent quasiparticle behavior is restored for an unpaired single hole. General implications for the nature of pairing in doped Mott insulators will be also discussed.

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