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Role of cyclic four-spin exchange in doped two-leg ladders GUILLAUME ROUX, LPT Toulouse UMR 5152, STEVE R. WHITE, UC Irvine, California, DIDIER POILBLANC, SYLVAIN CAPPONI, LPT Toulouse UMR 5152, ANDREAS M. LAEUCHLI, IRRMA - EPFL, Lausanne — The cyclic four-spin exchange has a dramatic effect in undoped 2-leg ladders since it introduces frustration and biquadratic terms. A quantum phase transition is known to happen for K/J = 0.2, in which K is the magnitude of the cyclic exchange term. Here, we report the first investigations of its role on t-J two-leg ladders using Exact Diagonalisation and DMRG computations. We show that the low energy spectrum is very sensitive to K and discuss the robustness of the magnon-hole pair bound state and the recently discovered resonant mode(at finite doping) by studying the low energy triplet spectrum. We also report the evolution of the pairing energy and the Luther-Emery liquid parameter with K. These results are discussed in connection with experiments on superconducting $Sr_{14-x}Ca_xCu_{24}O_{41}$ ladder materials.

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