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The magnon-mediated attraction between two holes doped in a CuO₂ layer

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We study a realistic three-band model for two holes doped into a CuO₂ layer, using a variational method that allows us to turn on/off the exchange of magnons between the holes. This enables us to verify that the magnon-mediated effective hole-hole interaction is attractive and could therefore indeed be (part of) the superconducting glue. We derive its analytical expression and show that it consists of a novel kind of pair-hopping+spin-exchange terms. The coupling constant is fitted to numerical results obtained with the variational exact diagonalization. For realistic parameter values, this effective interaction is borderline strong enough to bind the holes into a pre-formed pair.

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