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Possible theory of high-T_c superconductivity:
the chirality liquid and pairing via chiral confinement

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The ground state of the two-dimensional t–J model at appropriate hole dopings is proposed to be a novel kind of spin liquid, which I call chirality liquid. The spinon and holon excitations of this liquid carry a chirality quantum number, which determines the sign of the winding phases associated with their half-fermi statistics. The liquid may be viewed as a significant generalization of the chiral spin liquid, which is a liquid in the spin degrees of freedom but effectively aligns the non-relativistic plaquet chiralities and hence breaks the discrete symmetries P and T. These symmetries are preserved in the chirality liquid. The spinon or holon excitations of the chirality liquid are confined in pairs of no net chirality via chiral confinement forces. Individual holes emerge in the theory as spinon-holon bound states. In the singlet channel, pairs of holes attract strongly through virtual annihilation processes of spinon pairs into the vacuum, and thereby bind into cooper pairs.

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