

Aspects of strong coupling in gauge theory of high-Tc cuprates

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Strong coupling effects in the gauge theory of high-Tc superconductors are reviewed mainly focusing on the confinement problem. The doped holes into a Mott insulator are described as vortices in the dual superconductor. When the instanton effect is taken into account, each hole is accompanied by the “string” or “branch cut” extending to infinity. This means that the hole has nonlocal and topological effect, which leads to the phase separation when the gauge charges have the same sign, while it leads to the hole pairing and hence superconductivity when two species of holes have opposite gauge charges as in SU(2) theory. Therefore the superconducting transition is identified with the confinement-deconfinement transition instead of the single holon condensation.

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