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Hole correlation in the $t-J$ model with four holes on a 32-site lattice[1] P. W. LEUNG, Hong Kong University of Science and Technology — We study the $t-J$ model with four holes on a 32-site square lattice using exact diagonalization. This system corresponds to doping level x=1/8. At the "realistic" parameter J/t=0.3, holes in the ground state of this system are unbound. They have short range repulsion due to lowering of kinetic energy. There is no antiferromagnetic spin order and the electron momentum distribution function resembles hole pockets. Furthermore, we show evidence that in case antiferromagnetic order exists, holes form d-wave bound pairs and there is mutual repulsion among hole pairs. This presumably will occur at low doping level. This scenario is compatible with a checkerboard-type charge density state proposed to explain the "1/8 anomaly" in the LSCO family, except that it is the ground state only when the system possesses strong antiferromagnetic order.

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