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Pairing instabilities and Bose condensation in Hubbard nanoclusters GAYANATH FERNANDO, KALUM PALANDAGE, Department of Physics, University of Connecticut, Storrs, ARMEN KOCHARIAN, Department of Physics, California State University, Los Angeles, JAMES DAVENPORT, Computational Science Center, Brookhaven National Laboratory, Upton — Pairing instabilities found from exact studies of small Hubbard clusters with different topologies appear to provide answers to some long standing puzzles. Electronic charge and spin pairing instabilities in a phase space defined by temperature, magnetic field and chemical potential, lead to properties that are remarkably similar to correlated, inhomogeneous bulk systems such as the high temperature superconductors and colossal magnetoresistance materials. In particular, the role of square- planar geometry is borne out when the vertex coupling in an octahedron is shown to have a detrimental effect on the negative charge and positive spin gaps, which are favorable to forming a Bose condensate in the region of instability. In addition, it is shown that magnetic flux can get trapped in stable minima at half integral units of the flux quantum.

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