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Nagaoka instabilities and coherent pairing in various cluster topologies ARMEN KOCHARIAN, California State University, Los Angeles, GAYANATH FERNANDO, Department of Physics, University of Connecticut, KALUM PALANDAGE, JAMES DAVENPORT, Computational Science Center, Brookhaven National Laboratory — Electron pairing and formation of various types of magnetic correlations in the ensemble of small clusters of different geometries are studied with emphasis on tetrahedron, square pyramid, etc under variation of interaction strength, electron doping and temperature. These exact calculations of charge and spin collective excitations and pseudogaps yield intriguing insights into level crossing degeneracies, phase separation, condensation and spatial inhomogeneities. Separate condensation of electron charge and spin degrees offers a new route to superconductivity in inhomogeneous HTSC systems, different from the BCS scenario. Phase diagrams resemble a number of inhomogeneous, coherent and incoherent nanoscale phases seen recently in high Tc cuprates, manganites and CMR nanomaterials.

[1] A. N. Kocharian, G. W. Fernando, K. Palandage, and J. W. Davenport, Phys. Rev. B**78** 075431 (2008).

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