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Coherent pairing and phase separation in small negative U Hubbard nanoclusters away from half filling KALUM PALANDAGE, Trinity College, Hartford, GAYANATH FERNANDO, Department of Physics, University of Connecticut, Storrs, ARMEN KOCHARIAN, Department of Physics, California State University, Los Angeles — The similarities and differences in the mechanism of electron pairing instabilities, driven by attractive and repulsive electron interaction, are studied in the ensemble of small clusters for one hole off half filling under variation of interaction strength and temperature. These exact calculations of charge and spin collective excitations, and corresponding critical transition temperatures yield intriguing insights into the level crossing degeneracies, phase separation transitions, condensation and formation of spatial inhomogeneities in various cluster geometries [Ultramicroscopy 109, 1066 (2009)]. Separate condensation of electron charge and spin degrees in negative U model away of half filling offers a new route for the mechanism of superconductivity in inhomogeneous systems, different from the quasi-particle BCS scenario for electron condensation. Phase diagrams resemble a number of inhomogeneous, coherent and incoherent nanoscale phases seen in various positive Hubbard cluster geometries in high Tc cuprates, iron pnictides, and other transition metal oxides.

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