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Superconductivity and magnetism in small attractive and repulsive Hubbard clusters ARMEN KOCHARIAN, California State University, GAYANATH FERNANDO, KALUM PALANDAGE, University of Connecticut, JAMES DAVENPORT, Brookhaven National Laboratory — The existing mapping between the ground state properties of $U > 0$ and $U < 0$ Hubbard models are extended to finite temperatures, arbitrary magnetic field and electron doping or chemical potential for small two and four sites clusters. The microscopic origin of charge-spin separation effect and pseudogap formation are studied in response thermodynamics for spin and charge susceptibilities, using exact analytical diagonalization technique and grand canonical ensemble method. In the limiting case of non- interacting particles there are no temperature or magnetically driven driven spin-charge separation. The obtained knowledge we use to compare the thermodynamic phase diagrams of $U > 0$ and $U < 0$ clusters in a multidimensional parameter space of temperature, magnetic field and chemical potential. Magnetism and superconductivity are often thought to be incomparable with one another, however, we found many identical features for $U > 0$ and $U < 0$ at various range of doping level in the specific heat, spin and charge pseudogaps, Mott-Hubbard and antiferromagnetic crossovers, when these physical characteristics are monitored as a function of chemical potential or doping level. The developed bottom up approach for small clusters displays important intrinsic characteristics of highT_c superconductors.

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