Abstract Submitted
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Spin orbit coupling and electron pairing instabilities in superconductors[1] ARMEN KOCHARIAN, California State University, Los Angeles, CA, GAYANATH FERNANDO, KUN FANG, University of Connecticut, Storrs, CT, ALEXANDER BALATSKY, Nordic Institute for Theoretical Physics, Stockholm, Sweden — Exact diagonalization, Lanczos and variational cluster approximation (VCA) have been used for accurate studies of Rashba spin-orbit effects in the presence of electron correlations. These have been carried out in order to address current challenging problems in superconductivity, magnetism, topological insulators and spin dependent transport associated with numerous interfaces and heterostructures. The modeled spin-orbit coupling in assembled nano-ribbons (as arrays of clusters) in various two-dimensional square and topological honeycomb structures (generated by periodically repeated Betts lattices) provide an ideal playground for understanding various competing phases, electron pairing and phase separation instabilities in conventional and unconventional superconductors. Our models allow us to calculate the spectral functions and accurately extract electronic, magnetic properties including spin transport and electron pairing in these systems. The results also highlight important aspects of the interplay of the spin-orbit coupling with magnetic fields in graphene-like systems and unconventional superconductors induced by weak, moderate and strong electron interactions.

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