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Bond Order Correlations in the 2D Hubbard Model[1] CONRAD MOORE, SAMEER ABU ASAL, SHUXIANG YANG, JUANA MORENO, MARK JARRELL, Louisiana State Univ - Baton Rouge — We use the dynamical cluster approximation to study the bond correlations in the Hubbard model with next nearest neighbor (nnn) hopping to explore the region of the phase diagram where the Fermi liquid phase is separated from the pseudogap phase by the Lifshitz line at zero temperature. We implement the Hirsch-Fye cluster solver that has the advantage of providing direct access to the computation of the bond operators via the decoupling field. In the pseudogap phase, the parallel bond order susceptibility is shown to persist at zero temperature while it vanishes for the Fermi liquid phase which allows the shape of the Lifshitz line to be mapped as a function of filling and nnn hopping. Our cluster solver implements NVIDIA's CUDA language to accelerate the linear algebra of the Quantum Monte Carlo to help alleviate the sign problem by allowing for more Monte Carlo updates to be performed in a reasonable amount of computation time.

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