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Nonlocal correlations in the orbital selective Mott phase of a one dimensional multi-orbital Hubbard model SHAOZHI LI, NITIN KAUSHAL, YAN WANG, ELBIO DAGOTTO, STEVEN JOHNSTON, Univ of Tennessee, Knoxville, YANFEI TANG, Virginia Tech, GONZALO ALVAREZ, ALBERTO NOCERA, THOMAS MAIER, Oak Ridge National Lab. — In recent years the multi-orbital Hubbard model has been widely studied by using the dynamical mean field theory (DMFT), which neglects spatial fluctuations and nonlocal correlations. However, it is currently not known how important additional nonlocal correlations may be, particularly in one dimension where DMFT is least accurate. In this talk, we present a determinant quantum Monte Carlo and density matrix renormalization group study of the non-local correlations in a three-orbital Hubbard model defined on an extended one dimensional chain. We focus on a parameter regime that hosts an orbital selective Mott phase (OSMP) and an orbitally ordered insulating state. In the OSMP, we show that the momentum dependence of electronic properties is strong for the itinerant electrons and weak for the localized electrons. In addition, although electrons are localized in the orbitally ordered insulating phase, there are short range orbital correlations at finite temperature. In short, these momentum dependent quantities and the orbital order indicate a degree of non-local correlations, which suggests that non-local effects, neglected in single-site DMFT approaches, can be important.

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