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Density Waves, Sub-Gap Structures, and Translational Invariance in Cluster Methods for cuprates SIMON VERRET, MAXIME CHARLEBOIS, ALEXANDRE FOLEY, DAVID SNCHAL, A.-M. S. TREMBLAY, Universit de Sherbrooke and Institut quantique — Cluster Dynamical Mean-Field Theory (CDMFT) is widely used to solve the two-dimensional Hubbard model and explain key features of high temperature superconductors (cuprates) [1]. However, it is known that this numerical method intrinsically breaks translational invariance, a problem usually addressed through various periodization schemes [2]. Yet, in light of the massive experimental evidence for bulk density waves in cuprates, translational-symmetry breaking seems to play an important role in any theory for the cuprates. Is it possible that artificially breaking translational invariance may actually help CDMFT to deal with the cuprate problem? In this talk we analyze the effects of translational-symmetry breaking intrinsic to CDMFT and find much similarity with charge-density waves and pair-density waves mean-fields. Based on this knowledge, we discuss avenues to improve CDMFT. — [1] Lichtenstein and Katsnelson PRB 62 R9283 (2000); Kotliar et al. PRL 87 186401 (2001); Maier et al. RMP 77 1027 (2005). [2] Kancharla et al. PRB 77 184516 (2008); Biroli et al. PRB 69 205108 (2004); Sakai et al. PRB 85 35102 (2012).

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