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Modeling Correlation Effects in Nickelates with Slave Particles¹ ALEXANDRU BOGDAN GEORGESCU, Department of Physics and Center for Research on Interface Structures and Phenomena, Yale University, SOHRAB ISMAIL-BEIGI, Department of Applied Physics, Physics, Mechanical Engineering and Center for Research on Interface Structures and Phenomena, Yale University — Nickelate interfaces display interesting electronic properties including orbital ordering similar to that of cuprate superconductors and thickness dependent metal-insulator transitions. One-particle band theory calculations do not include dynamic localized correlation effects on the nickel sites and thus often incorrectly predict metallic systems or incorrect ARPES spectra. Building on two previous¹,² successful slave-particle treatments of local correlations, we present a generalized slave-particle method that includes prior models and allows us to produce new intermediate models³. The computational efficiency of these slave-boson methods means that one can readily study correlation effects in complex heterostructures. We show some predictions of these methods for the electronic structure of bulk and thin film nickelates.

1. Florens and Georges, PRB (2002); Lau and Millis, PRL (2013).

2. deMedici, Georges and Biermann, PRB (2005); deMedici, Giovannetti and Capone, PRL (2014).

3. Georgescu and Ismail-Beigi, arXiv:1506.03515, in press at PRB (2015)

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