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**Role of Competing Interactions on the Nature of Carriers at a Model Polar Oxide Interface** BIRABAR NANDA, SASHI SATPATHY, University of Missouri-Columbia — Transport measurements of the polar oxide interfaces like $LaAlO_3/SrTiO_3$ have revealed a rich variety of physical properties such as a Kondo resistance minimum, metallicity, insulation, superconductivity, and possibly also magnetism under varying experimental conditions. We present a mean-field study of a model Hamiltonian, appropriate for the polar oxide interfaces, that includes the electron hopping, Jahn-Teller coupling, and Coulomb interaction terms. Our results predict the existence of a number of interesting phases, *viz.*, a 2D metallic or polaronic phase as well as 3D metallic or a polaronic phase depending on the relative strengths of these interactions. Under appropriate conditions, a mixed phase may also result consisting of 2D polarons and a 3D metal. In the polaronic phase, the combination of Jahn-Teller coupling and Coulomb terms could form magnetic centers. In addition, our results also reveal the possibility of a phase separation, where for some carrier concentrations, the system phase separates into a 2D like region and a 3D region. This will have important implication for the interpretation of the transport measurements. Work supported by the US Department of Energy.

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