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Electronic Phases and Phase Separation in the Hubbard-Holstein Model of a Polar Interface[1] BIRABAR NANDA, SASHI SATPATHY, University of Missouri — From a mean-field solution of the Hubbard-Holstein model, we show that a rich variety of different electronic phases can result at the interface between two polar materials such as $LaAlO_3/SrTiO_3$. Depending on the strengths of the various competing interactions, viz., electronic kinetic energy, electron-phonon interaction, Coulomb energy, and electronic screening strength, the electrons could (i) either be strongly confined to the interface forming a 2D metallic or an insulating phase, (ii) spread deeper into the bulk making a 3D phase, or (iii) become localized at individual sites forming a Jahn-Teller polaronic phase. In the polaronic phase, the Coulomb interaction could lead to unpaired electrons resulting in magnetic Kondo centers. Under appropriate conditions, electronic phase separation may also occur resulting in the coexistence of metallic and insulating regions at the interface.

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