Abstract Submitted
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Tuning the two-dimensional electron gas at the $LaAlO_3/SrTiO_3$(001) interface by metallic contacts[1] ROSSITZA PENTCHEVA, REMI ARRAS, VICTOR G. RUIZ LOPEZ, Ludwig Maximilians University Munich, Germany, WARREN E. PICKETT, University of California, Davis — Density functional theory calculations reveal that adding a metallic overlayer on $LaAlO_3/SrTiO_3$(001) reduces/eliminates the electric field within the polar $LaAlO_3$ film and thus suppresses the thickness-dependent insulator-to-metal transition observed in uncovered films. Independent of the $LaAlO_3$ thickness both the surface and the interface are metallic, with an enhanced interface carrier density relative to $LaAlO_3/SrTiO_3$ (001) after the metallization transition. Moreover, a monolayer thick metallic Ti-contact exhibits a finite magnetic moment and for a thin $SrTiO_3$-substrate induces a spin-polarized 2D electron gas at the n-type interface due to confinement effects. The height of the Schottky barrier formed between the metal contact and $LaAlO_3$ depends strongly on the choice of the overlayer and allows to tune the carrier density at the interface [1].

[1] V. Ruiz López, R. Arras, W. E. Pickett, and R. Pentcheva, arXiv:1106.4205v1.

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