Abstract Submitted
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Impact of electric-field-dependent dielectric constants on two-dimensional electron gases in complex oxides[1] CHRIS VAN DE WALLE, HARTWIN PEELAERS, KARTHIK KRISHNASWAMY, LUKE GORDON, DANIEL STEIAUF, ANNA SARWE, ANDERSON JANOTTI, Univ of California - Santa Barbara — A high-density two-dimensional electron gas (2DEG) can be formed at interfaces of complex oxides. The electric field in the vicinity of the interface depends on the dielectric properties of the material as well as on the electron distribution. However, electric fields can strongly modify the dielectric constant of $SrTiO_3$ (STO) as well as other complex oxides. Solving the electrostatic problem thus requires a self-consistent approach in which the dielectric constant varies according to the local magnitude of the field. We have implemented the field dependence of the dielectric constant in a Schrodinger-Poisson solver and use the $SrTiO_3/GdTiO_3$ interface as an example to discuss the importance of taking this field dependence into account when modeling interfaces of complex oxides [1].

[1] H. Peelaers, K. Krishnaswamy, L. Gordon, D. Steiauf, A. Sarwe, A. Janotti, and C. G. Van de Walle, Appl. Phys. Lett. **107**, 183505 (2015).

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Chris Van de Walle
Univ of California - Santa Barbara

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