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The effect of strain on the SrTiO3/LaAlO3 heterointerface C. TYLER DIGGANS, KRISTOPHER E. ANDERSEN, Northern Arizona University, C. STEPHEN HELLBERG, Naval Research Laboratory — Recent experiments have shown that it is possible to form a highly mobile, quasi-2D electron gas at the interface between $SrTiO_3$ and $LaAlO_3$. Although the origin of this effect is still debated, there is growing consensus that under certain growth conditions (e.g. high oxygen pressures) it is caused by the diverging electric potential within $LaAlO_3$ -the so-called polar catastrophe. One aspect of this system that has not been previously considered is the electric polarization of $SrTiO_3$, which can be effectively tuned by strain. This polarization can partially or fully compensate the diverging $LaAlO_3$ potential, and must be considered if $SrTiO_3/LaAlO_3$ is to be grown on a substrate such as Si. In this talk, an electrostatic model is presented to show how the polar catastrophe is modified by polarization within strained $SrTiO_3$. This model is supported by first-principles calculations on strained $SrTiO_3/LaAlO_3$ multilayers of varying thickness.

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