Abstract Submitted
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Colossal Electroconductance[1] KENNETH GRAY, QING'AN LI, HONG ZHENG, JOHN MITCHELL, Argonne National Laboratory — An abrupt, colossal jump in conductance is observed at a critical electric field, E_c, in bilayer manganite, $La_{2-2x}Sr_{1+2x}Mn_2O_7$, crystals exhibiting charge order below T_{CO}. The four-terminal conductance measured on an ab-plane facet jumps well over three orders-of-magnitude at 135 K for x=0.6 and a smaller amount for x=0.5. The very large conductance anisotropy isolates four-terminal measurements on opposite faces of our crystals, so the temperature rise due to the dissipation at E_c can be quantitatively determined and ruled out as the cause. Detailed data for x=0.5 and t=1-T/T_{CO} <0.15 show that E_c extrapolates linearly to zero at T_{CO} ($\sim$221 K) with E_c/t$\sim$13500 V/m. Possible mechanisms are being explored.

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