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Understanding Metal-Insulator transitions in ultra-thin films of $LaNiO_3$ JAYAKANTH RAVICHANDRAN, Department of Physics, Columbia University, PHILIP D.C. KING, Department of Physics, Cornell University, DARRELL G. SCHLOM, Department of Materials Science and Engineering, Cornell University, KYLE M. SHEN, Department of Physics, Cornell University, PHILIP KIM, Department of Physics, Columbia University — $LaNiO_3$ (LNO) is a bulk paramagnetic metal and a member of the family of $RENiO_3$ Nickelates (RE = Rare Earth Metals), which is on the verge of the metal-insulator transition. Ultra-thin films of LNO has been studied extensively in the past and due to its sensitivity to disorder, the true nature of the metal-insulator transition in these films have been hard to decipher. We grow high quality ultra-thin films of LNO using reactive molecular beam epitaxy (MBE) and use a combination of ionic liquid gating and magneto-transport measurements to understand the nature and tunability of metal-insulator transition as a function of thickness for LNO. The underlying mechanisms for the transition are discussed in the framework of standard transport models. These results are discussed in the light of other Mott insulators such as Sr_2IrO_4, where we have performed similar measurements around the insulating state.

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