

Abstract Submitted
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Metallic 2D Surface State of Silicon by Ionic Liquid gating and observation of Reentrant Insulating behavior¹ J.J. NELSON, A.M. GOLDMAN, Univ of Minn - Minneapolis — Metal insulator transitions are usually observed in high mobility and low carrier density 2D electron systems. There are several open questions regarding the metallic state including its existence in the limit of zero temperature. The current experimental focus is on the production of higher mobility samples to push the critical carrier density to even lower values, which will increase the effects of the Coulomb interaction. Here we report an unexpected result, the observation of the onset of a metallic state at high carrier densities in silicon gated with the ionic liquid DEME-TFSI. In addition we have observed a return to the insulating state as the carrier density was further increased. This reentrant insulating behavior is an effect that was recently predicted [Das Sarma, S. and Hwang, E. H., PRB 89 121413, 2014].

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J.J. Nelson
Univ of Minn - Minneapolis

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