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Virtual Scanning Tunneling Microscope: Modeling Interlayer Tunneling Between Two-Dimensional Electron Systems in the Ballistic Regime KATHERINE LUNA, EUN-AH KIM, PAUL ORETO, STEVEN KIVELSON, Stanford University — We study a theoretical model for the virtual scanning tunneling microscope (VSTM), which is a proposal to use interlayer tunneling in a bi-layer system as a way to probe two-dimensional electron systems (2DES) in semiconductor heterostructures. We model the bi-layer in the presence of weak tunneling between the layers using an analog of the spin-boson model. Previously, such a system was modeled in the diffusive regime by Levitov and Shytov [1], and they predicted a zero-bias anomaly, where the tunneling conductance vanishes singularly near zero-bias as a result of Coulomb blocking. Motivated by the availability of high mobility samples and the goal of using VSTM to probe the physics of clean 2DES dominated by interactions, we focus on tunneling in the ballistic regime. We find the absence of a zero-bias anomaly due to extremely efficient screening in the ballistic regime. We discuss the implications of our results on ongoing experimental efforts. [1] S. Levitov and A.V. Shytov. JETP Lett. **66**, 214 (1997).

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