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Pseudospin Transfer Torques in Semiconductor Electron Bilayers[1] YOUNGSEOK KIM, Department of Electrical and Computer Engineering, University of Illinois, Urbana, Il, 61801, ALLAN H. MACDONALD, Department of Physics, University of Texas at Austin, Austin, Texas 78712, MATTHEW J. GILBERT[2], Department of Electrical and Computer Engineering, University of Illinois, Urbana, Il, 61801, MATTHEW J. GILBERT GROUP COLLABORATION
— We use self-consistent quantum transport theory to investigate the influence of interactions on interlayer transport in semiconductor electron bilayers in the absence of an external magnetic field. We conclude that even though spontaneous pseudospin ferromagnetism does not occur at zero field, interaction-enhanced quasiparticle tunneling does alter the resultant interlayer I-V curves. We find that the system exhibits a critical bias voltage that is similar to that of the pseudospin ferromagnetic system, but whose properties depend heavily on the charge imbalance between the two layers and their relative spatial separation. When the bias voltage exceeds the critical value, interlayer current is gradually droped due to the charge imbalance between the layers until the transport current no longer reaches steady state values.

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