Abstract Submitted
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Measurement of stochastic current switching in semiconductor superlattices[1] YURIY BOMZE, HUIDONG XU, STEPHEN W. TEITSWORTH, Duke University, RUDOLF HEY, HOLGER T. GRAHN, Paul-Drude-Institute, Berlin, Germany — We report on the experimental measurement of stochastic current switching in doped, weakly coupled GaAs/AlAs superlattices with large contact conductance. Static current-voltage ($I-V$) curves exhibit multiple current branches with the number of branches approximately equal to the number of superlattice periods. Some current branches are split, indicating injection from more than one subband in the contact layer. High bandwidth current switching data are collected in response to steps in applied voltage to final voltages V_f near the voltage corresponding to a particular current jump. For a certain range of V_f values, switching times reveal large stochastic fluctuations driven by shot noise, and switching time distributions show exponential tails indicative of a first passage process from an initial metastable state. The mean switching time τ and its standard deviation are plotted versus final voltage V_f. The τ -$V_f$plot reveals an exponential dependence on V_f, in qualitative agreement with predictions based on a discrete drift-diffusion transport model.

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