roughness scattering rates based on the exponential function shows a good agreement with experiments. The effect of screening on the roughness scattering is also discussed.

MA7. Lattice Effects in the Complex Subband Dispersion of 2DEG Semiconductor Waveguide Structures Subject to a Perpendicular Magnetic Field*, *G. Edwards and D. K. Ferry, Center for Solid State Electronics Research, Arizona State University, Tempe, AZ, 85287-6206.* In modeling 2DEG magneto-transport experiments it is important to have knowledge of the electronic states subject to a magnetic field perpendicular to the plane of the 2DEG, and the waveguide confinement potential. The Schrödinger equation including the **B** field and the confinement potential can be solved by a discretization procedure and hence putting the wavefunction 'field' on a lattice. When the lattice constant is much smaller than the Fermi wavelength the lattice model should be able to reproduce the true continuum situation, for states up to the Fermi level. We present numerical results, within the lattice model, for the full edge state (magneto-electric states) complex subband dispersion of a rectangular waveguide, including both the real 'bands' and the complex evanescent 'bands'. The full complex dispersion is needed in treating a heterogeneous structure such as a ballistic cavity or disordered quantum wire, in a **B** field, when a rectangular waveguide section is used as a lead region to inject current. The waveguide states subject to the **B** field can be obtained analytically by perturbation theory or **WKB** theory. At a fairly fine degree of discretization the form of our numerical purely real subband solutions 'agree' well with the analytic real band solutions. However, far from the bandedges, our numerical evanescent solutions can have a different topology to the analytic evanescent solutions. We find that a very fine level of discretization is necessary to describe the evanescent states accurately, deep into the complex dispersion region .

* Work supported by NEDO under the Intemational Joint Research Program 'Nanostructures and Electron Waves Project'.

P1. Simulation of a Single Electron Tunnel Transistor with Inclusion of Inelastic Macroscopic Quantum Tunneling of Charge, *Christoph Wasshuber and Hans Kosina, Institute for Microelectronics, TU-Vienna, Gusshausstrasse 27-29/E360, A-1040 Wien, Austria.* Until now Single Electron Tunnel (SET) devices were simulated by either neglecting macroscopic quantum tunneling of charge (q-MQT) or approximating it. Thus, we simulated a SET transistor with the full non-approximative inclusion of inelastic q-MQT or cotunneling. A Monte Carlo method was used to simulate electrons that tunnel back and forth through the two tunnel junctions of the SET transistor and co-tunnel back and forth through both junctions simultaneously. In the coulomb blockade regime and at low temperature the q-MQT effect dominates the current through the transistor. The thermally agitated normal tunneling is orders of magnitude smaller. Resonances in the I-V characteristic were found. The resonant peaks decrease with increasing temperature. This resonance does not originate from the normal tunnel effect, like in the well known resonant tunneling in double barriers, but from the co-tunnel effect. Thus the simulation shows a new feature of the SET transistor, that can be helpful for particular measurements of, for example, the coulomb energy or related capacitances, or can be exploited in new devices. This resonance is not yet experimentally verified.

P2. Wireless Single-Electron Logic Biased by Alternating Electric Field, *Alexarlder N. Korotkov, Department of Physics, State University of New York at Stony Brook, NY 11794-3800.* Single-electron effects in systems of small-capacitance tunnel junctions can possibly be used as the physical basis for a new generation of ultradense digital electronics.[1] Logic/memory based on single-electron transistors[1,2] and logic/memory which uses single electrons to represent digital information[1] have been discussed in the literature. In the present work a new type of single-electron logic is proposed.[3] The basic element is a short chain of islands which shows bistable polarization and affects the polarization of neighboring chains. In contrast to previous approaches wires are not used (which is a very favorable feature when considering nanometer-size circuits and possibly molecular structures), and the circuits are biased by an external electric