Resonant electron tunneling in a tip-controlled potential landscape

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In this master thesis the conductance of a quantum point contact is measured while the biased tip of a scanning probe microscope is used to locally modify the potential landscape of the sample. The conductance as a function of the tip position shows the inner structure of the edge channels, which carry the current in the quantum Hall regime. It is possible to observe conductance oscillations when the tip is placed at specific positions relative to the quantum point contact. The magnetic field, gate voltage and tip voltage dependence of the oscillations are studied and their possible origin is discussed. Aharonov-Bohm oscillations and Coulomb charging phenomena of an island between the tip and the quantum point contact defined by the gates are considered in the particular geometry.