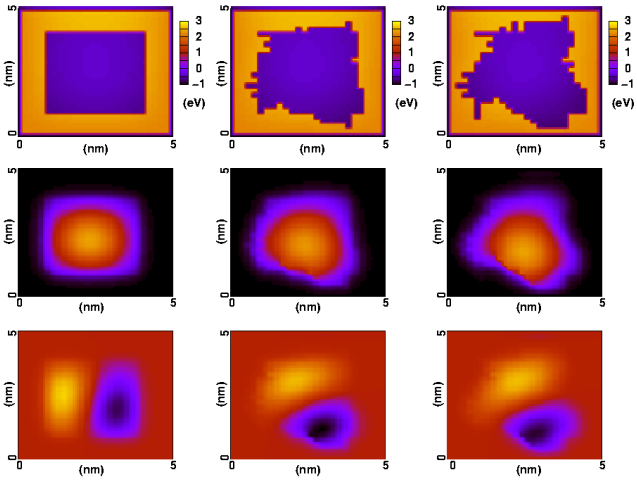
Simulation of quantum transport in nanowires, channel magnetoconductance and influence of roughness



Impact of surface roughness on eigenfunctions shape across a 3x3 nm^2 nanowire. Roughness was described using an exponential autocorrelation function. The figures are given for a correlation length L =1 nm and a standard deviation s = 0, 0.2, 0.4 nm from left to right.

Magnetoconductance measurement allows mobility extraction independently of the exact knowledge of channel dimensions. It is therefore very well suited to study transport in ultra short devices. To support the experimental and modelling work performed within the group, a simulation study of nano devices magnetoconductance has been carried on using the Non Equilibrium Green Functions (NEGF) formalism. It has been shown that the magnetoconductance of short nanowires was following the expected quadratic dependence with magnetic field. We published the first simulation results showing the influence of roughness on the mobility extracted from channel magnetoconductance.

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See for instance: C. Buran, M. Pala, M. Bescond, M. Mouis, *Surface roughness mobility in Si nanowires from quantum magnetoconductance simulation*, 12th International Workshop on Computer Electronics (IWCE 2007), October 8-10, 2007, University of Massachusetts (USA), Proceedings of IWCE (2007)