# Optimization of Nano-structure Devices

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**Abstract:** This talk focuses on the optimization of a non-trivially shaped laser puls, which locally excites a quantum wire. In the present case, the nano wire is described with a one-dimensional tight-binding model in real space. It has been shown in that such a quantum wire can be incorporated in a more elaborate metal semiconductor hybrid structure. Due to a non-trivial alignment of different frequency components a coherently created wave-packet dynamics leads to the accumulation of carriers at a certain location at a given time. It is the goal of the optimization procedure to find the corresponding shape of the laser pulse that concentrates the electrons at a particular position in space at a predefined time.

To simulate excitation of the quatum wire, a differential equation has to be integrated in time. Afterwards, derivatives with respect to numerous parameters are computed to apply a calculus-based optimization method. Details of this approach are discussed and the achieved results compared with the results obtained with a genetic algorithm.

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