



**Sonderforschungsbereich 631**  
Festkörperbasierte Quanteninformationsverarbeitung



## SONDERSEMINAR

**Monday, July 23, 2007**

at 2 pm

Room 450, Theresienstr. 37 – 4th floor

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### ***Kondo Effect in Single Electron Transistor: A Non-Crossing Approximation Study***

Quantum phenomena of charge and spin transport are soon to become quite important physical factors in modern electronic device technology where the minimum device features are projected to be less than 10 nm by 2016. Therefore, it is of crucial interest to be able to predict transient transport dynamics of nanoelectronic devices. To this end, time-dependent non-crossing approximation is employed to study the transient currents through a quantum dot coupled to metallic leads. In the first half of the talk, I will discuss the symmetric coupling case in which the dot-lead tunneling constant is suddenly changed such that the Kondo effect is present in the final state. The resulting transient current exhibits two unique timescales except for the trivial non-Kondo timescale corresponding to charge relaxation. In the second half of the talk, I shall consider the asymmetric coupling case in which the dot energy level is abruptly shifted to a position where the Kondo effect is present. Sinusoidal modulations in the Kondo timescale are observed in the current. This phenomenon is attributed to the interference between the emerging Kondo resonance at the Fermi level and the conduction electron band edges in the leads.

*Gezeichnet: Stefan Kehrein*