SFB/TRR 21 - Seminar
17. September 2007, Stuttgart

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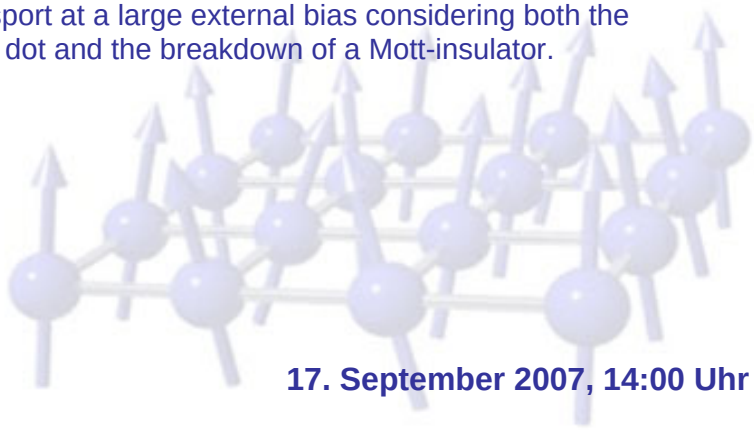
Transport and non-equilibrium properties of one-dimensional strongly correlated electron systems

Transport through interacting nano-structures such as quantum dots or molecules is a rapidly evolving field due to its potential applications. Moreover, experimentally, it is feasible to design nano-devices to realize specific model Hamiltonians and to search for exotic ground-states. The theoretical description requires reliable and flexible methods, especially when it comes to studying transport away from equilibrium. The density matrix renormalization group technique with its recent extension to real-time simulations provides a powerful numerical tool in the investigation of one-dimensional systems. Time-dependent phenomena such as relaxation processes or transport through interacting nano-structures are research areas where this method has a large potential to reveal interesting physics. As an example, I first discuss its application to transport through quantum dots, where the method adequately describes resonant transport due to the Kondo effect in the linear response regime.
Second, I address transport at a large external bias considering both the examples of a quantum dot and the breakdown of a Mott-insulator.



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