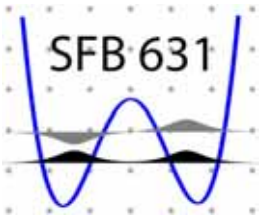

Sonderforschungsbereich 631

Festkörperbasierte Quanteninformationsverarbeitung

TECHNISCHE UNIVERSITÄT MÜNCHEN

SEMINAR ANNOUNCEMENT

Tuesday, 16th March 2004

03.30 p.m.

WSI, seminar room S101

Charge Qubits and their realization

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Quantum computation in its binary concept requires a set of two different quantum states, a quantum two-level system (qu2LS), that realizes the quantum bit physically. Some physical systems are intrinsically qu2LSs such as the spin 1/2 of a fermion or the polarization of a photon. In terms of quantum computation, however, charge qubits is the candidate that appears to provide the most natural link to electronic circuitry. I will discuss quantum bits (qubits) encoded in the spatial wave function of electrons embedded in condensed matter systems. The first question to be answered is to whether it is possible to realize a charge qubit solely based on capacitive coupling. The model is based on a network of quantum dots coupled via tunneling and Coulomb interaction. A total number of two excess electrons free to move appears to be sufficient to understand the major properties of this type of charge qubits. Tunneling is considered constant throughout, also since the experimental handle on it seems rather complex. The effect of a uniform external magnetic field will be discussed and utilized in terms of Ahahronov Bohm phase.