Kolloquium

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Experiments with Josephson phase qubits

A Josephson tunnel junction is formed by a thin layer of insulator sandwiched between two pieces of a superconductor. The superconducting current of paired electrons flows back and forth through the junction, somewhat like a ball rolling back and forth inside a curved bowl. The energy levels corresponding to these oscillations can be observed at millikelvin temperatures. In a Josephson junction qubit, the |0> and |1> states can be thought of as the two lowest-frequency oscillations of the currents flowing back and forth through the junction. This behavior is similar to the way an atom's electrons oscillate naturally around its nucleus, forming discrete quantum states. I will present our observations of Rabi oscillations in current-biased Josephson junctions, often referred now as phase qubits. The qubit junction is embedded in a superconducting loop, whose eigenstates are mapped in the readout process to macroscopically distinct magnetic flux states. The qubit states are manipulated by short microwave pulses and read out using quantum tunneling stimulated by a nanosecond-long pulse of magnetic flux. We are also studying a system of two qubits interacting capacitively, for which avoided level crossing is observed.

Wann? Freitag, 30.06.2006, 14:00 Uhr

Wo? Universität Tübingen, Raum D4 A19