

FKE-Seminar

Olivier Buisson

Institut NEEL
CNRS & UGA, GRENOBLE

Artificial atom based on superconducting quantum circuit with a V-shape spectrum

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During the last two decades, it has been shown that superconducting electrons dynamics inside superconducting circuits may follow quantum law at very low temperature. These circuits appear as artificial atoms and quantum bit whose properties are not fixed by the number of electrons or atom nucleus but by electronics compounds (capacitance, inductance, Josephson junction). These are adjustable during the nano-fabrication process and many quantum properties can then be reached through this optimization.

After an introduction on superconducting qubits, I will exemplify how we have built an artificial atom with V-shape energy spectrum. This atom is made of two Josephson junction coupled via a large inductance realized through a Josephson chain. The resulting circuit presents two modes showing strong non linear couplings between them. This leads to various quantum properties that will be discussed through recent experiments. Moreover such V-shape artificial atom is predicted to realize quantum non-demolition qubit read out with a very high fidelity and very short measurement time. This novel readout proposal will be presented as well as its current implementation.

Host: A. Lugstein