



Location University of Regensburg, Dept. of Physics
Room PHY 5.0.21

Time Thursday, 10th December 2009
3:15 p.m.

Speaker **Prof. Dr. Gerd Schön**
Dept. of Physics, University of Munich

Title Lasing and Cooling in Circuit QED

Abstract Motivated by recent experiments, which demonstrated lasing and cooling of the electromagnetic modes in a resonator coupled to a superconducting qubit, we describe the specific mechanisms creating the population inversion, and we study the spectral properties of these systems in the lasing state. Different levels of the theoretical description, i.e., the semi-classical and the semi-quantum approximation, as well as an analysis based on the full Liouville equation are compared. We extend the usual quantum optics description to account for strong qubit-resonator coupling and include the effects of low-frequency noise. Beyond the lasing transition we find for a single or a few-qubit system the phase diffusion strength to grow with the coupling strength, which in turn deteriorates the lasing state.

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