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Detection of microwave photons with superconducting qubits for axion searches

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An elegant solution to the strong CP problem, proposed in 1977 by Peccei and Quinn, implies the existence of a new neutral boson called the Axion. Axions could explain the presence of cold dark matter in our Universe. Microwave cavity experiments looking for galactic axions (ADMX, QUAX) need to push their sensitivity beyond the quantum limit of amplifiers by means of single-photon counters in the microwave region (10-30 GHz). Superconducting qubits provide an interesting option: a photon in a cavity can change the state of a coupled qubit, and this is detected performing spectroscopy on the qubit-cavity system. In this talk we will discuss status and prospects for this technique.

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