**Josephson photonics: Quantum optics and Cooper pair tunneling**

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Activities to combine the two and for decades basically distinct fields of quantum optics and charge transfer in mesoscopic systems have started only in the last few years. Impressive progress has been particularly achieved for superconducting tunnel junctions. In this talk I will address the relation between charge counting (full counting statistics) and statistics of photon radiation from a theoretical perspective. This then leads me to discuss how, via circuit design, the nature of photon radiation can be tuned. Recent experimental realizations include single microwave photon sources and entangled photon pairs. An extended set-up can be used as cooling device (refridgerator) or heat engine.