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Correlations of microwave photons emitted by inelastic Cooper pair tunneling ALEXANDER GRIMM, SALHA JEBARI, DIBYENDU HAZRA, CEA, INAC-SPSMS, F-38000 Grenoble, France, CARLES ALTIMIRAS, OLIVIER PARLAVECCHIO, FABIEN PORTIER, CEA, IRAMIS-SPEC, F- 91191 Gif-sur-Yvette, France, MAX HOFHEINZ, CEA, INAC-SPSMS, F-38000 Grenoble, France

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A simple DC voltage-bias on a small Josephson junction leads to emission of microwave radiation via inelastic Cooper-pair tunneling. In this process a tunneling Cooper pair emits one or several microwave photons with a total energy of 2eV. The observed average photon emission rate is well explained within the so-called P(E) theory, but this theory does not make any predictions about the statistics of the emitted photons.

Recent theory indicates that these statistics can be highly nontrivial. Depending on the bias conditions and the impedance of the circuit in which the junction is embedded, correlations can range from strongly bunched to anti-bunched. I will present experiments investigating photon correlations in circuits with specifically engineered environments.

This type of devices might offer a new way of generating useful photon states for circuit quantum optics experiments, without the need of carefully calibrated control pulses. Moreover, the frequency of the emitted radiation is only limited by the gap of the superconductor. We are building our devices using NbN-MgO-NbN tunnel junctions which should in principle allow operation up to the THz regime.

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