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**Near quantum limited amplification from inelastic Cooper-pair tunneling** MAX HOFHEINZ, SALHA JEBARI, FLORIAN BLANCHET, ALEXANDER GRIMM, DIBYENDU HAZRA, ROMAIN ALBERT, CEA Grenoble, FABIEN PORTIER, CEA Saclay — Josephson parametric amplifiers approach quantum-limited noise performance but require strong external microwave pump tones which make them more difficult to use than DC powered amplifiers: The pump tone can affect the device under test and requires expensive room-temperature equipment. Inelastic Cooper pair tunneling processes through a small DC voltage-biased Josephson junction, where a tunneling Cooper pair dissipates its energy $2eV$ in the form of two photons are reminiscent of parametric down conversion. We show that these processes can be used to provide amplification near the quantum limit without external microwave pump tone. We explain the measured gain and noise based on the $P(E)$ theory of inelastic Cooper pair tunneling and general fluctuation–dissipation relations.

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