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Dissipative effects and GHz amplification with superconducting Fabry-Perot resonators coupled to nanowires MATTHEW BRENNER, SARANG GOPALAKRISHNAN, JASEUNG KU, University of Illinois, NAYANA SHAH, University of Cincinnati, PAUL GOLDBART, ALEXEY BEZRYADIN, University of Illinois — Superconducting nanowires embedded in microwave Fabry-Perot resonators exhibit nonlinear and dissipative phenomena when the cavity is driven at sufficiently high power. These phenomena arise when the a.c. current in the resonator exceeds the nanowire's depairing current. The behavior includes the appearance of (1) a local minimum in the transmitted intensity at the resonance frequency (i.e., a "crater"), (2) dissipative bi-stability and hysteresis as the input frequency is swept across the resonance, and (3) a periodic array of transmission maxima at frequencies offset from the input frequency. When a superposition of two signals is applied, with the stronger pump signal residing in the crater, a narrowband amplification (+24.0 dB) of the weaker signal is observed. The frequency of the amplification band can be controlled by adjusting the pump power. We demonstrate the existence of these effects in MoGe and Nb nanowires and develop a phenomenological model to describe them

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