

Energy Relaxation in a Diffusive SNS Junction in an AC Field

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In an earlier work, we have studied a diffusive S(uperconduct)-N(ormal metal)-S(uperconductor) wire as a detector for electromagnetic radiation.¹ This brings up many questions regarding the coupling of the absorber to the incoming radiation and the subsequent energy relaxation, namely electron-electron, electron-phonon and energy-outdiffusion processes. Here, the photon-electron coupling in particular becomes complicated due to the proximity-induced superconductivity in the absorber.² In the extreme cases, this results in a huge enhancement of superconductivity due to irradiation

Previously, we have only used a simple model which disregards the proximity effect in photon-electron coupling. Here, we study the relaxation process in a diffusive SNS junction in an AC field, be it optical irradiation or produced by an electrical circuit, with a focus on the effects resulting from the induced superconductivity in the junction.

¹J. Voutilainen, M. A. Laakso, and T. T. Heikkilä, *J. Appl. Phys.* **107**, 064508 (2010).

²P. Virtanen, F. S. Bergeret, J. C. Cuevas, and T. T. Heikkilä, arXiv:1012.4294 (2010).