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Superconductor/ferromagnet tunnel junction based thermoelectric bolometer and calorimeter

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Based on the giant thermoelectric effect of a superconductor/ferromagnet tunnel junction [1], a novel ultra-sensitive radiation detector (SFTED) has been proposed both as bolometer [2] and calorimeter [3]. This type of detector can be operated without the need of additional circuit lines for the sensing bias, and at the same time providing a noise equivalent power (NEP) below $1 \times 10^{-19} \times \sqrt{G_T} \text{ W}/\sqrt{\text{Hz}}$ [2] ($\sqrt{G_T}$ is the tunneling conductance of the junction), rivaling the best TES and KID detectors, in theory. Here we report our recent numerical studies on the feasibility of a SQUID readout of SFTED in both bolometric and calorimetric regimes, and in the direction of providing a set of practical design parameters for the detector fabrication and the readout circuitry implementation.

[1]. A. Ozaeta, *et al.*, *Phys. Rev. Lett.*, **112**, 057001 (2014)

[2]. T.T. Heikkilä, *et al.*, *Phys. Rev. Appl.*, **10**, 034053 (2018)

[3]. S. Chakraborty and T.T. Heikkilä, *J. Appl. Phys.*, **14** 123902 (2018)

Less than 5 years of experience since completion of Ph.D

Y

Student (Ph.D., M.Sc. or B.Sc.)

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Primary authors: Mr GENG, Zhuoran (University of Jyväskylä); Mr HELENIUS, Ari (University of Jyväskylä); Prof. HEIKKILÄ, Telo (University of Jyväskylä); Dr MAASILTA, Ilari (University of Jyväskylä)

Presenter: Mr GENG, Zhuoran (University of Jyväskylä)

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