Superconducting Nanowire Single Photon Detector (SNSPD) for Quantum Information

Lixing You[1,2]

[1]Division of Superconductivity, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences (SIMIT, CAS)
[2]Department of Physics, University of California, Berkeley

E-mail: lxyou@mail.sim.ac.cn

Abstract — At the beginning of this century, a new type of detector, the superconducting nanowire single photon detector (SNSPD or SSPD) joined the family of superconducting sensors and detectors. It has rapidly emerged as one of the most important players in this class since it surpasses conventional single photon detectors (APD: avalanche photodiode and PMT: photo multiplier tube) with many advantages, such as high detection efficiency, low dark count rate, low timing jitter and higher counting speed. Now commercial SNSPDs, including the cryogenic systems, are available from several start-up companies across the world. Many interesting applications of SNSPDs have been demonstrated in the past few years.

In this talk, I will introduce our work on SNSPD technology and its applications for quantum information in SIMIT, CAS.

(i) High detection efficiency SNSPD for the fiber communication wavelength of 1550 nm;
(ii) High detection efficiency SNSPD for wavelengths from the visible to near infrared;
(iii) How to reduce the dark count rate of SNSPD by use of an on-chip film narrow-bandpass filter;
(iv) Applications of SNSPD in quantum information and other scientific fields.

The operating principle and recent technical progress of SNSPDs will also be reviewed.

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