

Superconducting Strip Photon Detectors and Applications

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Abstract—The pioneering research by Prof. Goltsman in 2001 introduced an exceptional detector: superconducting strip photon detectors (SSPDs), also known as superconducting nanowire single-photon detectors (SNSPDs). Over the past two decades, SSPDs have demonstrated unparalleled performance and found applications in diverse fields, with particular prominence in quantum information science. Notably, they have emerged as high-end scientific instruments in a niche yet rapidly expanding market.

In this talk, I introduce the detector architecture and then review the latest advancements at SIMIT in enhancing key SSPD metrics, including: high detection efficiency (99% at 1550 nm), ultra-low dark count rate ($\sim 10^{-2}$ cps), and photon-number resolving capability. Finally, I summarize the applications of SSPDs in quantum information processing, highlighting their role in cutting-edge technological implementations.

Keywords (Index Terms)—photon detector, detection efficiency, dark count rate, photon number resolvability, quantum information