

# VERA Apparatus and Measurement of Photon Detection Efficiency

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Silicon Photomultipliers (SiPMs) are compact arrays of single-photon avalanche diodes (SPADs). The Vacuum Emission Reflection Absorption (VERA) apparatus is a custom setup developed at TRIUMF, used to measure photon detection efficiency and reflectivity of SiPMs in a vacuum chamber at cryogenic temperatures. Photon detection efficiency is one of the most critical parameters of any single photon detector and plays a role in developing all SiPMs. This characterization of SiPMs Quantifies the ability of a single photon detector to detect photons. This can also be described as the ratio between detected photons and photons arriving at the detector. The VERA apparatus uses several experiments to collect data from SiPMs and photodiodes to measure photon detection efficiency.

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