

# Laser-Driven Photon Emission in SiPMs with MIEL

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Silicon Photomultipliers (SiPMs) are tightly-packed arrays of single-photon avalanche diodes (SPADs), biased above breakdown, that undergo a self-sustaining charge avalanche process upon absorption of an incident photon. Due to its compactness, high single-photon resolution, low-noise and ability for operation at cryogenic temperatures, the SiPM is emerging as a baseline photon sensing solution in a number of rare-event searches in physics, notably the planned nEXO neutrinoless double-beta decay experiment. An unfortunate byproduct of the avalanche process is the production of secondary photons. These can trigger avalanches in neighbouring SPADs, or leave the SiPM entirely and trigger a neighbouring sensor –this has a systematic effect on detector performance. The Microscope for Injection and Emission of Light (MIEL) is a custom setup developed at TRIUMF enabling the study of secondary photon emission in SiPMs, by stimulating a SPAD using a laser. The setup is used to view the light emission geographically on the SiPM surface, and obtain a spectral distribution for emitted photons.

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