



UNIVERSITÀ DI PAVIA
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Avviso di Seminario

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**PRESENT AND FUTURE
OF SUPERCONDUCTING NANOWIRE
SINGLE-PHOTON DETECTORS**

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Abstract: Superconducting Nanowire Single Photon Detectors (SNSPDs) have established themselves as a key enabling technology for photonic based quantum information and quantum communication, due to their unrivaled specifications. Commercial SNSPDs optimize a combination of near unity detection efficiency, spectral range, low dark count rates, short dead times and/or picosecond time resolution. Recently, multiple results have been published demonstrating intrinsic Photon Number Resolution (PNR) properties of SNSPDs. However, the physics of the detection processes underpinning trade-offs in detector performance and PNR remain unclear. As a result, no commercial detectors with native PNR are yet available. At Leiden University we explore the fundamental properties of SNSPDs. By fabricating MoSi nanowires, we aim to study how their electro-thermal properties affect photon number resolution. We use Quantum Detector Tomography to deduce the SNSPD's response in the photon number basis from measurements done with a set of known (coherent) states of light. In this seminar, I will give an introduction to the general characteristics of SNSPDs and introduce simplified models for photon detection that are often used to describe and predict some detector properties. I will then explore some of the latest results, as well as the challenges that the research in this field is trying to tackle.