

Allgemeines Physikalisches Kolloquium

Donnerstag, 04.12.25 – 16 Uhr c.t.

IG1 – HS 2 / Wilhelm-Klemm-Str. 10

Kolloquiums-Kaffee ab 16 Uhr vor dem Hörsaal

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Detecting light at a single photon level: quantum devices and applications

Quantum devices can control light at the single photon level and enable novel instrumentation. Future quantum communication and sensing will require high-performance devices able to generate and detect light one photon at a time. The ability to detect single photons is crucial for quantum optics as well as for a wide number of applications. Several technologies have been developed for efficient single photon detection in the visible and near infrared. The invention of the superconducting nanowire single photon detector in 2001 enabled the development of a new class of detectors that can operate close to physical limits. Different aspects will be discussed including wavelength detection range, time resolution, dark counts, saturation rates and photon number resolution along with various applications such as Lidar, quantum communication, deep space communication, microscopy and bio-medical measurements.

Multipixel single photon detectors based on superconducting nanowires will also be discussed, including a quantum spectrometer based on an array of high-performance single photons. By time stamping single photon detection events at the output of a spectrometer, we generate data that can yield spectra as well as photon correlations and cross correlations among different spectral lines, under pulsed excitation, transition lifetimes can also be extracted. This instrument therefore replaces a spectrometer, a streak camera, and a Hanbury-Brown Twiss interferometer and operates with far higher signal to noise ratio than is possible with existing detectors that are commonly used in the infrared.