Westfälische Wilhelms-Universität Münster

Fachbereich Physik

› Allgemeines Physikalisches Kolloquium

› Donnerstag, 03.05.2018 um 16 Uhr c.t.

Prof. Dr. Gregor Weihs

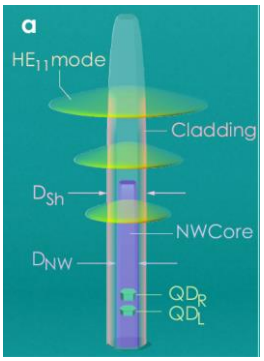
Universität Innsbruck

"Creation and Interference of Multiphoton States"

Quantum states of multiple photons are conjectured to enable all-optical quantum repeaters and quantum computers. While photon loss is ubiquitous and source and detection efficiencies are from perfect, there are models that can deal with these errors with reasonable overhead. The big advantage is that stochastic noise is very small in typical circuits.

In my talk, I will present our work on efficient sources of multiphoton states, for example from multiexciton cascades in nanowire quantum dot molecules. The quantum dots are grown in nanowires that are free from stacking faults and thus exhibit very high quantum efficiency. The nanowire acts as an antenna that matches the emission mode of the quantum dot molecule to the receiving lens, which improves the outcoupling. As a result, our source surpasses earlier reported sources by orders of magnitude in brightness.

Applying multiphoton states in any linear optical network involves multiparticle interference. I will present theoretical results on the complete generalization of the Hong-Ou-Mandel interference of two photons on a beamsplitter. In this work, we cover all possible scenarios of an arbitrary number of bosons or fermions in an arbitrary multiport beamsplitter with a surprisingly simple criterion. In a slightly different setting, we experimentally investigated the interference of a time-correlated three-photon state through Franson interferometry. I will show how we achieved genuine three-photon interference with high visibility, which enables tests of the foundations of quantum mechanics.



InP nanowires act as antennas for photons emitted by InAsP quantum dot insertions in their core. The size and spacing of the dots that form a molecule can be controlled very accurately.

Kolloquiums-Kaffee
ab 16 Uhr vor dem Hörsaal

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