



LUND
UNIVERSITY

NANOSCIENCE COLLOQUIUM



Thursday October 24th 2013 at 15:15, K-space, Fysicum

Quantum optics with nanowires

Dr. Val Zwiller

Kavli Institute of Nanoscience, TU Delft,
The Netherlands



Nanowires offer new opportunities for nanoscale quantum optics; the quantum dot geometry in semiconducting nanowires as well as the material composition and environment can be engineered with unprecedented freedom. A tapered nanowire enables improved light extraction efficiency, as recently demonstrated by our group. We will also discuss the possibility of coupling a quantum dot to an atomic vapor to frequency lock the quantum dot emission and achieve universal indistinguishable emission. By doping a nanowire and making ohmic contacts on both sides, a nanowire light emitting diode can be obtained with a single quantum dot as the active region. Under forward bias, this will act as an electrically pumped source of single photons. Under reverse bias, an avalanche effect can multiply photocurrent and enables the detection of single photons. Another type of nanowire under study in our group is superconducting nanowires for single photon detection, reaching efficiencies, time resolution and dark counts beyond semiconductor based photodetectors. We will discuss our first attempts at combining semiconducting nanowire based single photon emitters and superconducting nanowire single photon detectors on a chip.

Host: Magnus Borgström (FTF)

This is one in a regular series of Nanoscience Colloquia, aimed at all researchers and students with an interest in nanoscience. The series is arranged by the Strategic Research Environment "The Nanometer Structure Consortium at Lund University" (nmC@LU) and by the Linnaeus environment "Nanoscience and Quantum Engineering", funded by the Swedish Research Council (VR).



Vetenskapsrådet