

SONDERSEMINAR/SPECIAL SEMINAR
LMU/MPQ

am: Wednesday, November 9, 2011

Uhrzeit: 9:30 a.m. s.t.

spricht: Dipl.-Ing. Gwenaelle Vest

Thema: Design and Modeling
of a Two-Dimensional Photonic Crystal Cavity/
Master Thesis
CINTRA (CNRS International/Nanyang Technological
University/Thales Research Alliance
Singapore

Ort: Chair Professor Theodor W. Hänsch,
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Discussion Room H 311

gez. Prof. T.W. Hänsch

Abstract

With the growing demand of more compact and powerful optical systems, the development of integrated light sources is a necessity for the achievement of fully functional all-optical circuitry. Toward this end, we propose an original hybrid structure where a single vertical semiconductor nanowire is grown on top of a photonic crystal microcavity with a high-Q factor. This approach combining bottom-up and top-down fabrication processes allows both components to be engineered independently and with an unprecedented versatility.

This project focused on designing a two-dimensional PhC microcavity supporting a strong resonant TM-mode. The band structures of perfect photonic crystals were calculated by Plane Wave Expansion (PWE) method. Different microcavities were designed and optimized, and the mode properties were evaluated by electromagnetic simulations in time domain (FDTD). Finally, the coupling with a vertical nanowire was investigated for different nanowire diameters and its efficiency was discussed according to the field geometry, the Purcell factor and the far field radiation pattern.