

Allgemeines Physikalisches Kolloquium

Donnerstag, 15.01.26 – 16 Uhr c.t.

IG1 – HS 2 | Wilhelm-Klemm-Str. 10

Kolloquiums-Kaffee ab 16 Uhr vor dem Hörsaal

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Integrated Nanowire Photonics

Integration of ultracompact light sources on photonic integrated circuits (PIC) opens many promising potentials for on-chip optical signal processing and sensing in application areas that use classical or non-classical states of light. To leverage advanced on-chip integration while simultaneously offering new capabilities in light-matter interaction and waveguiding, semiconductor nanowires (NW) provide a unique class of optically active materials and highly integrated nanocavities to control optical mode coupling and propagation in integrated photonic circuits.

In this talk, I will illustrate how monolithically and heterogeneously integrated III-V semiconductor NWs provide a versatile platform of advanced light sources in silicon (Si) photonic circuits for two model cases aiming at on-chip classical and quantum photonic technologies; (i) vertical-cavity NW-lasers with ultrasmall footprint, ultrafast emission dynamics and emission tunability in the relevant telecom band and mid-infrared spectral ranges, as well as (ii) NW-based quantum emitters deterministically integrated on quantum photonic integrated circuits (QPIC) with efficient light coupling to proximal Si waveguides. I will also demonstrate how the integration of NWs into high-Q resonators can be used to tailor the emission characteristics and coupling properties in integrated circuits. Finally, an outlook will show first examples of how on-chip integrated NW-cavities can be extended to other photonic circuit platforms, such as e.g. AlN-based photonic circuits.