

Semiconductor quantum optics – resonance fluorescence, single- and cascaded-photon emission

P. Michler

*Institute for Semiconductor Optics and Functional Interfaces and Research Center SCoPE,
University of Stuttgart, Allmandring 3, 70569 Stuttgart, Germany*

Exploiting the quantum properties of the light which is emitted from semiconductor nanostructures has the potential of enabling many new applications in the field of photonics and quantum information technology, such as secure communication, imaging and lithography techniques beyond the diffraction limit, as well as photonic quantum computing. Many of these applications require the generation of indistinguishable single and cascaded photons. Resonance fluorescence from single quantum dots in microcavities opens this possibility. In my talk, I will discuss the fascinating physics as well as the current status of such light sources. For some applications, e.g. quantum cryptography, photon indistinguishability is not a precondition and more practical aspects such as electrical pumping become important. The current status of electrically driven quantum dot single-photon sources will also be discussed in the talk.