General session V

Towards Single Photon Sources at Room Temperatures for Quantum Cryptography Application

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Single quantum dots (QDs) are promising candidates for the realization of electrically triggered sources of single photons or entangled photon pairs for application in quantum cryptography. Devices based on III-N QDs are operable at much higher temperatures than their arsenide counterparts, and provide the possibility to tune the emission wave length over a wide range. In this presentation, we study the fundamental processes of photon emission by excitonic complexes confined in single III-N QDs using InGaN/GaN and GaN/AlN QDs as examples. Furthermore, a comparison with corresponding results in InGaAs QDs will be given. Experimental results from single-QD spectroscopy are evaluated as well as theoretical results obtained by eight-band k.p theory.

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Solid-state based room temperature terahertz imaging systems

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Conventional way to realize room temperature terahertz (THz) imaging is based on usage optoelectronic approach when femtosecond lasers are used to generate-detect radiation via coherent scheme [1]. Such set-ups are rather bulky, hence, for practical aims, one need to have compact room temperature operating THz imaging systems which is free of optical laboratory environment and precise alignment issues. In a given lecture, we discuss several principles can be applied to realise such THz imaging systems based on solid-state devices. Our focus will be given to electronic multiplier sources [2], quantum-cascade lasers [3] and plasmonic nanometric field effect transistors [4]. We consider room temperature THz sensors – plasmonic nanometric field effect transistors, too, and bow-tie diodes [5] with special emphasis on spectroscopic THz imaging applications [6]. Particular attention will be given to illustrate bow-tie diodes' heterodyne detection scheme and its advantages in the context of operation frequency range, sensitivity and noise-equivalent power.

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