TRR 142
Tailored Nonlinear Photonics

TRR Guest Scientist Lecture / Seminar

Date/Time: 15.03.2018 / 11:00 Uhr
Location: Paderborn, P8.4.09

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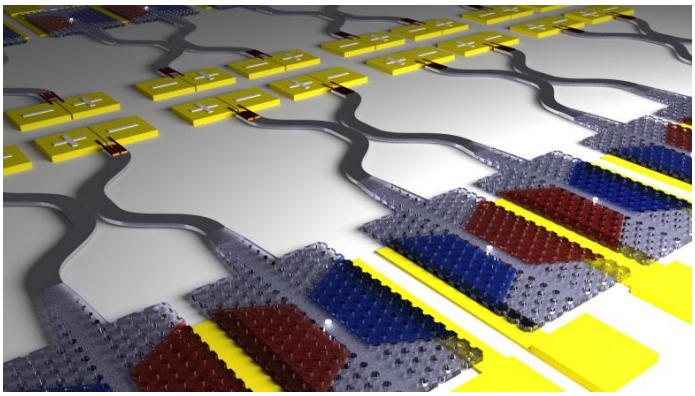
Integrated Quantum Photonics on GaAs

Abstract:

Quantum information processing is a rapidly developing research field. The exploitation of quantum bits instead of classical bits offers key advantages for future technologies including secure communication and ultra-fast computation. Lab-size experiments on quantum information processes have already proven the validity of its concepts. However, any wide spread utilization will require dense integration of functionalities. This requires the realization of semiconductor integrated quantum photonic circuits on a single semiconductor chip with embedded sources, photon processing units and detectors on the single photon level. Among the different material platforms currently being investigated, direct-bandgap semiconductors and particularly gallium arsenide (GaAs) offer the widest range of functionalities, including single and entangled-photon generation by radiative recombination, low-loss routing, electro-optic modulation and single-photon detection. We review recent achievements in quantum integrated photonic components and circuits based on the GaAs technology platform [1]. All key functionalities, including single-photon sources and single-photon detectors, integrated auto-correlators and tuneable Mach-Zehnder interferometers have been realized and tested. These results lay the foundation for a fully-functional and densely integrated quantum photonic technology based on GaAs components.



References
[1] C. P. Dietrich, A. Fiore, M. G. Thompson, M. Kamp, S. Höfling, "GaAs integrated quantum photonics: Towards compact and multi-functional quantum photonic integrated circuits", Laser & Photonics Reviews 10, 870 (2016) (2016).

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