学术报告视频

Armando Rastelli | Semiconductor Nanostructures as Nearly-Ideal Sources of Quantum Light

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► **【纳米物理与器件重点实验室系列学术报告(130)】**

报告题目: Semiconductor Nanostructures as Nearly-Ideal Sources of Quantum Light

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Abstract:

Semiconductor quantum dots (QDs) obtained by epitaxial growth are regarded as one of the most promising solid-state sources of triggered single and entangled photons for applications in emerging quantum communication and photonic quantum-information-processing.

In this talk, we will focus on GaAs QDs in AlGaAs matrix [1,2], which show a unique combination of appealing features: fast radiative rates of ~5 GHz, capability of generating near perfectly entangled photon pairs [3] with good indistinguishability [4], ultralow multiphoton emission probability [5], high brightness [6], as well as wavelength (~800 nm) suitable for free-space quantum communication. Some of these properties were recently used to implement photonic quantum teleportation and entanglement swapping using photons sequentially emitted by the same quantum dot [7].

Because of the statistical fluctuations in the optical properties of different QDs in an ensemble, scaling up the QD hardware is still an open challenge. Realistic strategies and encouraging results relying on post-growth tuning of the QD properties [8-11] will be discussed.

References

[1] A. Rastelli et al., Phys. Rev. Lett. 92, 166104 (2004).

[2] Y. Huo et al., Nature Phys. 10, 46 (2014).

[3] D. Huber et al., Phys. Rev. Lett. 121, 033902 (2018).

[4] M. Reindl et al., arXiv:1901.11251

[5] L. Schweickert et al., Appl. Phys. Lett. 112, 093106 (2018).

[6] J. Liu et al., Nature Nanotech. 14, 586 (2019).

[7] M. Reindl et al., Science Adv. 4, 12, eaau1255 (2018). F. Basso Basset et al., arXiv:1901.06646v1

[8] A. Rastelli et al, Phys. Status Solidi (b), 249, 687 (2012).

[9] R. Trotta et al., Nat. Comm. 7, 10375 (2016).

[10] M. Reindl et al., Nano Lett. 17, 4090 (2017).

[11] X. Yuan et al., Nat. Comm. 9, 3058 (2018).

Brief bio:

Prof. Armando Rastelli heads the Semiconductor Physics division of the Institute of Semiconductor and Solid-State Physics at the Johannes Kepler University of Linz, Austria since 2012. He obtained his PhD in Physics from the University of Pavia, Italy, in 2003. During his PhD he was research assistant at the ETH Zürich, Switzerland, and Marie-Curie-Fellow at the Technical University of Tampere, Finland. From 2003 to 2007 he was first PostDoc and then group leader at the Max-Planck-Institute of Stuttgart, Germany, and, till 2012 at the Leibniz Institute of Dresden, Germany. In 2019 he was elected corresponding member of the Austrian Academy of Sciences. Throughout his career, he has been developing new methods to obtain, study, and control epitaxial quantum dots. The main current focus is on the optimization of GaAs quantum dots as quantum light sources and their post-growth tuning via microstructured piezoelectric actuators. The combination of these two technologies has recently led to tunable sources of entangled-photon pairs with near unity fidelity and the modification of the quantum-dot optical-selection-rules for applications in integrated quantum photonics. He is coauthor of more than 230 peer-reviewed papers with more than 7000 citations and has given 100 invited talks on his research activities.

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