Seminar/Talk

New Methods and Materials in Quantum Emitter Science

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Host: Maria Ibáñez

Solid-state emitters of single photons serve as testbeds for studying fundamental condensed matter dynamics and are increasingly appealing for various applications. I highlight recent advances in both the materials science of single-photon emitters and the spectroscopic methods used for their characterization. Lead-halide perovskite quantum dots (PQDs) exhibit highly coherent optical emission at low temperatures [1]. I outline the latest developments in perovskite quantum emitters, including our first demonstration of two-photon (Hong-Ou-Mandel) interference from sequentially emitted single photons. We achieved visibilities of up to 0.55, surpassing the threshold for genuine quantum interference, even without cavity acceleration of the emission. This indicates that entangled-photon generation is indeed feasible with perovskites [2]. Additionally, advancements in quantum defect spectroscopy using combined optical and electron-beam methods will be presented [3]. These developments also include a novel all-optical super-resolution concept based on spatio-temporal time-frequency photon-correlation functions. This Spectral Fluctuation Super-Resolution (SFSR) technique is effective for non-blinking emitters and stochastic spectral fluctuations with arbitrary temporal statistics, suggesting its utility in super-resolution microscopy of quantum emitters at low temperatures, where spectral diffusion is often more prominent than emitter blinking, as used in alternative optical fluctuation microscopy. [1] Science, 2019, 363 (6431), 1068-1072.[2] Nat. Photon., 2023, 17, 775–780.[3] PNAS, 2024, 121 (14) e2308247121.

Thursday, January 9, 2025 11:00am - 12:00pm
Office Bldg West / Ground floor / Heinzel Seminar Room (I21.EG.101)

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