universität innsbruck

Department of Theoretical Physics

Seminar Talk

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"Photon statistics emerging from light scattering by atomic ensembles"

Abstract

Coherence, photon indistinguishability, and nonclassicality are key resources for modern quantum technologies. Investigating how these properties emerge in light scattered by atomic ensembles represents an important research direction with strong potential for quantum applications. We focus on signatures of coherence in light scattered by a hot atomic gas and show that coherence affects photon statistics even in the presence of atomic motion [1]. Based on this effect, we propose a scheme for measuring the thermal motion of the atoms [2]. Furthermore, we study the opposite limit of an ensemble consisting of only a few atoms and demonstrate nonclassical features of the emitted light [3]. We employ measurement of the third-order correlation function and aim at certification of advanced nonclassical features that are not detectable through the second-order correlation function.

[1] A. Kovalenko et al., Optica 10, 456-463 (2023)
[2] arXiv:2409.18651
[3] L. Lachman and R. Filip, Prog. in Quantum Electron. 83, 100395 (2022)

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