

東京大学 光量子科学連携研究機構 (UTripl) セミナー

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TACMI コンソーシアム オープンセミナー ・ 量子科学技術フェローシップ (Q-STEP) セミナー

“Strong-Field Quantum Optics”

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Technion - Israel Institute of Technology

日 時: 2025年4月11日(金) 10:00~11:00

場 所: 東京大学工学部3号館4階439号室(34講義室)

+ ZOOMでの開催(事前登録制)

【Abstract】

Decades of research in photonics established a mindset that quantum optics matters mostly for few-photon processes, whereas high-intensity light behaves mostly classically. In this talk, I will review recent developments that bridge this gap. In a series of recent works, we found quantum optical effects intrinsic to strong-field processes, for example showing that high-harmonic generation and other atto-science phenomena can become sensitive to the quantum nature of the driving field. I will present key theoretical advances and pioneering experiments, showing how correlations between emitters can get imprinted on emitted harmonics, and how high-harmonic spectra depend on the photon statistics of the driving field. I will discuss ongoing experiments by us and by other groups around the world, wrapping up with outlook on the prospects for engineering quantum many-photon states and entangled attosecond pulses.

- [1] A. Gorlach, O. Neufeld, N. Rivera, O. Cohen, and I. Kaminer, The Quantum-Optical Nature of High Harmonic Generation, *Nature Communications* 11, 4598 (2020)
- [2] A. Pizzi, A. Gorlach, N. Rivera, A. Nunnenkamp, and I. Kaminer, Light emission from strongly driven many-body systems, *Nature Physics* 19, 551 (2023)
- [3] A. Gorlach, M. Even Tzur, M. Birk, M. Krüger, N. Rivera, O. Cohen, and I. Kaminer, High harmonic generation driven by quantum light, *Nature Physics* 19, 1689 (2023)
- [4] M. Khalaf and I. Kaminer, Compton Scattering Driven by Quantum Light, *Science Advances* 9, eade0932 (2023)
- [5] M. Even Tzur, M. Birk, A. Gorlach, M. Krüger, I. Kaminer, and O. Cohen, Photon-statistics force in ultrafast electron dynamics, *Nature Photonics* 17, 501 (2023)
- [6] A. Rasputnyi, Z. Chen, M. Birk, O. Cohen, I. Kaminer, M. Krüger, D. Seletskiy, M. Chekhova, F. Tani, High Harmonic Generation by Bright Squeezed Vacuum, *Nature Physics* 20, 1960 (2024)
- [7] M. Even Tzur, C. Mor, N. Yaffe, M. Birk, A. Rasputnyi, O. Kneller, I. Nisim, I. Kaminer, M. Krüger, N. Dudovich, O. Cohen, Measuring and controlling the birth of quantum attosecond pulses, *arXiv:2502.09427* (2025)

使用言語 : 英語 (English)

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申込方法 : Google forms(下記)にて参加の申し込みを行ってください。

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