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“Quantum Electrodynamics of Strong Laser-Matter Interaction: The Ongoing Journey and Beyond”

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日 時: 2025年8月8日(金) 10:30~11:30

場 所: 工学部8号館502講義室

【Abstract】

Do you ever wonder about the quantum electrodynamics aspects of strong laser physics phenomena? Strong laser-matter interactions have captivated researchers and technologists alike since the advent of high-power lasers around half a century ago. They serve as a cornerstone for fundamental explorations in atomic, molecular, and optical physics, shaping fields like attosecond physics, nonlinear optics, and ultrafast optoelectronics. While classical electromagnetic field descriptions have sufficed for many studies, recent attempts to develop fully quantized approaches have revealed intriguing possibilities, promising exciting future prospects. This seminar aims to explore recent efforts to tackle intense laser-atom interactions from a fully quantized standpoint. We delve into the generation of controllable high-photon-number entangled coherent states and coherent state superpositions — a feat beyond the scope of semiclassical theories. By applying this new formalism to processes like high-harmonic generation and above-threshold ionization, we uncover new phenomena inaccessible to classical frameworks. Furthermore, we contemplate the extension of these insights to complex materials and their implications for quantum technologies. As we envisage a new photonic platform merging attosecond physics with quantum information science, we embark on a journey to harness the full potential of intense laser-atom interactions.

使用言語 : 英語 (English)

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