

Seminar Title:

Collective light scattering in arrays of single dysprosium atoms

Speaker: **Dr. Giulio Biagioni**

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日時：2026年6月26日(金) 14:00–15:30

Date and Time: Friday, June 26, 2026, 14:00–15:30

場所：理学研究科北棟3階第2講義室363号室

Place: The 2nd Lecture room, Room 363 (3F), Physics Department North Building

Abstract:

While the interaction of light with a single quantum emitter is well understood, an ensemble of many emitters coupled by a resonant probe constitutes a complex open quantum system. Programmable arrays of atoms in optical tweezers are particularly appealing for studying such systems, as their geometrical ordering and flexibility enable the enhancement of collective behavior through constructive and destructive interference between emitters. I present a novel experimental apparatus that produces single dysprosium atoms trapped in one-dimensional tweezer arrays and cooled to their motional quantum ground state. For interparticle separations on the order of the transition wavelength, we observe collective light scattering, manifested as a Lamb shift of the 626 nm transition, detected in both the weak- and strong-excitation regimes. We also discuss recent experimental advances toward reaching the subwavelength regime, where many-body phenomena such as superradiance and subradiance are expected to emerge. These advances include the implementation of new optical microscopes with higher numerical aperture and an accordion lattice designed to transfer atoms from the tweezer array and compress their spacing to below 400 nm.

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