Coherence in Spontaneous Emission of a Single Atom

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When a quantum system is put into an excited state, it decays back to the ground state through the process of spontaneous emission, which is ultimately responsible for most of the light around us.

Spontaneous emission from a single emitter is a random process, rendering the phase of the emitted photon completely uncertain. This uncertainty raises the question of whether coherence exists between emissions in different spatial directions. Our experimental results confirm that such coherence does indeed exist.