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# Felicidades al nuevo graduado de doctorado del ICFO

## El Dr. Tomas Lamich se ha doctorado con una tesis titulada "A single emitter emitting resonance fluorescence into a coherent beamï¿½

February 26, 2026

Felicitamos al Dr. Tomas Lamich que ha defendido su tesis esta manana en el auditorio del ICFO.
El Dr. Lamich obtuvo su Master en Optica y Optoelectronica por la Palacky University Olomouc, en la Republica Checa, antes de unirse al grupo de investigacion de Atomic Quantum Optics dirigido por el profesor ICREA en ICFO Dr. Morgan Mitchell. Su tesis titulada "A single emitter emitting resonance fluorescence into a coherent beam" ha sido supervisada por el Prof. Dr. Morgan Mitchell y el Dr. Romain Veyron.

**RESUMEN:**
This thesis studies the statistics of light produced by a single trapped atom in free space when interfaced with two orthogonal coherent beams. The atom scatters light into the same spatial mode as a weak coherent probe beam, giving rise to controllable photon statistics. Being able to control the photon statistics of a source can be used in applications in where different photon statistics are desired.
A single emitter in free space, when left to interact with a single pumping beam can only scatter one photon at any given moment leading to anti-bunched photon statistics. However, Goncalves et al. (2021) studied the possibility of interfacing the atom with a strong pumping beam, and a weak probing beam, leading to a controllable photon statistics, where super- and sub-Poissonian statistics can be achieved by varying either the pump-probe ratio or the relative pump-probe phase. By controlling the pump-probe ratio, it is also possible to control the probe transmission through the atom.
The experimental implementation of the "GMC" scheme shows the predicted behaviour where the transmission can be suppressed to 62 %, and tuned by changing the pump-probe ratio. It also shows that the photon statistics can go from super- to sub-Poissonian by changing the relative pump-probe phase, and the photon bunching achieved is also pump-probe ratio dependent.
In addition, measurements of the atom temperature are presented in this thesis, where the

interference of the pump and probe beams on the atom lead to a direct measurements of the rms displacement of the atom within the trap, which is linked directly to the atom temperature. These measurements demonstrate a new non-destructive method of estimating the atom temperature.

**Tribunal de Tesis:**

Prof. Dr. Sile Nic Chormaic, Okinawa Institute of Science and Technology Graduate University

Prof. Dr. Darrick Edward Chang, ICFO

Prof. Dr. Igor Ferrier-Barbut, Institut d'Optique