



**PhD Position – Room Temperature Superfluorescence in Nanohybrids – FIS3 Starting Grant
Photonics and Photophysics of Nanomaterials (PHOTO²N) Group
University of Palermo, Italy**

The **PHOTO²N** (<https://photo2n.unipa.it/>) research group at the Department of Physics and Chemistry of the University of Palermo, Italy invites applications for a fully funded three-years PhD position in experimental nanophotonics, focused on the study of **superfluorescence (SF)** in innovative nanohybrid materials.

The Group

The **PHOTO²N** group investigates the fundamental optical properties of new nanomaterials using advanced spectroscopic techniques with time resolution ranging from steady-state to the femtosecond regime.

Project Overview

Superfluorescence is a cooperative quantum emission process that leads to intense, ultrafast light bursts from initially uncorrelated photoexcited emitters. Understanding the conditions that enable or suppress SF is essential for advancing photonic and quantum-enabled technologies, as well as for exploring many-body quantum effects in condensed matter systems.

The **RAPID** project (*Room Temperature Superfluorescence in Nanohybrids*) aims to identify and control the mechanisms governing SF in **nanohybrids composed of fluorescent molecules embedded within crystalline frameworks such as metal-organic frameworks (MOFs)**. The project addresses a key knowledge gap by expanding the class of material systems in which SF can be observed and reliably controlled.

Research Activities

As a PhD candidate, you will:

- **Design and study nanohybrid systems** based on MOFs and fluorescent molecules.
- Perform **optical characterization from steady-state spectroscopy to ultrafast femtosecond-resolved measurements**.
- Carry out **low-temperature photoluminescence experiments** to investigate emission dynamics and cooperative effects.
- Conduct advanced **photon-correlation and antibunching measurements** to probe the quantum nature of the emitted light.
- Analyze the influence of structural and environmental parameters on collective emission phenomena.

Candidate Profile

We are looking for a highly motivated candidate with:

- A Master's degree (or equivalent) in Physics, Materials Science, Chemistry, Nanotechnology, or related fields.
- Strong interest in nanophotonics, quantum optics, and experimental research.
- Background in optical spectroscopy and photophysics is a plus;
- Ability to work independently and collaboratively in an interdisciplinary research environment.
- Lots of enthusiasm!

Period: **November 1st 2026 – October 31st 2029**

For information and application, contact alice.sciortino02@unipa.it