

NIEDER GROUP

ULTRAFAST BIO- AND NANOPHOTONICS



Quantum Photonics

Advanced Bioimaging & Sensing

Integrated Photonics

Group Leader



Jana Nieder

Tenured Senior members of the group



Bruno Romeira



Christian Maibohm

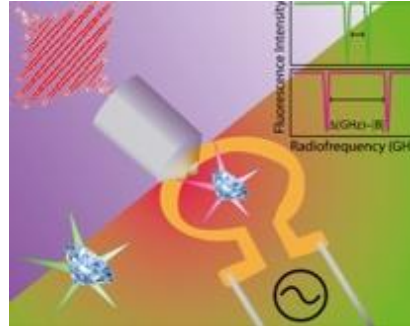


The Nieder group (Foto from April 2025)

Quantum Photonics

- Single quantum emitters in 2D materials & devices
- NV center in diamond based nanomagnetometry
- Quantum4Wire – energy transfer systems

Quantum sensing and metrology using NV centers in diamond

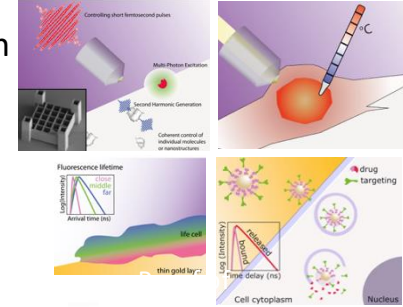


Integrated Photonics

- Semiconductor nanoLEDs, nanophotodetectors, neuromorphic devices
- Photonic sensors based on polymer PICs (e.g. Mach-Zehnder interferometers)
- 3D microfabricated polymer optical interconnects

Advanced Bioimaging and Sensing

- Near-field super-resolution
- Nanothermometry
- Applications in nanomedicine
- Nonlinear few-cycle lasers
- Adv. spectroscopy
- Streak imaging
- 3D scaffolding



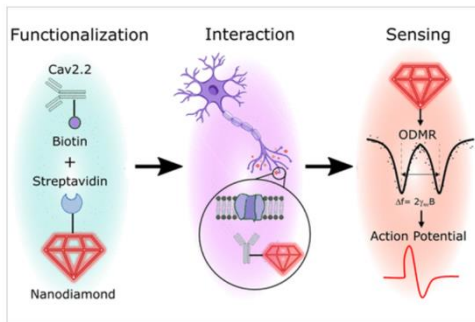
Neuromorphic photonic computing



Quantum Sensing and Metrology Highlights

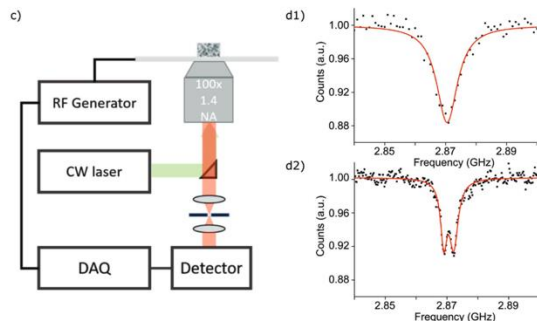
First in Portugal in quantum sensing setups and publications

Nanodiamond
functionalization and
sensing for **biological**
systems and **material**
sciences



Functionalized Nanodiamonds for
Targeted Neuronal Electromagnetic Signal
Detection, Costa, ... & J. Nieder, ACS Appl
Mater Interfaces, 16(44):60828-60841
(2024)

INL has developed the **first quantum
sensing setup** in Portugal



Magnetic Field Mapping Around
Individual Magnetic Nanoparticle
Agglomerates Using Nitrogen-Vacancy
Centers in Diamond Camarneiro ... &
J. Nieder
Particle & Particle Systems
Characterization, 38(8) (2021)

Quantum Chip Pilot Line

FPA phase approved, SGA1 submitted (tbc) 2026-2030



Diamond for Industry
REady Quantum
Technologies



ChipsAct Pilot line

On going (Nov 24-Oct 2029)



Quantum PhD Programme

On going

Quantum Portugal Initiative (QPI)

Diamond4Brain

Finalized 2020-2025



"la Caixa" Foundation



Fundação
para a Ciência
e a Tecnologia

Fundação
para a Ciência
e a Tecnologia

DIAMOND-CONNECT

Finalized 2021-2025



Fundação
para a Ciência
e a Tecnologia

QUA-ND-O

Finalized (2018-2022)

