

PRESS RELEASE

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New Standards for Quantum Sensing

NoQTeS aims to develop and standardise robust, SI-traceable Quantum Sensors based on color centers in diamond or other suitable material.

Solid-state quantum sensors (Qs) have the potential to measure several physical quantities with unprecedented spatial resolution and high sensitivity. As such, they are emerging candidates for potential applications in a plethora of fields. Nitrogen-Vacancy (NV) centres are photoluminescent point defects in diamond, which have high potential for future uptake as they are amongst the solid-state atomic-scale sensors presenting the highest Technology Readiness Level. However, standardised methods which would enable the adoption of such Qs, in particular NV centres, are still missing. The NoQTeS project aims to address this need by developing standardised techniques for the creation and characterisation of Qs based primarily on NV centres in diamond for nanoscale and high sensitivity sensing of electromagnetic fields, temperature or pressure.

For this to be possible, NV-based sensors must be produced using reference (well established) methods, which enable to control key properties such as doping, native defects concentration or position of colour centres. Additionally, standardised methods must be developed for the characterisation of NV-based sensors, and reproducible procedures for producing and testing non-NV sensors/ single photon emitters must be targeted. To obtain sensors based on colour centres in diamond with enhanced performance, current techniques and methods must be extended to include enhancement of the excitation source and of the readout.

The project activities pushes forward the achievements of the previous QADeT EMPIR project, of which NoQTeS is follow-up, by exploiting advanced techniques related to controlled ion implantation, single-photon metrology, confocal microscopy, electronic spin resonance.

The work is in synergy with the needs expressed by the standardization community, represented at European in particular by CEN/CENELEC JTC-22 “Quantum Technologies”, to promote early uptake of the project outputs and foster future uptake of novel solutions, including colour centres in other bulk or 2-D semiconductor materials (e.g. Si, SiC, hBN).

THE PROJECT

Full name	Normating colour-centre-based quantum sensing technology towards industrial application and standards
Start date	1st June 2024
Duration	3 years
Budget	1,270 M €
Project number	23NRM04
Coordinator	Dr. Paolo Traina (INRiM)
Website	https://noqtes.cmi.gov.cz/

PROJECT PARTNERS

Czechia

- Český Metrologický Institut (CMI)

Denmark

- Dansk Fundamental Metrologi A/S (DFM)
- Sparrow Quantum A/S (SQ)

Estonia

- AS Metrosert (Metrosert)

Finland

- Aalto University (Aalto)

France

- Ecole Normale Supérieure Paris-Saclay (ENS Paris Saclay)

- Thales (Thales)

Germany

- Physikalisch-Technische Bundesanstalt (PTB)

Italy

- Istituto Nazionale di Ricerca Metrologica (INRIM)
- Università degli studi di Torino (UNITO)

Portugal

- Universidade Nova de Lisboa (UNL)

United Kingdom

- Heriot-Watt University (HWU)

CONTACT

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