

November
2024

23FUN01 PhoQuS-T Project

The project 23FUN01 PhoQuS-T has received funding from the European Partnership on Metrology, co-financed from the European Union's Horizon Europe Research and Innovation Programme and by the Participating States.

What is PhoQuS-T about?

23FUN01 PhoQuS-T (Photonic and quantum sensors for practical integrated primary thermometry) is a 36-month project with a goal to develop integrated photonic and opto-mechanical quantum-based practical primary thermometry from 4 K to 500 K, validated and traceable to the best temperature standards by providing self-calibrating sensors.

Why this project?

The kelvin redefinition has prompted new approaches to temperature traceability, focusing on practical primary thermometry that offers reliable, on-demand temperature measurements without the need for recalibration.

Our ambition is to change a paradigm of the temperature traceability with a novel small-scale embedded in-situ primary temperature standard operational over the large temperature range 4 K to 500 K.

This project explores innovative photonic and quantum-based methods, which promise significant advancements in thermometry by providing self-calibrating sensors.

The advantages of these sensors are:

- it allows for in-situ traceability at point of measurement,
- it is continuously and rapidly improving photon-based technology with high potential
- a chipset technology which facilitates the direct integration of the sensor, allows for high special-resolution measurements
- a photon-based approach makes the sensor immune to electromagnetic perturbations.

Multiple users would directly benefit from such sensors in Photonics and Quantum technologies, and in industries using the embedded sensors: semiconductors, aerospace, cryogenics, hydrogen energy.

What is planned to be done?

Based on the achievements of the 17FUN05 PhotOQuanT project the 23FUN01 PhoQuS-T project will develop integrated optical practical primary thermometry from 4 K to 500 K to enable in-situ traceability in further practical applications. This will be reached through the four technical objectives:

1. Noise thermometry from 4 K to 300 K based on optomechanical sensors with quantum reference below 10 K.
2. High-resolution photonic thermometry from 80 K to 500 K based on micro and nano resonators
3. Packaging solutions of the optomechanical and photonic sensors
4. Validation, traceability and quantum applications of the developed sensors



**23FUN01 PhoQuS-T project kick-off meeting at LNE, Paris (France)
26-27 September 2024**

Who are we?

The 16 partners working together on the project are from France, Germany, Spain, Italy, Finland, Sweden, the Netherlands and the United Kingdom, each with a wide variety of expertise in their relevant field:

- the National Metrology Institutes with high expertise in the field of thermal metrology,
- Leading Research institutions with strong experience in advanced micro and nano-fabrication techniques,
- Institutions with world experts in optomechanical and photonic readout of thermal systems,
- as well as the experts on quantum sensing and quantum based metrological standards.



Events

The Kick-off Meeting of the PhoQuS-T project was hosted by LNE in Paris (France) the 26-27th September 2024, attended by representatives from all the consortium partners.

The project results will be presented at:

- "Royal Society Theo Murphy Discussion meeting: The redefined Kelvin: progress and prospects" on 24-25 February 2025 in Glasgow (Scotland, UK)
- MEASURING BY LIGHT 2025 international meeting on optical measurement techniques and industrial applications on 1-3 April 2025 in Delft (Netherlands)
- TEMPMEKO/ISHM 2025 Symposium on 20-24 October 2025 in Reims (France).

For a detailed and updated list of presentations and events, visit our web page:

www.phoqus-t.com

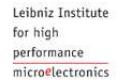


The Consortium

PhoQuS-T project is coordinated by:



Project partners:



PhoQuS-T project funding:

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EUROPEAN PARTNERSHIP



Co-funded by the European Union

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METROLOGY PARTNERSHIP



EURAMET project page: <https://www.euramet.org/project-23funo1>

