

QuantERA Call 2023 Pre-Announcement

QuantERA ERA-NET Cofund in Quantum Technologies is a consortium of Research Funding Organisations (RFOs) supporting research and innovation in Quantum Technologies (QT) in Europe.

The funding organisations of QuantERA jointly support European multilateral research projects with the potential to initiate or foster new lines of QT through collaborations exploring advanced multidisciplinary science and/or cutting-edge engineering.

At the end of January 2023 QuantERA II will launch a joint transnational Call for research proposals in Quantum Sciences and Technologies (named Call 2023).

Deadline for proposal submission: May 11th 2023

- The Call 2023 Pre-Announcement gives an overview of the QuantERA Call 2023 research themes and tentative timeline.
- Researchers are encouraged to start discussing possible projects with prospective partners. Partner Search Tool is available [here](#).

Please note that this Pre-Announcement is for information purposes only. It does not create any obligation for the QuantERA II consortium nor for any of the participating organisations.

The official QuantERA Call 2023 Announcement, to be published at the end of January 2023, shall prevail.

Call Information

French National Research Agency (ANR), France

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Call 2023 Key Facts & Figures

Topics	<p>Quantum Phenomena and Resources (QPR)</p> <p>Applied Quantum Science (AQS)</p>
International consortium	<p>The project consortia must have a minimum of 3 eligible partners requesting funding in at least 3 of the following countries:</p> <p>Austria, Belgium, Bulgaria, Czechia, Denmark, Estonia, Finland, France, Germany, Israel, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, the United Kingdom</p>
Standard consortium size	Three to six partners
Evaluation	Proposals are evaluated based on the European Commission's criteria of Excellence, Impact, and Quality and efficiency of the implementation
Duration	24 or 36 months
Eligibility for funding	Each applicant must fulfil the conditions of the Research Funding Organisation from their respective country (to be described in the Call Announcement).

Tentative Timeline

May 11th, 2023, 17:00 CET	Deadline for proposal submission
December 2023	Notification of accepted proposals
January 2024	Start date for funded projects

QuantERA Call 2023 Pre-Announcement: Participating organisations

Country	Funding organisation	Contact
Austria	FFG, Austrian Research Promotion Agency	Fabienne.Nikowitz@ffg.at
Belgium	FNRS, Fund for Scientific Research	international@frs-fnrs.be
Belgium	FWO, Research Foundation Flanders	eranet@fwo.be
Bulgaria	BNSF, Bulgarian National Science Fund	Aleksandrova@mon.bg
Czechia	MEYS, Ministry of Education, Youth and Sports	Michal.Vavra@msmt.cz
Czechia	TA CR, Technology Agency of the Czech Republic	Katerina.Volfova@tacr.cz
Denmark	IFD, Innovation Fund Denmark	Jens.Peter.Vittrup@innofond.dk
Estonia	ETAg, Estonian Research Council	Margit.Suuroja@etag.ee
Finland	AKA, Academy of Finland	Katrine.Mahlamaki@aka.fi
France	ANR, French National Research Agency	Serguei.Fedortchenko@anr.fr
Germany	DFG, German Research Foundation	Andreas.Deschner@dfg.de; Michael.Moessle@dfg.de
Germany	BMBF, German Federal Ministry of Education and Research VDITZ, German Association of Engineers	Krug@vdi.de
Israel	Inn Auth, Innovation Authority	Dan@iserd.org.il; Nitzan@iserd.org.il
Latvia	LZP, Latvian Council of Science	Jbalodis@latnet.lv; Juris.Balodis@viaa.gov.lv
Lithuania	LMT, Research Council of Lithuania	Saulius.Marcinkonis@lmt.lt
Luxembourg	FNR, Luxembourg National Research Fund	Christiane.Kaell@fnr.lu; Helena.Burg@fnr.lu
Netherlands	Quantum Delta NL	Julia.Feddersen@quantumdelta.nl
Poland	NCBR, National Centre for Research and Development	Krystyna.Maciejko@ncbr.gov.pl
Poland	NCN, National Science Centre Poland	quantera@ncn.gov.pl
Romania	UEFISCDI, Executive Agency for Higher Education, Research, Development, Innovation Funding	Nicoleta.Dumitrache@uefiscdi.ro
Slovakia	SAS, Slovak Academy of Sciences	Mnovak@up.upsav.sk; Panisova@up.upsav.sk
Slovenia	MIZS, Ministry of Education, Science and Sport	Andrej.Ograjensek@gov.si
Spain	AEI, State Research Agency	era-ict@aei.gob.es;
Sweden	VR, Swedish Research Council	Tomas.Andersson@vr.se
Switzerland	SNSF, Swiss National Science Foundation	quantera@snf.ch
United Kingdom	UKRI, United Kingdom Research and Innovation	Joseph.Westwood@epsrc.ukri.org; Chris.Jones@iuk.ukri.org



Targeted research

The submitted proposals are expected to be aligned with one of the two QuantERA Call 2023 topics:

Quantum Phenomena and Resources (QPR)

where the goal is to lay the foundations for the QT of the future. The focus is on basic quantum science and fundamental physics, and the projects should explore novel quantum phenomena, concepts, resources, protocols, algorithms, and/or address major challenges that prevent broad applications of some quantum technologies;

Applied Quantum Science (AQS)

where the goal is to take known quantum effects and established concepts from quantum science, translate them into technological applications and develop new products. These could be novel devices that are based on known quantum effects and that will serve a novel application in QT, or devices and systems that translate known quantum applications into products and industrial applications.

Key principles

Applicants are strongly encouraged to contact their respective Research Funding Organisations (RFOs) to check their eligibility. Each funding organisation participating in the Call decides to allocate its budget to the QPR topic, or the AQS topic, or both. This information will be shown in the Call Announcement.

- Through this Call, the RFOs of the QuantERA II consortium support the Quantum Technologies Flagship agenda¹. By launching joint calls for proposals for research projects, RFOs can support diverse research communities, able to tackle the most challenging and novel research directions.
- Projects funded in QuantERA II should contribute to the development of the European research and innovation in QT. The transformative research funded within the QuantERA II should explore collaborative advanced interdisciplinary science and/or cutting-edge engineering with the potential to initiate or foster new lines of QT and help Europe grasp leadership early on in promising future technology areas.
- To promote equal opportunity and gender balance, QuantERA II encourages the participation of consortia with a fair representation of female researchers both as PIs and in the research team.
- To spread research excellence throughout Europe, QuantERA II projects are encouraged to include partners from the widening countries participating in the Call: Bulgaria, Czechia, Estonia, Latvia, Lithuania, Luxembourg, Poland, Romania, Slovakia, Slovenia.
- To build leading innovation capacity across Europe and connect with industry (in particular for the AQS topic), QuantERA II projects are encouraged to involve key actors that can make a difference in the future, for example excellent young researchers (in both topics), ambitious high-tech SMEs (in particular in the AQS topic), etc.

¹ See Strategic Agenda at <https://qt.eu/>

Targeted outcomes

Funded projects in both topics are expected to address one or more of the following areas:

1. Quantum communication

Methods/tools/materials/strategies to deal with the issues of distance, reliability, efficiency, robustness and security in quantum communication; novel protocols for multipartite quantum communication and quantum cryptography; quantum memory and quantum repeater concepts.

Novel photonic sources for quantum information and quantum communication, coherent transduction of quantum states between different physical systems; integrated quantum photonics; quantum communication embedded in optical telecommunications systems; other communication protocols with functionality enhanced by quantum effects. Methods for quantum communications in space, between satellites and Earth.

2. Quantum simulation

Platforms and materials for quantum simulation; development of new measurement and control techniques and of strategies for the verification of quantum simulations.

Application of quantum simulations to condensed matter, chemistry, thermodynamics, biology, high-energy physics, quantum field theories, quantum gravity, cosmology and other fields.

3. Quantum computation

Development of noisy intermediate-scale quantum platforms; devices to realise multiqubit algorithms; demonstration and optimisation of error correction codes; progress towards fault-tolerance; interfaces between quantum computers and communication systems.

Development of novel quantum algorithms and software stacks; demonstration of quantum speed-up; new architectures and programming paradigms for quantum computation, including hybrid approaches.

4. Quantum information sciences

Novel sources of non-classical states and methods to engineer such states. Development of device-independent quantum information processing. Methods for the reconstruction and estimation of complex quantum states or channels and certification of their properties. Development of resource theory for quantum information. Study of topological systems for quantum information purposes. Understanding and control of open quantum systems; development of methods to confine dynamics in controllable decoherence-free subspaces. Study of thermodynamic processes at the quantum scale. Novel ideas and applications in quantum science and technologies, based on e.g. superposition, interference, and entanglement, as means to achieve new or radically enhanced functionalities.

5. Quantum metrology sensing and imaging

Use of quantum properties for time and frequency standards (including precise frequency distribution), light-based calibration and measurement, gravimetry, magnetometry, accelerometry, and other applications. Development of detection schemes that are optimised with respect to extracting relevant information from physical systems; novel solutions for quantum imaging and ranging. Implementation of micro- and nano- quantum sensors, for instance for quantum limited sensitivity in the measurement of magnetic fields at the nanoscale. Extension of the reach of quantum sensing and metrology to other fields of science including e.g. the prospects of offering new medical diagnostic tools.

Expected impacts

Funded projects are expected to significantly advance the state-of-the-art of quantum sciences and technologies² by achieving one or more of the following targets:

- Develop a deeper fundamental and practical understanding of systems and protocols/algorithms for manipulating and exploiting quantum information;
- Enhance the robustness and scalability of quantum information technologies in the presence of environmental decoherence, hence facilitating their real-world deployment;
- Develop reliable technologies for the different components of quantum architectures;
- Identify new opportunities and applications fostered through quantum technologies, and the possible ways to transfer these technologies from laboratories to industries;
- Enhance interdisciplinarity in crossing traditional boundaries between disciplines in order to enlarge the community involved in tackling these new challenges;
- Move towards a gender diverse and inclusive quantum community, in particular targeting PhD students and early-career researchers;
- Spread excellence throughout Europe by involving partners from the widening countries;
- Build leading innovation capacity across Europe by involvement of key actors that can make a difference in the future, for example excellent young researchers, ambitious high-tech SMEs or first-time participants.

Partner Search Tool

In order to facilitate the process of forming research consortia, we offer applicants a Partner Search Tool available here: <https://ncn.gov.pl/partners/quantera/>. This tool can be used by projects looking for partners and partners looking for projects.

Contact

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² QuantERA projects shall not duplicate research funded as part of the projects of the Call 2017, Call 2019, and Call 2021, and the projects of the EC Quantum Technologies Flagship call (see the lists of the projects [here](#), [here](#), [here and here](#))