

## QuantERA Cofund Call 2021 Pre-Announcement

**QuantERA II ERA-NET Cofund** in Quantum Technologies is a consortium of Research Funding Organisations (RFOs) supporting research in Quantum Technologies (QT) in Europe. QuantERA II is supported by the European Union's Future and Emerging Technologies programme (FET).

The funding organisations of QuantERA II 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.

**QuantERA II will launch in March 2021 a joint transnational call for research proposals in Quantum Information and Communication Sciences and Technologies (named Call 2021).**

**Anticipated deadline for pre-proposals: 13<sup>th</sup> of May 2021**

The present *Call 2021 Pre-announcement* gives an overview of the QuantERA Cofund Call 2021 research themes and tentative timeline.

Researchers are encouraged to start discussing possible projects with prospective partners. Partner Search Tool is available and networking on-line event is planned before the opening of the call.

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 research funding organisations. The official *QuantERA Cofund Call 2021 Announcement*, to be published in March 2021, shall prevail.

### Call Information

**French National Research Agency (ANR), France**

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## Call 2021 Key Facts & Figures

Scope: **Quantum Phenomena and Resources**  
**Applied Quantum Science**

Maximum call budget: **€40 M**

International consortium: **The project consortia must have a minimum of 3 eligible partners requesting funding in at least 3 of the following countries:**  
**Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey.**

Standard consortium size: **Three to six partners**

Evaluation: **Pre- and full proposals are evaluated based on the EC FET criteria of Excellence, Impact, and Quality and efficiency of the implementation**

National/Regional RFOs eligibility for funding: **Each partner must fulfil the conditions of the national/regional research funding organisation (to be described in the Call Announcement annex).**

## Tentative Timeline

**13<sup>th</sup> May 2021, 17:00 CET** **Deadline for pre-proposal submission**

July 2021 Notification of accepted pre-proposals

**15<sup>th</sup> September 2021, 17:00 CET** **Deadline for full proposal submission**

December 2021 Notification of accepted proposals

Early 2022 Start date for funded projects

## Participating Countries

Nb	Country	Institution	Contact Person
1	Austria	FFG	Fabienne.Nikowitz@ffg.at
2	Austria	FWF	Stefan.Uttenthaler@fwf.ac.at
3	Belgium	FNRS	Florence.Quist@frs-fnrs.be; Joel.Groeneveld@frs-fnrs.be
4	Belgium	FWO	eragnet@fwo.be
5	Bulgaria	BNSF	Aleksandrova@mon.bg
6	Croatia	HRZZ	Jasminka@hrzz.hr
7	Czech Republic	MEYS	Michal.Vavra@msmt.cz
8	Czech Republic	TA CR	Baya.Barbora.Nunez@tacr.cz; Iveta.Zaparkova@tacr.cz; eliska.sibrova@tacr.cz
9	Denmark	IFD	Jens.Peter.Vittrup@innofond.dk
10	Estonia	ETAg	Margit.Suuroja@etag.ee; Maarja.Soonberg@etag.ee
11	Finland	AKA	Jukka.Tanskanen@aka.fi
12	France	ANR	Serguei.Fedortchenko@anr.fr
13	Germany	DFG	Andreas.Deschner@dfg.de; Michael.Moessle@dfg.de
14	Germany	BMBF, VDITZ	Krug@vdi.de
15	Hungary	NKFIH	Edina.Nemeth@ist.hu
16	Ireland	SFI	EU-Cofund@sfi.ie; Maria.Nash@sfi.ie
17	Israel	Inn Auth	Dan@iserd.org.il; Tzlil.Ribak@iserd.org.il
18	Italy	CNR	info.quantera@cnr.it; Chiara.Mustarelli@cnr.it
19	Italy	MUR	Giorgio.Carpino@miur.it; Aldo.Covello@miur.it
20	Italy	INFN	Alessia.Dorazio@bo.infn.it
21	Latvia	VIAA	Jbalodis@latnet.lv; Juris.Balodis@viaa.gov.lv
22	Lithuania	RCL	Saulius.Marcinkonis@lmt.lt
23	Luxembourg	FNR	Christiane.Kaell@fnr.lu; Helena.Burg@fnr.lu
24	Malta	MFIN	Diane.m.Muscat@gov.mt; John.f.Grima@gov.mt
25	Norway	RCN	Psma@forskningsradet.no
26	Poland	NCBR	Krystyna.Maciejko@ncbr.gov.pl
27	Poland	NCN	quantera@ncn.gov.pl
28	Portugal	FCT	Germana.Santos@fct.pt
29	Romania	UEFISCDI	Nicoleta.Dumitrache@uefiscdi.ro
30	Slovakia	SAS	Mnovak@up.upsav.sk; Panisova@up.upsav.sk
31	Slovenia	MIZS	Andrej.Ograjensek@gov.si
32	Spain	AEI	era-ict@aei.gob.es
33	Sweden	VR	Tomas.Andersson@vr.se
34	Switzerland	SNSF	quantera@snf.ch
35	Turkey	TUBITAK	Serkan.Ucer@tubitak.gov.tr

## Research Targeted in the Call

The submitted proposals are expected to be aligned with one of the two QuantERA 2021 cofunded call 2021 (hereinafter referred to as the “call”) 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, 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 that translate known quantum applications into products and industrial applications.

Applicants are strongly encouraged to contact their respective 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 Research Funding Organisations (RFOs) of the QuantERA II consortium support the Quantum Technologies Flagship agenda<sup>1</sup>. 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 Quantum Technologies (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 projects are encouraged to include partners from the widening countries participating in the call: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia, Slovenia and Turkey.

To build leading innovation capacity across Europe and connect with industry (in particular for the AQS topic), QuantERA 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.

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<sup>1</sup> See Strategic Research Agenda of the European Quantum Technology community at [www.qt.eu](http://www.qt.eu)

## Target 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; 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 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, 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 technologies<sup>2</sup> by achieving one or more of the following targets:

- Develop a deeper fundamental and practical understanding of systems and protocols 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;
- Create a diverse and inclusive quantum community;
- 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

### **Call Secretariat Leader:**

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### **Coordinator:**

#### **National Science Centre (NCN Poland)**

Programme Office

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