Swiss National Science Foundation

Quantum transitional call

Call for proposals 2022

This transitional measure intends to support Swiss quantum researchers and research entities who have not been eligible for participation in the Horizon-CL4-2021-DIGITAL-EMERGING-02[1] call "Digital and emerging technologies for competitiveness and fit for the green deal", as described in the Horizon Europe Work Programme 2021-2022 - Digital, Industry and Space[1]. The present call is targeted to Swiss quantum researchers[2,3] who are affected by the exclusion from participation in the above mentioned call's quantum-related topics. A total budget of CHF 24 Mio[4] can be distributed by the State Secretariat for Education, Research and Innovation (SERI) which has mandated the Swiss National Science Foundation (SNSF) to launch the call and to perform the evaluation of proposals in response to the call.

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1. Purpose and scope

[1] In line with the rules of the Swiss National Science Foundation (SNSF), the Swiss Confederation, represented by SERI, provides funding to enable qualified researchers who perform research with self-chosen goals independently and under their own responsibility on the following topics:

I. Quantum software ecosystem for quantum computing platforms
II. Developing quantum computers
III. Developing quantum simulation platform technologies
IV. Quantum communication
V. Quantum sensing technologies based on effects such as entanglement and superposition

Applications in Quantum Materials are welcome if they are key to one of the technologies listed in the topics I-V.

Further information on the scope of the listed topics can be found in the appendix (chapter 9) of this call.

[2] The Quantum transitional call is aimed at Swiss researchers[2] who are affected by the exclusion from the HORIZON-CL4-2021-DIGITAL- EMERGING-02 call[1], namely:

a. Swiss participants in projects of the Quantum Technologies Flagship[5] ramp-up under Horizon 2020 and researchers who aimed at being part of the Quantum Technologies Flagship consortium under Horizon Europe. For Swiss participants who are currently funded by ongoing Quantum Technologies Flagship projects, funding can only be requested for the time after the EU funding has stopped.
b. Swiss researchers[2,3] who had intended to submit a proposal in response to the restricted topics of the HORIZON-CL4-2021-DIGITAL- EMERGING-02 call[1].

[1] https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2021-2022/wp-7-digital-industry-and-space_horizon-2021-2022_en.pdf, pages pp. 253-270, 452-465
[2] Researchers affiliated at a higher education research center in Switzerland (according to RIPA article 4, letter c)
[3] https://www.fedlex.admin.ch/eli/cc/2013/786/en
[4] Including 15% Overhead. The available funds to be allocated to applicants in the scope of the Quantum transition call is therefore CHF 20.5 mio. Please note that this deviates from the usual SERI rates for HEU direct funding.
[5] https://digital-strategy.ec.europa.eu/en/policies/quantum-technologies-flagship

[3] Applicants can apply for coverage of research costs and staff salaries as well as for the funding of scientific cooperation, networking and communication; however, they may not apply for their own salaries.

2. Duration of funding, minimum grants

[1] The grants are awarded for a maximum of four years.

[2] The minimum duration of projects is 12 months. The SNSF does not consider applications for shorter periods of research.

[3] The minimum amount that may be requested in research applications is CHF 50,000. The SNSF does not consider applications for lower amounts.

3. Personal and formal requirements for the submission of proposals

3.1. Personal requirements, general

[1] Natural persons are eligible to submit applications if they meet the general eligibility requirements for the submission of applications pursuant to Article 10 of the Funding Regulations of the SNSF[6]. The requirements set out in Article 13 of the Funding Regulations of the SNSF[6] with regard to the proposed research must also be met.

[2] Applicants with a doctorate must have obtained the latter four years before the submission date of the application. Applicants without a doctorate must generally have completed three years of research work as their main source of income since obtaining their higher education degree. Such research work will be regarded as equivalent to a doctorate.

[3] Researchers who assume an independent research post less than four years after obtaining the doctorate may submit Quantum transitional call grant applications as soon as they assume the said position.

[4] Applicants must be in a position to carry out research projects under their own responsibility and to lead project staff both scientifically and as personnel.

[5] Applicants must make a substantial contribution to the proposed research and their work must not be directed by instructions from third parties.

[6] In addition, the provisions of Chapter 3.2 and 3.3 of this call must be met.

3.2. Other personal requirements

[1] Applicants must be able to show that

a. they are conducting their research activities along with any scientific teaching activities to an extent equivalent to at least 50% FTE. Researchers devoting less than 50% of their time to scientific activities are eligible if their scientific research and teaching activities are usually carried out in the context of another professional activity;
b. they are employed at least for the duration of the project at a research institution eligible for research funding from the SNSF or have been given assurance of such employment in writing;
c. the necessary research infrastructure is at their disposal.

[6] https://www.snf.ch/SiteCollectionDocuments/allg_reglement_16_e.pdf

[2] If the proposed project is not to be conducted in the context of a position, applicants must show that they are independently conducting scientific research in Switzerland as their main source of income. The SNSF may demand further information on the research conditions.

3.3. Two or more applicants and project partners

[1] Applications for Quantum transitional grants are generally submitted by individuals (applicants).

[2] Two or more applicants are eligible if they are needed to achieve the aims set for the planned project. In the case of two or more applicants, one person must be designated as the applicant engaging in correspondence with the SNSF and SERI. This corresponding applicant is carrying out scientific research in Switzerland (according to Article 10 of the Funding Regulations of the SNSF[6]).

[3] If there are two or more applicants, then one of them may be based in a European country eligible for Quantum Technologies Flagship[5] funding if their expertise is essential for the project and does not exist in Switzerland.

[4] Each applicant must meet the eligibility requirements for the submission of applications pursuant to this call document as well as the Funding Regulations of the SNSF[6], and each is personally responsible for the project.

[5] Project partners are researchers who contribute to a research project through cooperation without being responsible for the project. They must be designated as such in the application. Within the scope of their contributions such as analyses etc., project partners benefit from the grant. However, they do not count as (remunerated) employees of the project and are not among those responsible for the project as a whole. They may not refer to the support received from the Swiss Confederation as a grant they have acquired themselves.

[6] The relationship between the applicants and, after approval of the grant, between the grantees is governed by the Funding Regulations of the SNSF[6].

3.4. Formal requirements

[1] Quantum transitional call applications must be submitted electronically to the SNSF.

[2] The submission date is 2 November 2022.

[3] In all other respects, any further formal requirements for the submission of applications apply, in particular the Funding Regulations of the SNSF[6] and its Implementation Regulations[7].

4. Applications and eligible costs

4.1. Applications

[1] Quantum transitional call grant applications must be submitted in accordance with the requirements issued by the SNSF for such grants and must contain all the necessary data and documents.

[2] The applicants must describe the proposed research project in the research plan.

[3] Proposals that are evaluated in the Quantum transitional call may not be submitted in parallel to any other SNSF funding instrument.

[7] https://www.snf.ch/media/en/B0SWnPsrDCRTaiCx/snsf-general-implementation-regulations-for-the-funding-regulations-e.pdf

4.2. Eligible research costs

[1] Quantum transitional call grants may be used to cover the following costs:

a. the salaries of scientific and technical staff in research projects within the scope of the salary ranges and rates prescribed by the SNSF;

b. material costs that are directly related to the research work, namely material of enduring value, expendable items, field expenses, travel expenses, third-party charges, cost of computing time and data as well as of providing open access to research data;

c. direct costs incurring through the use of research infrastructure linked to the research work;

d. costs for the organisation of conferences and workshops in connection with the funded research;

e. costs for national and international cooperation and networking activities carried out in connection with the funded research.

[2] Researchers from institutions that are not employees of research centres (according to RIPA[3] article 4 letter c) or companies may not be applicants on a Quantum transitional call grant application. They can contribute as project partners (as specified in chapter 3.3.5) or subcontractors (as specified in Article 2.10 of the Implementation Regulations[7]). The cost of services provided by project partners and subcontractors cannot exceed a maximum of 40% of the grant.

[3] The required funding must be applied for in the proposal. A justification for the requested funding is required.

5. Evaluation process, assessment criteria and grants

5.1. Consideration of proposals

[1] Only proposals that meet the formal and personal requirements according to chapter 3 above are considered by the SNSF and evaluated by the Quantum transitional call evaluation panel.

[2] Proposals are not considered if their objectives manifestly do not match the purpose and scope of the Quantum transitional call as explained in chapter 1 of this document, if the proposals manifestly do not fulfil one of the evaluation criteria listed in chapter 5.2, or if they only request ineligible costs.

5.2. Evaluation

[1] The Quantum transitional call grant proposals are evaluated by a panel of experts (Quantum transitional call grant Evaluation Panel).

[2] The Quantum transitional call grant proposals are internationally peer-reviewed.

[3] The relevant criteria of the scientific evaluation for the award of Quantum transitional grants are:

a) Excellence:
   (i) Clarity and pertinence of the project's objectives, and the extent to which the proposed work is ambitious and goes beyond the state of the art;
   (ii) Soundness of the proposed methodology, including the underlying concepts, models, assumptions, interdisciplinary approaches.

b) Feasibility:
   (i) Credibility of the pathways to achieve the expected outcomes and impacts specified in the call, and the likely scale and significance of the contributions from the project.

c) Implementation
   (i) Suitability and quality of the measures to maximise expected outcomes and impacts (and where appropriate dissemination and communication activities).
   (ii) Quality and effectiveness of the work plan, assessment of risks, and appropriateness of the effort assigned to work packages, and the resources overall.
   (iii) Capacity and role of each participant, and, if appropriate, the extent to which the consortium as a whole brings together the necessary expertise.

d) Specific call criteria:
   In case of overlap of the evaluated Quantum transitional call grant proposal with past or ongoing Horizon Europe Quantum Technologies Flagship grants, the following criteria also apply:

   (i) Appropriateness for supporting and safeguarding Swiss quantum international excellence,
   (ii) links to previous Quantum Technology Flagship projects, complementarity & compatibility with ongoing Quantum Technology Flagship work and potential for future collaboration in Quantum Technology Flagship projects.
   (iii) appropriateness for maintaining the Swiss participants' capability to be (re)integrated in the Quantum Technology Flagship

5.3. Evaluation process

The evaluation is performed during a meeting of the Quantum transitional call evaluation panel after the proposal submission, with each proposal being assigned to two referees at least.

5.4. Decisions

[1] The Quantum transitional call Steering Committee (see below) recommends on the financing or rejection of the Quantum transitional call proposals. These decisions are based on the evaluation results of the Quantum transitional call Evaluation Panel.

[2] The Presiding Board of the SNSF endorses the recommendation of Quantum transitional call Steering Committee.

[3] The SNSF will transfer the recommendations to the SERI who takes the final funding decisions and concludes funding contracts with the corresponding applicants of the successful projects.

[4] The SNSF will communicate the rejection reasons for the rejected proposals to the SERI who will forward them to the corresponding applicant of the respective proposal in the form of a ruling. Such rulings may be appealed against before the Federal Administrative Court.

6. Conduct of the approved projects

[1] Successful Quantum transitional grants may start at the earliest on 1 April 2023 and no later than 1 December 2023.

[2] Quantum transitional call grants are awarded and managed according to the applicable rules of the SNSF, in particular according to the Funding Regulations of the SNSF[6] and its Implementation Regulations[7].

[3] Holders of Quantum transitional call grants are obliged to submit to the SNSF reports in accordance with the requirements stipulated by the SNSF.

[4] In particular, output data must be provided 18 months after the start of the project at the latest and a final report upon conclusion of a project.

7. Organisational provisions

7.1. Quantum transitional call Steering Committee

[1] The Quantum transitional call Steering Committee oversees the evaluation of the Quantum transitional call proposals. It selects the Quantum transitional call Evaluation Panel members and makes a proposal to the Presiding Board on which proposals will be funded, based on the result of the evaluation procedure described in chapter 5.

[2] The Quantum transitional call Steering Committee consists of national and/or international experts, The number of members of the Quantum transitional call Steering Committee is between 3 and 10.

[3] The Quantum transitional call Steering Committee members are selected by the Presiding Board of the SNSF Research Council. Members of the Quantum transitional call Steering Committee are not eligible to submit applications.

[4] The members of the Quantum transitional call Steering Committee are remunerated in accordance with the usual SNSF rates.

[5] The Quantum transitional call Steering Committee can nominate ad-hoc replacements if members of the Quantum transitional call Evaluation Panel are unable to attend the evaluation meeting.

7.2. Quantum transitional call Evaluation Panel

[1] The Quantum transitional call Evaluation Panel consists of national or international experts from the disciplines concerned. The number of members of the Quantum transitional call Evaluation Panel is between 5 and 20.

[2] The Quantum transitional call Evaluation Panel members are selected by the Quantum transitional call Steering Committee. Members of the Quantum transitional call Evaluation Panel are not eligible to submit applications.

[3] The members of the Quantum transitional call Evaluation Panel are remunerated in accordance with the usual SNSF rates.

[4] The Quantum transitional call Evaluation Panel evaluates following the SNSF Unified Evaluation procedure. A majority of the members of the panel constitutes a quorum.

8. Applicable law

[5] Unless these Regulations provide otherwise, the regulations of the SNSF, namely the Funding Regulations of the SNSF[6] and its Implementation Regulations[7] apply.

9. Appendix: Glossary

Quantum Communication has already achieved commercial success for first generation quantum random number generators (QRNGs) and quantum key distribution (QKD) systems, all based on photons. However, next-generation systems are looking to further advance these in terms of rates, robust ness, and eventually, potentially cheaper solutions. Nonetheless, point-to-point quantum communication becomes too slow and impractical at distances larger than a few hundred kilometres. The main problem lies in the exponential photon loss with distance in the optical fibres. The scaling with length is radically changed with an alternative approach, the quantum repeater, in which the photons are interfaced with stationary atoms or ions. An essential requirement is a reversible photon-matter interface, capable of preserving quantum coherence and entanglement at large scales, both in distance and in numbers.

Quantum Computation will transform our ability to solve problems in quantum physics, materials design and chemistry. Building a quantum computer is a massive, long-term challenge. A realistic goal is to put the foundation stones in place. These involve the design of scalable architectures, the development of the individual elements (physical qubits), and the realization and exploitation of few and many qubit devices, for example, using available technology based on trapped ions, spins in semiconductors or superconducting circuits.

The main goal of **Quantum Simulation** is to attain a deeper understanding of quantum many-body systems by creating model Hamiltonians and Liouvillians in highly controlled experimental conditions. This approach not only affords a direct comparison of the physics on different experimental or theoretical platforms, but also provides a unique route to venture into new unexplored regimes of many-body physics.

At their core, **Quantum Sensors** include a quantum system characterized by discrete energy levels, which can readily be initialized into a well-known state and subsequently read out. To act as a sensor, the system must interact with the physical quantity to be measured. The system's quantum coherence or – in some cases – its degree of quantum entanglement is exploited in a measurement of the ex- ternal quantity's effect on the system. In principle, such processes are then limited only by fundamental quantum-mechanical constraints, which necessarily set the ultimate limit for a given measurement. The physical implementation of these sensors involves a range of both atomic, molecular, and condensed matter systems, including for example cold atoms, trapped ions, single spins in the solid-state, nano- and micromechanical oscillators, and quantum states of light.