VINNOVA
Sveriges innovationsmyndighet

CALL FOR PROPOSALS

Datum
05-04-2019
Reviderad

Diarienummer
2019-01288

Increasing capacity and skills of PhD students regarding industrially relevant neutron and synchrotron-based analytical methods – 2019

A call for proposals within the program "**Research infrastructure - utilisation and collaboration"-** for increased competence and industrial utilisation of large-scale infrastructure such as MAX IV and ESS.

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Revision history

Date	Change

If there are any uncertainties, please refer to the Swedish text.

1 Summary

With this call for proposals, we want to give the opportunity for PhD students, employed either in academia or at research institutes or companies, to gain more knowledge about neutron and synchrotron-based techniques and how these can be used in industry-relevant applications. The funding offer is directed towards PhD students without prior knowledge to learn more about these advanced analysis techniques and experimental environments.

The project shall build on and complement an already ongoing PhD-project. It shall also be based on an industry-relevant application. The industrial relevance of the project shall be verified by a Letter of Support from a Swedish company[1] (which does not need to be a project participant).

The project shall be planned and implemented in close collaboration with experts in the neutron or synchrotron technology addressed. Expertise may, but does not have to be, employed by a project participant. Costs for expertise are eligible costs.

The project description shall include the implementation of an experiment at MAX IV or at any international large-scale research infrastructure for neutron or synchrotron-based techniques. To be able to perform experiments in these advanced experimental environments, access to beam time (also called experimental time) must have been granted. Beam time does not need to be formally approved when the proposal is submitted to Vinnova. The proposal shall however include a description of the proposed experiment, where it is planned to be implemented and how beam time intends to be accessed.

One of the PhD student's supervisors should be the project manager. The organisation(s) that employ the PhD student and the supervisor should be project participant(s). There is no requirement for additional project participants, but collaboration and knowledge transfer between different organisations is encouraged.

The maximum project period length is 12 months.
Each project proposal can apply for a maximum grant of SEK 300.000.

Up to SEK 10 million is available for the call.

[1] In this context, the term "company" does not include research institutes or companies that do not own the development needs that the project intends to meet.

Important dates:

The proposal must be submitted to Vinnova by: **20 August 2019, at 14.00**

Decision date: 10 October 2019
Earliest start date: 10 October
Latest start date: 31 October 2019

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Link to the Call for proposals website:
https://www.vinnova.se/en/e/research-infrastructure-utilisation-and-collaboration/competence-building/

2 What we want to accomplish with the call

World-leading research increasingly requires access to advanced research infrastructures. In addition to contributing to excellent basic research, these infrastructures also enable cutting-edge applied research and innovative development work in industrial and public sectors. MAX IV in Lund is Sweden's largest research infrastructure and one of the world's brightest source for synchrotron radiation. In close proximity, the European Spallation Source (ESS) is being built to become the world's strongest neutron source. This will give unique development opportunities within a wide range of research areas, such as life sciences and materials science.

Through the "Research infrastructure – utilisation and collaboration" program, Vinnova wants to strengthen the Swedish innovation system by contributing to building skills and increasing the understanding of how the use of advanced research infrastructures such as MAX IV and ESS can answer to industrial and societal needs. The goal of this call for proposals is to increase the number of researchers with a doctoral degree who have knowledge of neutron and synchrotron-based techniques - and how these can be used in industrial research. Beyond obtaining an increased skills base, another expected outcome is that the formation of new networks within and between universities, institutes and companies will contribute to an increased capacity to utilise these techniques.

Within this call for proposals we will fund experiments performed at MAX IV as well as at any international large-scale research infrastructure for neutron or synchrotron-based techniques outside Sweden. In all, the techniques allow for an extensive portfolio of advanced experiments based on e.g. diffraction, spectroscopy and various forms of imaging in 2D and 3D (see Appendix).

Additional calls of this kind are planned by Vinnova, but the content will be developed gradually based on experience and outcomes from previous call for proposals.

Vinnova is tasked with promoting sustainable growth by increasing the innovation capacity. Through our funding, we strengthen the capacity to reach the goals for sustainable development in Agenda 2030[2]. Gender equality is a prerequisite for sustainable growth, why this permeates the work with all sustainability goals [3].

[2] Read more (in Swedish only): https://www.vinnova.se/m/agenda-2030/
[3] Read more about what our work for equality innovation means for you who apply for grants from us (in Swedish only: https://www.vinnova.se/m/jamstalld-innovation/

3 To whom is this call for proposals directed?

This call for proposals is directed toward PhD students who are employed either in academia, at a research institute, a company or another legal entity.

We want to give the opportunity for PhD students to build new networks and gain more knowledge about using neutron and synchrotron-based techniques - and how these can be used for industry-relevant applications. **This means that we do not intend to fund projects to further strengthen a PhD student or supervisor who already has the capacity to make use of these advanced analytical techniques and experimental environments.**

One of the doctoral student's supervisors should be the project manager. The organisations that employ the PhD student and the supervisor must be project participants.

There is no requirement for additional project participants, but the project must be planned and implemented in close collaboration with expertise in the addressed neutron or synchrotron technique. **We believe that a realistic project plan contains a relatively extensive commitment of expert support**. Expertise can be obtained from all types of organisations. If there is not already a well-established collaboration between the PhD student/supervisor and the expert(s), it is allowed that the expert(s) is employed at another faculty/workplace/research group within the same organisation as the PhD student/supervisor. However, collaboration between different organisations is encouraged.

The project should be based on an industry-relevant application. This must be verified by a Letter of Support from a Swedish company [4]. We believe that it is likely that the PhD-student already has contact with a company within the framework of the doctoral project, but the collaboration can also be initiated in connection with the project proposal.

Funding is only granted to Swedish organisations. Swedish organisations include foreign organisations that have a branch or establishment in Sweden. The costs in the project must be attributable to the activities of the Swedish branch or establishment. A non-Swedish organisation may be a project participant if it finances its own costs.

This call for proposals also allows eligible costs of expertise employed at an international research infrastructure for neutron and synchrotron-based technologies as consulting costs (“konsultkostnad”) of a project participant.

[4] In this context, the term "company" does not include research institutes or companies that do not own the development needs that the project intends to meet.

4 What do we fund?

4.1 What project activities do we fund?

The project shall complement an already ongoing PhD-project with the aim to build competence regarding how experimental environments such as MAX IV and ESS can be utilised in Swedish industry.

In addition to the implementation of experiments at the research infrastructure and analysing the measurement data, the following types of activities also constitute eligible costs:

- Planning and design of experiments, including adaptation of a relevant experimental environment.
- Sample preparation and sample characterization directly linked to the neutron/synchrotron experiment to be performed.
- Comparisons with already existing results from more established analytical techniques or modelling.
- Knowledge transfer between organisations and planning for how the results can be developed after the project.

The project description shall include the implementation of an experiment at a large-scale research infrastructure for neutron or synchrotron-based techniques. The project proposal should therefore describe a relevant and realistic choice of technique, as well as how beam time/experimental time is believed to be obtainable, with the help of expertise, at a specific experimental station within the project time. Please note that paid beam time/experiment time is **not** an eligible cost in this Call for proposals.

Beamtime does not need to be formally approved or fixed in time when the proposal is submitted to Vinnova. However, the following apply:

- Project consortia intending to seek experimental access through open calls (”peer review”) should describe where (and how) this should be performed, as well as how access will be ensured to the largest possible extent.
- If free experimental access already has been granted before the proposal is submitted, that confirmation can be attached to the proposal. Note, however, that no project activities may be started before the project's start date.
- Project consortia who intend to carry out experiments in direct collaboration with staff at the research infrastructure should enclose a letter of support confirming this.

There is no requirement for additional funding of the project (co-funding / in-kind). **However, we believe that a realistic project plan also needs to include activities that are covered by the PhD student's existing funding**.

4.2 Eligible costs

Vinnova's funding is through grants and is subject to certain regulations. These regulations control, among other things, the types of costs of the project partners that may be covered by grants. Eligible costs are described in the "Vinnova's general terms and conditions for grants"[5] and are described in more detail in the "Vinnova Guide to Terms and conditions for eligible costs"[6].

Eligible costs for expertise in neutron or synchrotron-based techniques that are not employed by a project participant may be included as a consultancy cost (Swedish: Konsultkostnad). Please note that the expertise may only be used as subcontractors **to the extent specified in the project description.**

Travel and accommodation in connection with the experiment are eligible costs for the PhD student, the supervisor and the expert, respectively. Travel and accommodation shall be reasonable and appropriate.

Also observe that paid beam time/experimental time is **not** an eligible cost in this Call for proposals.

5 What size grant do we fund?

Each project proposal can apply for a maximum grant of SEK 300.000 for a project period of maximum twelve (12) months.

There is no overall requirement for additional funding of the project (co-funding/in-kind) from any project participant.

[5] Current terms and conditions can be found on our website, along with help to understand and meet the terms: https://www.vinnova.se/en/apply-for-funding/rules-for-our-funding/terms-and-conditions-for-our-funding/ (note that there are different documents depending on the number of project partners).
[6] See Sections 4.1 – 4.5 of the https://www.vinnova.se/globalassets/dokument/guide-till-vinnovas-villkor-om-stodberattigande-kostnader.pdf (in Swedish only).

Grants to organisations carrying out economic activities are, however, subject to state aid rules. **If the PhD student or any other key person is employed by a company, the following applies:**

The amount that a company applies for in grants can only represent a certain share of its total eligible cost. For this call, companies can apply for the following share from Vinnova, depending on the size of the company[7]:

Large: 50 percent
Medium: 60 percent
Small: 70 percent

The remaining costs must be financed by the company itself.

6 Conditions for us to assess the proposal

Vinnova will only assess proposals that meet the following formal requirements:

- All project participants (Swedish: Projektpart) are legal entities.
- The participants applying for grants are either registered in Sweden or have a branch or establishment in Sweden[8].
- Organisation(s) that employs the PhD student and the supervisor are project participant(s).
- The Project manager (Swedish: Projektledare) is a supervisor of the PhD student in the ongoing PhD project.
- A PhD student may not participate in more than one project proposal in this call from Vinnova.
- The proposal follows the instructions in section 9 and contains all the mandatory attachments requested there.
- A Letter of Support is enclosed from at least one company.

[7] For the current definition of small and medium sized companies see:
http://ec.europa.eu/DocsRoom/documents/15582/attachments/1/translations
[8] The costs in the project must be attributable to the activities of the Swedish branch or establishment.

7 Assessment of submitted proposals

7.1 What do we assess?

Only the written content of the submitted proposal will be assessed, and what is assessed is the degree to which the project proposals meet the three main evaluation criteria of Potential, Feasibility and Participants. The bulleted list below indicates what contributes positively to the assessment.

Potential

- Project activities and the skills build-up within the project are in line with the purpose of the call for proposals, according to sections 3 and 4.
- The background description of the proposal motivates the choice of experiment, as well as its industrial relevance. A comparison with more established analytical techniques is included when relevant.
- The project is implemented in collaboration between the PhD-student, supervisor and expertise within neutron or synchrotron-based techniques at a large-scale infrastructure.
- The project results have potential to contribute to economic, environmental and socially sustainable societal development. The proposal also relates to relevant aspects of the project with regards to gender equality.

Feasibility

- The project activities and time schedule are reasonable with respect to the project goals and the available resources that are described in the proposal.
- The proposal motivates in a credible way that the experiments are technically feasible and possible to carry out at an intended experimental station with respect to the project time.
- Relevant risks associated with the project implementation are managed in an appropriate and credible manner.

Participants

- The competence and resources allocated correspond to the project plan and goals, with adequate commitment from both supervisor and expertise.
- The project proposal clarifies collaboration and knowledge/technology transfer within the project consortium and how competence and results will be utilised within and outside of the project consortium.

7.2 How do we assess the proposals?

The proposals that meet the formal requirements (see section 6) will be according to the assessment criteria by specially chosen experts appointed by Vinnova. This results in a recommendation for funding to Vinnova. Programme managers at Vinnova may also participate in the assessment process.

Vinnova decides which projects are to be funded, taking into account the evaluators recommendation. In a competitive situation, account will be taken to the breadth of the project portfolio with respect to scope/area of application, as well as to distribution between the universities where the PhD students are registered. Also, already granted/confirmed beam time/experimental time will be seen as a strength in the case of a competitive situation.

Proposals that do not meet formal requirements will be rejected without further justification.

8 Decisions and conditions

8.1 About our decisions

The granted amount to each participant in the project is stated in the grant decision. Vinnova's grants is awarded with support from the rules on state aid for research, development and innovation, stated in SFS 2015:208. The aid foundation is set out in the grant decision and also governs the eligibility of costs.

Vinnova’s decision to grant or refuse a proposal cannot be appealed.

8.2 Terms and conditions for awarded grants

Vinnova's general conditions for grants apply to the awarded grants[9]. These conditions include rules on prerequisites for payment, follow up, reporting and utilisation of results. Note that no project activities may be started before the decision date.

Also, the following terms apply to the grants awarded in this call:

1. In connection with final reporting to Vinnova, an easily accessible description of the purpose, participating actors and overall project results must be enclosed for open publication and dissemination. A template for this is distributed by Vinnova.

[9] Current terms and conditions can be found on our website, along with help to understand and meet the terms: https://www.vinnova.se/globalassets/dokument/guide-till-vinnovas-villkor-om-stodberattigande-kostnader.pdf (note that there are different documents depending on the number of project partners).

2. The following condition replace § 1.4 of Vinnovas general terms and conditions: Project agreement is not required within this project.

Note, however, that a project agreement should be established if the project participants consider that need to be dealt with in an agreement.

Additional terms may be decided for individual projects.

If you do not comply with Vinnova's terms, you may be liable to repay the grant. This is also true if you have been granted an incorrect or excessive amount of funds.

9 How to apply

To apply for a grant, you fill in a special web-based form in Vinnova's eServices portal (Intressentportalen). There you will also upload the following required documents, according to templates downloaded from the Web page of the Call for proposals[10]. The documents must be written with twelve (12) point normal black text.

Please note that the proposal can be assessed by both Swedish and international evaluators. Therefore, we recommend that the proposal is written in English. If the proposal is written in Swedish it will be translated without your co-operation.

Mandatory attachments:

- **Project description**
  The description may consist of maximum five (5) A4 pages.

- **CV** Shall include relevant information regarding the PhD-student, supervisor (project manager), expert(s) and possible additional key persons.

- **Letter of Support**
  Shall be attached from at least one company and brief description of how the expected skills increase? can be of benefit in the field of application. It should also be stated whether/how knowledge transfer is planned. The Letter of Support shall be signed by a person qualified to sign contracts for research- and innovation projects on behalf of the organisations concerned.

[10] You find templates for the required documents to attach on: https://www.vinnova.se/en/e/research-infrastructure-utilisation-and-collaboration/competence-building/

The following should be admitted as **"Other attachments"** when applicable:

- Project consortia who have already received/been granted experimental time at a research infrastructure can attach documentation that supports this.
- Project consortia that intend to implement the project using resources whose costs are not intended to be reported to Vinnova shall enclose a confirmation signed by someone with mandate to approve such allocation of resources. This may involve collaboration with a research infrastructure (friendly beam time, analysis support, etc.) or synergies with already ongoing projects.

No additional material may be attached to the proposal.

Proposals should be submitted to Vinnova by: **20 August 2019 at 14:00**

When the proposal period has expired, any addition to the proposal can only be made at the request of Vinnova.

10 Who can read the proposal?

The proposal can be read by Vinnova's staff and by Vinnova's external evaluators appointed for the call. They all work under the obligation of professional secrecy.

Proposals submitted to Vinnova become public documents, but Vinnova does not disclose information about the individual's business or operational conditions, inventions and research results if it can be assumed that any individual suffers damage if the information is divulged.

Appendix. Short guide to research infrastructures for neutron and synchrotron based techniques

Short guide regarding MAX IV and international research infrastructures
Detailed information on the capacity and availability of the individual international facilities can be provided through their respective websites. Most facilities have user offices that offer special support for industry and can answer if any of their experimental stations and instruments are suitable for the need.

MAX IV offers opportunities to design experiments in completely new ways – and the same will apply to ESS. In addition to industry relevant experiments, even more user applications could benefit from these technologies. Compared to other European synchrotron facilities, the potential of MAX IV is particularly competitive for experiments that depend on high brilliance and coherence, which opens for new opportunities regarding e.g. imaging of unstructured materials within material research and life science.

MAX IV has already opened up for experimental possibilities at several beamlines **in spring 2019** the open call addressed the following beamlines: BioMAX (”macromolecular crystallography”), HIPPIE (”ambient pressure x-ray photoemission spectroscopy”), NanoMAX (”hard x-ray nano-diffraction and imaging”), FinEstBeAMS (”photoemission in gas-phase and photoluminescence spectroscopy”), Balder (”hard x-ray absorption”), BLOCH (”angle-resolved photoemission spectroscopy”), MAXPEEM (”photoelectron microscopy”) and the open port of the beamline Veritas. Between August 22 and September 17, 2019, experimental time can be applied for regarding the period March and August 2020. See the following link for updates and specifications from MAX IV: https://www.maxiv.lu.se/users/proposal-calls/

Through the Swedish Research Council, Sweden also finances the experimental station P21/"Swedish materials science beamline” (SMS) at the German synchrotron Petra III[11] in Hamburg. P21 allows diffraction and imaging (P21.2) and broadband diffraction (P21.1) and is administered by Linköping University and KTH. Petra III complements MAX IV particularly well when needed for higher energy levels. Sweden also co-finances the reflectometer "Super ADAM" at the neutron source ILL[12] in France administered by Uppsala University. Additionally, the Swedish Research Council finances Swedish membership in the ILL neutron source, as well as in the synchrotron ESRF[13] in France, and they also contribute to operating costs of the neutron source ISIS[14] in England.

[11] Petra III at Deutsches Elektronen-Synchrotron (DESY) Hamburg, Germany
[12] Institute Laue-Langevin (ILL), Grenoble, France
[13] European Synchrotron Radiation Facility (ESRF), Grenoble, France
[14] ISIS Neutron and Muon Source (ISIS) Oxford, England.

There is a number of collaborative initiatives between European research infrastructures, whose websites convey both basic knowledge and links to useful individual sites. See for example the collaborative platform ”The European Analytical Research Infrastructures Village” (www.eariv.eu). Regarding **neutron sources**, the website for EU projects SINE2020 gives additional information on the possibilities, performance and availability for industry of several European facilities, see https://sine2020.eu/ . Regarding **synchrotrons**, information is for instance provided through the websites of the EU Project CALIPSOplus (http://www.calipsoplus.eu) and the collaboration platform LEAPS (https://www.leaps-initiative.eu/consortium/). The initiative Lightsources.org also collects several overseas facilities (https://lightsources.org/lightsources-of-the-world/).

Analysis options with neutron and synchrotron-based techniques
Neutrons and photons interact in different ways with a material. Therefore, both comparable and complementary analyses are made possible. For example, you can study how different materials and biological structures are constructed, map the chemical states of materials, or follow different types of processes in real time and in realistic experimental environments. The techniques allow for an extensive portfolio of analytical possibilities based on e.g. scattering, diffraction, crystallography, spectroscopy and various forms of imaging in 2D and 3D. Provided that an intended experimental environment is in place, the techniques can be used for experiments in relevant environments for different applications - for example, at extreme temperatures and high pressures, in gases and liquids, or under mechanical load. The possibility of in-situ analyses under manufacturing and operating conditions (in-operando) opens for ground-breaking development opportunities for many industrial applications.

Neutrons stand out by being able to distinguish light elements, such as hydrogen and lithium, which are of great relevance for, among other things, battery and energy storage applications. Since neutrons are susceptible to isotopes, deuterium can be used as a marker for the study of e.g. biological materials. You can also study issues related to magnetic properties and superconductivity. Because neutrons penetrate deep into the materials, the technology is also suitable for non-destructive analysis to find hidden defects and internal stresses, even inside large, compact materials or components.

Photons have a shallower penetration depth and are therefore well suited for surface analyses and for experiments using thinner samples. The strong light from a synchrotron facility allows measurements with high spatial and/or time resolution which may, for example, be used to follow rapid chemical and biological processes in real time. Considering certain variations between different synchrotron facilities, experiments can be conducted using a broad wavelength spectrum, for instance hard and soft X-ray radiation, ultraviolet light and infrared light.