

Research programme

Methods in Life Sciences March 2019

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1 Preamble

Research and development in the life sciences has achieved rapid advances over the last few decades. The consistent new and further development of innovative methods, supported by the steady improvement of analysis techniques, plays a key role.

In spite of these successes, many questions in the life sciences still remain unanswered and can only be addressed by developing new and innovative methods. There is a growing demand for methodological solutions which also benefit from cross-linking integrative approaches from various fields of the life sciences and include efficient data analysis.

With its programme on methods in the life sciences, the foundation Baden-Württemberg Stiftung aims to promote work on current research issues to advance the development and optimization of methods. Frequently, methodological developments not only generate practical applications for the originally envisioned issue but regularly also lead to enormous benefits in other research applications. Methodological developments furthermore require an expansive exchange between different scientific disciplines. The programme is intended to contribute to both aspects as well as to promote an interdisciplinary network of research groups from Baden-Württemberg.

Thanks to its outstanding research sector, consisting of academic and non-university institutions, the federal state of Baden-Württemberg has great potential for the development of new and innovative methods. The scientific excellence of Baden-Württemberg will further benefit from this and therefore make a sustainable contribution to new knowledge in the life sciences.

2 Aim and subject-matter of the call

The aim of the call is to establish internationally visible and competitive projects for methodological developments in the life sciences in the following areas:

- **Single-cell analyses**
- **High-resolution microscopy**

Single-cell analyses: Latest insights into the heterogeneity of cells in animal, human, and plant tissues as well as the composition of the microbiome have led to a renewed focus on the investigation of biological processes on the level of single cells. Since heterogeneous cell mixtures are limited in their potential to produce conclusive results, single-cell analyses are expected to create a better starting point.

The present call for applications therefore aims to facilitate the new and further development of methods that will permit better molecular characterization, on the one

hand, and the use of microscopic techniques for the spatial characterization of cells, e.g. within a tissue, on the other hand. Practical applications that could be advanced by single-cell analyses include cancer treatments since individual cells can react very differently to drugs, or infection biology identifying unknown or previously non-cultivable types of bacteria or viruses.

Methodological developments will focus on the genome, the epigenome, and the transcriptome. A need for further development exists in fields such as the gentle isolation of cells, multimodal analyses, high-throughput analyses, multi-parameter determination, and the efficient processing and integration of data.

High-resolution microscopy: The increasingly detailed spatial characterization of molecular processes within cells is an urgent research topic. The developments in the field of fluorescence microscopy in the past 10 years have made it possible to produce images of molecular processes resolved at the nanolevel. The developers of the STED and PALM/STORM techniques were awarded the 2014 Nobel Prize in Chemistry for this.

The present call for applications aims to advance high-resolution microscopy (“nanoscopy”) and exploit its potential for use in the various fields of application in the life sciences. The need for development is becoming apparent in quantitative imaging, in colocalization analyses of molecular drug targets using multicolour nanoscopy, the expansion towards imaging tissues, and the combination of additional methods.

Potential applications include drug development by clarifying spatial structures with high medical relevance (examples include neurodegenerative diseases, dynamic complexes in immune cells, or direct interactions between active substances and proteins).

Methodological developments are based on interwoven successions of individual steps (**process chains**). These include **(i) sample preparation** (incl. isolation), **(ii) sample analysis**, and finally **(iii) data processing**. Methodological new or further developments can thus address each individual step of this process chain.

The projects, which should primarily be validated using an application-oriented issue, should therefore convincingly present

- i.) the **added value of the new method** for the relevant issue and
- ii.) its validation **in the context of the aforementioned process chain**.

Methodological developments require considerable interdisciplinary cooperation. For this reason, such developments should be approached in **cooperation projects**.

3 Eligibility

All universities located in Baden-Württemberg and all non-profit non-university research institutions based in Baden-Württemberg are eligible to participate.

4 Modalities

The research is conducted on behalf of Baden-Württemberg Stiftung gGmbH on the basis of a contract with the research institution (contract research). All rights to the results are reserved by Baden-Württemberg Stiftung gGmbH.

The starting point of each research project should be a practical research issue that could result in an application in the medium term. The most important evaluation criteria are scientific excellence and a level of innovation that will lead to an economic added value for the federal state of Baden-Württemberg as well as the degree to which they stand out from the state of the art.

Financing will be provided for personnel and material costs, travel expenses, and – in duly justified cases – investment costs in the form of depreciation throughout the project.

Applications can be submitted by individual working groups/research institutions or by consortia of different research institutions. Where required by the research issue, an interdisciplinary approach is obligatory. Applications must always specify to what extent the competence required to conduct the research project are already in place.

If several research institutions are involved, then a jointly appointed project leader must be named as a contact person for Baden-Württemberg Stiftung who will act as coordinator for the research institutions and will be responsible for the overall execution of the project.

A one-stage application procedure is envisaged. Applications must be submitted by the date specified below and will be evaluated by an independent panel of experts that will provide Baden-Württemberg Stiftung with recommendations for a decision. Projects within the scope of this call for applications can be rejected without giving reasons. There is no entitlement to funding. By submitting a project description, applicants consent to these modalities.

The project duration should not exceed 3 years. Baden-Württemberg Stiftung has up to € 5 million at its disposal for this research programme.

5 Application process

All applications from universities must be submitted by their rectorates. Applications from non-university research institutions must be submitted by their management.

6 Deadlines

Applications must be received by the project management organization **by 29 May 2019, 16:00** (cut-off period).

Applications must be submitted electronically via Project Management Jülich's Internet portal <https://submission-bws.ptj.de/methodenentwicklung>. A PDF version of the project description signed by the rectorate of the university or the management of the research institutions must be uploaded to the portal. The signature in the PDF is sufficient to meet the deadline. The signed document must be submitted subsequently by post or fax without delay.

7 Scope and content of applications

Applications should be structured as follows:

- General information (applicant, institution, title and acronym of project, project leader or coordinator for cooperation projects, legally valid signature)
- Summary: brief, generally comprehensible description of the project

- State of research and differentiation of the application from the current state of the art, research on patent situation
- Detailed presentation of the planned project: Objective, scientific and technical benefits, potential for improvement, work programme, methods, application prospects
- Own project-related preliminary work and publications, incl. patents and invention disclosures
- Work plan and schedule, incl. milestones every six months that can be verified
- Breakdown of net costs by project years, indicating VAT separately (if no VAT is specified, Baden-Württemberg Stiftung will assume costs to be gross amounts incl. VAT):
 - Personnel costs incl. person months and pay groups (financing is available for a maximum of € 70,000/a for postdocs, € 65,000/a for doctoral researchers, and € 50,000/a for technical employees – each plus VAT)
 - Itemized material costs (small instruments up to € 5,000, consumables, travel expenses)
 - Investment costs in justified exceptional cases (applicable to new investments of € 5,000 or more, depreciation period according to official depreciation table, billable depreciation only for the period of use during project)
 - Overview of total costs
 - For cooperation projects, a clearly differentiated financing plan must be provided that logically presents the items and resources planned for each partner.

Applications should be no longer than 20 pages. The requirements for applications are outlined in the submission guidelines (see <https://submission-bws.ptj.de/methodenentwicklung>). These guidelines also contain the envisioned structure of the application.

8 Project management

Baden-Württemberg Stiftung gGmbH has commissioned Project Management Jülich (PtJ) with the implementation and monitoring of the research programme. Project Management Jülich is responsible for the organizational aspects of the programme and is the key contact for all applicants.

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