Call for Proposals

No. 54 **14 August 2017**

Priority Programme "Compressed Sensing in Information Processing (CoSIP)" (SPP 1798)

In 2014, the Senate of the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) established the Priority Programme "Compressed Sensing in Information Processing (CoSIP)" (SPP 1798). The programme is designed to run for six years. The present call invites proposals for the second three-year funding period.

Digital signal processing requires the conversion of analog signals in space and time to a discrete domain and vice versa. Conventional sampling relies on the Shannon-Nyquist theorem which ensures complete reconstruction of a bandlimited signal by sampling at a rate twice the bandwidth. In contrast, compressed sensing follows the paradigm that a sparse signal may be sampled far below the Nyquist rate, but nevertheless perfectly recovered. Compressed sensing relies on three salient principles: sparsity, incoherence and randomness. Sparsity refers to the idea that the information rate of a signal is much smaller than expected from its bandwidth, so that the signal may be represented by a small number of elements in a proper representation system. Incoherence expresses the concept that signals with a sparse representation are spread out in the sampling domain. Finally, perfect recovery can be mathematically guaranteed with high probability under the assumption that the measurements are selected at random.

Sparsity is encountered in signals of numerous applications, like wireless information and communication technology, imaging sciences, radar surveillance, and visual and audio signal processing, to name a few. In this Priority Programme, applications of compressed sensing in information processing will be emphasised, however, it is expected that the mathematical theory behind will receive significant attention. Innovative applications in other fields are solicited. Paired cooperation projects between engineers and applied mathematicians are particularly encouraged.

Investigating signals with respect to sparsity, bandwidth, dynamics, and statistical behaviour, random sampling in a compressed sensing fashion, and an algorithmic reconstruction of the original signal forms the focus of the Priority Programme.

Project proposals for the second period are invited to the following areas:

- using statistical prior information for compressed sensing
- quantisation in compressed sensing
- measurement design for compressed sensing
- reconstruction algorithms for compressed sensing

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- compressed sensing-type approaches to deep learning
- low rank matrix recovery and matrix completion in signal processing

Application fields of major interest include:

- wireless communication systems
- channel and network coding
- imaging sciences
- signal processing in communications
- radar and synthetic aperture radar imaging
- visual and audio signal processing
- biological signal processing
- machine learning and data science

Beyond that the Priority Programme is open to proposals and scientific disciplines that contribute to the above mentioned areas.

The Priority Programme intends to support the academic career of researchers through intense contact between different groups, workshops, and summer schools. It will also provide a gender equality programme and family friendly working conditions.

Proposals must be written in English and submitted to the DFG by **15 November 2017.** Please note that proposals can only be submitted via elan, the DFG's electronic proposal processing system. Applicants must be registered in elan prior to submitting a proposal to the DFG. If you have not yet registered, please note that you must do so by **1 November 2017** to submit a proposal under this call; registration requests received after this time cannot be considered. You will normally receive confirmation of your registration by the next working day. Note that you will be asked to select the appropriate Priority Programme call during both the registration and the proposal process.

If you would like to submit a proposal for a new project within the existing Priority Programme, please go to Proposal Submission – New Project – Priority Programmes and select "SPP 1798" from the current list of calls. Previous applicants can submit a proposal for the renewal of an existing project under Proposal Submission – Proposal Overview/Renewal Proposal. In preparing your proposal, please review the programme guidelines (form 50.05, section B) and follow the proposal preparation instructions (form 54.01). These forms can either be downloaded from our website or accessed through the elan portal. In addition to submitting your proposal via elan, please send an electronic copy to the programme coordinator.

The on-site report colloquium as well as the review colloquium for the Priority Programme will be held on **21–23 February 2018** at Technische Universität Berlin.

Further Information

More information on the Priority Programme is available under:
www.ti.rwth-aachen.de/SPP1798

The elan system can be accessed at:
https://elan.dfg.de/en

DFG forms 50.05 and 54.01 can be downloaded at:
www.dfg.de/formulare/50_05
www.dfg.de/formulare/54_01

For scientific enquiries please contact the Priority Programme coordinator:
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