SPIN MONITORING A RESTLESS EARTH

SPIN ESR 3.1: High quality 6 Degrees of Freedom point measurement - towards absolute amplitude measurements

Host institution: Ludwig-Maximilian-University Munich, Germany (LMU)

Supervisors:

main supervisor: Heiner Igel, LMU
co-supervisor: Cedric Schmelzbach, ETH

Application deadline: 1.4.2021 . Position remains open until filled
Earliest possible starting date: 1.10.2021

General information

This PhD position is one of the 15 Early Stage Researcher (ESR) positions within the SPIN project (http://spin-itn.eu). SPIN is an Innovative Training Network (ITN) funded by the European Commission under the Horizon 2020 Marie Sklodowska-Curie Action (MSCA).

SPIN will focus on training 15 PhD candidates in emerging measurement technologies in seismology. We will research the design of monitoring systems for precursory changes in material properties, all while optimizing observation strategies. The unique interdisciplinary and inter-sectoral network will enable PhDs to gain international expertise at excellent research institutions, with a meaningful exposure of each PhD to other disciplines and sectors, thus going far beyond the education at a single PhD programme. For further information on the project, please consult our website at: http://spin-itn.eu.

Project description

The wave propagation physics we study requires the highest possible quality of seismic ground motion observations. Several partners of SPIN (LMU, ETH, UHH, iXblue) have pioneered the concepts of 6 DoF ground motion observations in combination with emerging technologies to measure rotational ground motions. This project aims at developing (automated) data analysis tools for single station and networks of 6 DoF ground motion observations to increase the resolving power of seismic inverse problems for both structure and source. The project shall involve the design and organization of field experiments with multiple rotation sensors (and DAS if possible) with the aim of demonstrating the potential of multicomponent seismology in the field. In addition, the highly successful noise-based cross-correlation methodology shall be extended to the new rotation (and strain) observations, with the aim to further constrain time-dependent structural and nonlinear effects. The methodology shall be applied to field data at 1) active seismic faults, 2) volcanoes, 3) ocean-bottom observations, 4) teleseismic observations using ring lasers, and 5) laboratory data (tilt correction). This project is tightly linked to other SPIN work packages developing wave simulation techniques and through the non-academic partner (iXBlue) who develops rotation sensors. We are seeking candidates with an interest in both seismic instrumentation, field and laboratory studies, as well as theoretical seismology.

Expected results:

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- Open source synthetic 6 DoF benchmark data for processing, data analysis, and inverse problems
- Processing toolbox (Full 6 DoF) with documentation, embedded in Jupyter notebooks
- Case studies on field and laboratory data, demonstrate improvement in inverse problem resolution

Required skills and experience

We welcome applications from candidates who fulfill the following criteria:

- A completed research-oriented university degree, such as a Master's degree or BSc Hons, in a relevant field (e.g. Geophysics, Physics, Earth Sciences, Mathematics) The PhD enrollment requirements will depend on the hosting institute, please refer to the individual project descriptions and institute webpages.
- An outstanding academic track record
- An good command of English, both verbal and written
- Dedication and enthusiasm for research, combined with scientific curiosity, reliability and the capacity to teamwork in an interdisciplinary environment.
- Willingness to organize, and carry out and field experiments
- Experience in programming (ideally with Python)

Please ensure that you fulfill the following **eligibility criteria** for ESR (Early Stage Researcher) positions in H2020 MSCA-ITNs, as ineligible candidates cannot be considered:
https://spin-itn.eu/recruitment/#eligibility-criteria

Application Procedure

The **application deadline** is April 1, 2021. Application evaluations will start immediately, and will continue until all positions are filled. We wish to reflect the diversity of society and we welcome applications from all qualified candidates regardless of personal background. The selection will be exclusively based on qualification without regard to gender identity, sexual orientation religion, national origin or age.

Applications must include:

- A cover letter in which you describe your motivation and qualifications for the position.
- A CV including relevant competences, skills and publication list, if applicable
- Copies of degree certificate(s) and transcripts of records for previous studies (Bachelor and/or Master). Please indicate expected date of graduation if your Master's degree is not completed
- Contact information of two references
- Completion of the SPIN application form: http://uhh.de/min-spin-apply

Applications should be sent in **one single pdf file** with filename `SPIN_YourLastname_YourFirstname.pdf' to spin-applications.min@uni-hamburg.de

Data handling

By applying to a PhD position, you agree that all data concerning your application may be stored electronically and distributed among the supervisors involved in the selection procedure within the MSCA ITN SPIN. If you do not agree, your application can not be processed further, due to the project's centralised recruitment process. The data are used solely for the recruitment process and we do not share information about you with any third party.

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