SPIN MONITORING A RESTLESS EARTH

SPIN ESR 1.3: Wavefield gradient methods to monitor the Earth's crust

Host institution: ISTerre, Université Grenoble Alpes

Supervisors:

main supervisor: Michel Campillo, ISTerre, UGA
co-supervisor: Helle Pedersen, ISTerre, UGA
co-supervisor: Florent Brenguier, ISTerre, UGA
external collaboration: Heiner Igel, LMU

Application deadline 01/04/2021. Position remains open until filled.
Earliest possible starting date : 01/09/2021

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

This PhD project capitalises on the progress that has allowed the emergence of new observables in seismology (rotation sensors, advanced array processing, Distributed Acoustic Sensing, ...). The goal is to evaluate the possibilities offered by wave field gradient measurements in addition to traditional local measurements for monitoring temporal variations of elastic properties (mean velocities, structural changes in the Earth's crust. The field of application will focus on a volcanic area where such changes are already reported but not precisely characterized. The study will start with a test phase to adapt the method on realistic numerical simulations in media with high scattering and attenuation. Different strategies and observables will be tested to evaluate their ability to image changes in the environment associated with for example localized velocity changes or appearance of filled cracks. The method will next be applied to field data with a noise based monitoring approach. The processing of the field data will include a stage of characterization and classification of the ambient wavefield. The subsequent imaging will rely on inversion kernels for scattered waves based on a model of coupling of surface and body waves. The work is based at ISTerre, Grenoble (France), with collaboration with LMU, Munich (Germany).

Funded by the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 955515.

The project will be carried out in a highly collaborative environment, and within one of the leading organisations in the world in the field of seismic imaging and monitoring using seismic noise.

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, ..) 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.

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 01.06.2021. 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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