

SPIN

MONITORING A
RESTLESS EARTH

SPIN ESR 4.3: Monitoring hazards from a changing alpine environment

Host institution: ETH Zurich (ETHZ), Department of Earth Sciences,
Institute of Geophysics, Exploration and Environmental Geophysics
<https://ethz.ch/>
<https://eeg.ethz.ch/>

ETH zürich

Supervisors:

main supervisor: C. Schmelzbach (ETHZ)

co-supervisors: J. O. Robertsson (ETHZ), P. Roux (UGA), L. Meier (Geopraevent, Switzerland),
M. Segou (UKRI-BGS)

Application deadline: 1.5.2021, position remains open until filled

Earliest possible starting date: summer 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 Skłodowska-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

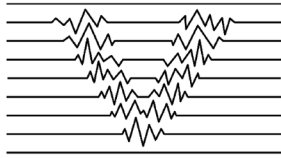
Alpine regions are particularly vulnerable to climate change, for example, due to melting permafrost resulting in unstable mountain slopes (e.g. devastating rock fall in Bondo, Switzerland). Such increased risks are a significant threat for ecosystems, infrastructures (e.g. hydraulic power plants), and densely populated alpine areas. Real time monitoring of exposed slopes as well as understanding internal processes is key to protect human lives and infrastructure, but obtaining in situ observations on instable slopes remains challenging because of the limited and dangerous access. In this project, we propose to **develop a novel seismic slope instability monitoring and early warning system**. We will combine latest developments in seismic multi-observable instrumentation (e.g., rotational motion measurements, spatial wavefield gradient estimates from local dense sensor layouts; *ESR1.4*; fiber optics *ESR1.2*), data analysis (e.g., coherence based detection methods *ESR3.3*), with our new understanding of time-dependent processes gained in SPIN (*ESR2.1*). We will furthermore explore whether existing fiber-optics infrastructure like telecom cables can be used as low-cost monitoring tool and whether seismic sensors could be deployed with drones to extend the application range into high-risk areas. Goal of this project is to develop a seismic monitoring workflow for the changing alpine environment context.

The successful candidate for the PhD project position should hold an outstanding Master's degree in geophysics, physics, applied mathematics, or similar fields, and should have a keen interest and preferably some experience in geophysical field work, data processing, as well as seismic wave propagation and



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inversion theory. Good knowledge of English is essential and, although not a prerequisite, a basic understanding of German is an advantage.

We offer a dynamic and stimulating working environment with highly qualified scientists, excellent computational facilities, a large pool of state-of-the-art geophysical equipment. In addition, our group has access to high-performance computing systems owned by ETH. The Exploration and Environmental Geophysics group at ETH Zurich is embedded in a top-ranked and vibrant Earth Science department, which will offer many opportunities for collaborative projects.

Required skills and experience

We welcome applications from candidates who fulfil 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, Applied Mathematics, or similar fields) The PhD enrolment 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.
- Preferably some experience in geophysical field work, data processing, as well as seismic wave propagation and inversion theory

Please ensure that you fulfil 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 1.5.2021 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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