The Seismology and Geodynamics group (SEG) and the Exploration and Environmental Geophysics (EEG) group at ETH Zürich, Switzerland (Institute of Geophysics, Department of Earth Sciences, Swiss Federal Institute of Technology) have immediate openings for two ambitious and talented PhD candidates in the field of geophysical signal processing of gravitational waves recordings.

Two PhD positions in signal processing of gravitational waves recordings

The era of the gravitational waves (GW) astronomy has been initiated by the report of the collision of a pair of black holes reported by the Laser Interferometer Gravitational Observatory (LIGO) on September 14th, 2015. In December 2015, the European Space Agency (ESA) has launched the LISA Pathfinder mission that has clearly demonstrated the technological readiness for the implementation of a GW observatory in space. Such an observatory, the Laser Interferometer Space Antenna (LISA), will be launched by ESA in the early 2030s. The design and the development have started in 2017, with participation of ETH Zürich. LISA will be an extraordinarily sensitive instrument with the capability of detecting GW from sources distributed around the whole universe. In support of LISA, several rounds of mock LISA data challenges (MLDC) have been performed to foster the development of data analysis tools and to demonstrate the readiness of the scientific community in processing the expected wealth of the LISA data.

In some ways, LISA can be considered as a seismometer in space: LISA is sensing the motion of a test mass, which is the principle of a seismometer. Similarly to seismological instruments, LISA recordings are going to be dominated not by instrument noise, but by complex signal, the confusion noise generated by millions of weak sources of gravitational waves located mainly in our galaxy.

With the motivation of exploiting the analogies between seismological and GW sensing, the two PhD projects aim at creating a bridge between the scientific communities of gravitational waves astrophysicists and earth scientists. The PhD students will explore the possibility of applying research methodology and data analysis procedures that are routinely used in seismology as well as newly designed signal processing techniques to the analysis of LISA data. The two PhD students will work in an interdisciplinary team together with researchers from the ETH SEG and EEG groups, the ETH Aerospace Electronics and Instruments Laboratory (AEIL), and experts in General Relativity and Gravitational Wave Astronomy from the University of Zürich and University Paris Diderot (France).

The successful candidates for these two PhD project positions should hold a Master’s degree in geophysics, physics, applied mathematics, or similar fields, and should have a keen interest in geophysical signal processing, inversion theory and physics. Good knowledge of English is essential.

We offer a dynamic working environment with highly qualified scientists and excellent computational facilities. In addition, the PhD students will have access to high-performance computing systems owned by ETH. The Institute of Geophysics group at ETH Zürich is embedded in a vibrant Earth Science department, which will offer many opportunities for collaborative projects.

We look forward to receiving your online application with the following documents: motivation letter, Curriculum Vitae and the names and addresses of three referees via the following link: https://emea2.softfactors.com/job-opening/rqum-sLqZ2QhKZznC6nr6N#/?lang=en. Please apply exclusively via the online application portal. Applications are accepted until the positions are filled. Applications sent by e-mail or post will not be considered.

For more information on projects, you may contact, Dr. Luigi Ferraioli (luigi.ferraioli@erdw.ethz.ch), Dr. Cedric Schmelzbach (cedric.schmelzbach@erdw.ethz.ch), and Dr. Simon Stähler (simon.staehler@erdw.ethz.ch). More information on the involved research groups can be obtained at www.erdw.ethz.ch.