Profile: Civil Engineer: track Geotechnical Engineering

Introduction

The Einstein Telescope (Einstein Telescope, or just ET) is a future third-generation gravitational wave detector currently being studied by various scientific bodies in the European Union. Like current detectors, the Einstein Telescope will use the principle of interference of two light beams to detect the passage of a gravitational wave: the entire structure will be built underground to mitigate disturbances caused by environmental seismic noise; the size of the interferometer will go from the 3-4 km of the current detectors (LIGO and Virgo) to 10 km; the optics will be cooled to a temperature of 10-20 K to reduce thermal noise; new quantum technologies will be adopted to reduce light fluctuations; and a series of infrastructures will be built to further reduce other environmental disturbances.

The work location will be Nikhef, Amsterdam. It is expected that the selected candidate is present in Maastricht at the ET-Pathfinder office (University of Science and Engineering) regularly, on average ~1 day/every other week.

The activities will be carried out within the ET Engineering Department and EMR (Euregio Meuse-Rhine) subsurface team in the following two areas:

The ET Engineering Department is charged with the design, procurement, installation, …. of the infrastructure and technical systems for ET research infrastructure independently of the location of the infrastructure (EMR or Sardinia). The main objective for the next three years is the Technical Design Report and complete cost evaluation of the project.

This EMR subsurface team is charged to make a recommendation within three years about the suitability of the subsurface in the EMR region to cost-effectively build and operate the Einstein Telescope.

Planned activities:

1. He/she will lead the effort and be responsible for identifying minimum requirements for the geology and hydrogeology of the subsurface in which to excavate the required shafts, caverns and tunnels for the Einstein Telescope. He/she will define the appropriate engineering / excavating objective and will define the required parameters for subsurface layer structure, rock stability etc. to achieve this objective. He/she will be a member of the subsurface technical team and he/she is expected to take on the role of interface between the geo efforts of the team and the civil-engineering community in academia and third party industry. In particular selected candidate will interface with the Project Lead Geo-data Processing to ensure that acquisition campaigns are “searching for the right information”, i.e. to identify which part of the subsurface volume is suitable (has an acceptable risk) for excavation. Together with the whole team he/she will be responsible to finalize a 3D subsurface Risk Volume that maps the risk of building and operating of the Einstein telescope, based on layer structure, rock stability, the presence of water and minimum excavation requirements. Selected candidate can expect technical support and coaching from the other members of the steering team and is expected to work closely with technical advisors and experts from other organizations such as KNMI, TNO, TU/D, and the Universities of Aachen, Liege and within the ET Engineering Department and collaboration .
2. He/she is expected to take on the role of interface between the geo efforts of the Engineering Department in collaboration with national institutes and the ET collaboration, translate user requirements into specifications and interfaces with the companies which will carry out the civil engineering works. He/she may in the future be in charge of the reception of the civil engineering works also resolving non conformities.

Master’s degree in Civil Engineering: Track Geotechnical Engineering with preferably experience in subsurface construction of rock and soft soil tunnels, shafts, etc. Good understanding and overview of the tunneling market and industry, safety requirements, and ability to discuss requirements and challenges with relevant stakeholders.

4 year contract with Nikhef under the INFRA-Dev project conditions.