PhD Opportunity at the University of Trento

Reference person: **Davide Noè Gorini (UNITN/DICAM)**

Title: Quantum-assisted Framework for Mega-Scale Seismic Evaluation of CERN Strategic Underground Infrastructures (project: QuMegaCERN)

The successful candidate will contribute to the development of a novel Quantum-based framework for territorial simulations of strategic Infrastructures exposed to natural hazards. The Quantum framework will be deployed for high-fidelity seismic evaluations of CERN underground infrastructures hosting the Large Hadron Collider (LHC), its injectors and experiments.

An advanced Mega-Scale numerical model of the Soil-Infrastructure system will be developed, capturing the multi-physics dynamic interactions between the 50 km-long CERN particle accelerator complex and the surrounding subsoil. Due to the remarkable computational complexity, this challenge will be addressed exploiting Quantum algorithms and Quantum simulators.

The ideal candidate should have a strong background in Computational Mechanics. Knowledge of Finite Element Analysis, Quantum Algorithms and Computing is highly desirable. Experience with tools such as OpenSees, ABAQUS, MATLAB/Simulink or Python is particularly valued. More broadly, candidates with advanced programming skills are encouraged to apply.

This highly multidisciplinary project will greatly benefit from a strong collaboration with the European Organization for Nuclear Research (CERN, Switzerland) and international partners. As such, the PhD program offers the opportunity to spend a research period abroad, during which the selected candidate will work closely with experts in the field.

The main goals of the path are grouped below.

1. Development of a Quantum-HPC integrated workflow for mega-scale engineering applications.

2. Implementation of a mega-scale numerical model of the CERN underground infrastructural system and the surrounding soil for high fidelity seismic simulations.

3. Seismic demands for the CERN strategic underground infrastructures and identification of critical components.

Further details can be found on the dedicated webpage of the call: https://www.unitn.it/it/dottorati/ingegneria-civile-ambientale-e-meccanica

Applications can be submitted exclusively via the following link by August 21 at 16:00 (Italy Local Time):

https://webapps.unitn.it/Apply/it/Web/Home/dott

Should you require any additional information, do not hesitate to reach out at: davidenoe.gorini@unitn.it