

## Detailed description of Ph.D. position ESR2 within XP-Resilience



**Title: Novel analysis of shallow and deep foundations and optimal layouts of subplants/plants under seismic conditions**

**Host institution: Department of Civil, Environmental and Mechanical Engineering at the University of Trento (Italy).** Contact [alessandro.gajo@unitn.it](mailto:alessandro.gajo@unitn.it) and [francesco.cecinato@unitn.it](mailto:francesco.cecinato@unitn.it) for details

Carrying out reliable analysis of the behaviour of foundations under seismic loading is a far from easy task, involving not only sound knowledge of earthquake geotechnical engineering, but also insights in the fields of seismology, applied mechanics and geology. Typical steps towards proper understanding of this broad and ever-important discipline involve both field and laboratory testing, analysis of the dynamic soil behaviour, the evaluation of seismic ground motion, the analysis of soil-structure interaction effects, and consideration of seismic design issues. Although there have been significant advances in this field in recent years, accurately evaluating soil behaviour under dynamic loading and making reliable assessment of the soil-foundation system response is far from being fully comprehended. The development of novel theoretical and numerical models can constitute a significant advancement towards proper understanding of such phenomena, leading to the development of practical tools that can play a crucial role in the more general framework of enhancing the resiliency of complex engineering systems (such as petrochemical installations) for disaster reduction.

In light of the above, the proposed research will focus on the development and validation of novel constitutive and numerical models for analysing soil-structure interaction under extreme loading conditions. Constitutive models describing soil behavior and single (deep or shallow) foundations' dynamic response are the expected starting points of a research path leading to modelling the soil-structure interaction. The analyses will benefit from available experimental and/or field data on existing buildings, to obtain a reliable modelling tool that will be employed, in the second part of this project, to perform parametric analyses to be incorporated into a more general probabilistic tool for risk assessment of critical infrastructures. In the framework of the EU ITN project 'XP-Resilience', modelling results will be used to aid conception of optimal layouts of tanks with boreholes and resonators made of tanks with tunable liquid/wall thickness, for petrochemical plants.

To be eligible, candidates must comply with mobility requirements. Please see [http://ec.europa.eu/research/participants/data/ref/h2020/other/guides\\_for\\_applicants/h2020-guide-appl16-msca-itn\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/other/guides_for_applicants/h2020-guide-appl16-msca-itn_en.pdf) for details.

### More information and application at:

<http://web.unitn.it/en/dricam/29807/admission-and-enrollment>

**The application deadline is officially 25/08/2016.**

### Funding

Project Reference: **721816**  
Call: **H2020-MSCA-ITN-2016**  
Period: **10/2016 -> 10/2019**



## 14 open Ph.D. positions within XP-Resilience



### **XP-Resilience: extreme loading analysis of petrochemical plants and design of metamaterial-based shields for enhanced resilience**

XP-RESILIENCE is an inter/multi-disciplinary programme including seven academic partners, one Institute of Applied Science and seven private companies from ten different European countries. XP-RESILIENCE intends to establish a network of individual research projects working towards Advanced Modelling and Protection –via metamaterial-based isolators/layouts- of Complex Engineering Systems for Disaster Reduction and Resilient Communities.

The objective of XP-RESILIENCE is to train researchers combining a robust academic foundation in reliability/resilience with practical experiences, technological expertise with awareness of the socio-economical context and conviction to furthering research with an entrepreneurial spirit. It aims at offering innovative research training ground as well as attractive career development and knowledge exchange opportunities for 14 Early Stage Researchers (ESRs) through cross-border and cross-sector mobility for future growth in Europe.

**The Department of Civil, Environmental and Mechanical Engineering at the University of Trento (UNITN)** (<http://www.dicam.unitn.it>), will host two ESRs:

- **ESR1:** Analysis and risk assessment of petrochemical plants endowed with innovative metamaterial-based shields under seismic/fire loadings. Applications are welcome from students with masters qualifications in the areas of civil/mechanical engineering, structural mechanics or a similar field of study, with a possibly strong background in numerical modelling, dynamics and uncertainties (contact [oreste.bursi@unitn.it](mailto:oreste.bursi@unitn.it) or [nicola.tondini@unitn.it](mailto:nicola.tondini@unitn.it), for details)
- **ESR2:** Novel analysis of shallow and deep foundations and optimal layouts of subplants/plants under seismic conditions. Applications are welcome from students with masters qualifications in the areas of civil engineering, applied mechanics or a similar field of study, with a possibly strong background in constitutive and numerical modelling in Geomechanics/Geotechnics. (contact [alessandro.gajo@unitn.it](mailto:alessandro.gajo@unitn.it) or [francesco.cecinato@unitn.it](mailto:francesco.cecinato@unitn.it) for details).

To be eligible, candidates must comply with mobility requirements. Please see [http://ec.europa.eu/research/participants/data/ref/h2020/other/guides\\_for\\_applicants/h2020-guide-appl16-msca-itn\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/other/guides_for_applicants/h2020-guide-appl16-msca-itn_en.pdf) for details.

**More information and application at:**  
<http://web.unitn.it/en/dicam/29807/admission-and-enrollment>

The application deadline for the two positions at UNITN is officially **25/08/2016**.

### **Funding**

Project Reference: **721816**  
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