Advertising for two Post-Doctoral positions at INGV (Rome) in

1) Seismic source numerical modelling
2) Probabilistic Tsunami Hazard Analysis (PTHA)

We are seeking for highly motivated researchers to fill two Post-Doctoral positions, one in seismic source modelling and one in Probabilistic Tsunami Hazard Analysis (PTHA), at Istituto Nazionale di Geofisica e Vulcanologia (INGV) in Rome (www.ingv.it). The initial positions are for two years, with possible extension of two extra years (for the seismic source numerical modelling position) and of one extra year (for the PTHA position).

INGV is a prestigious institute for Geophysical research and it is in charge of monitoring seismic and volcanic activity in Italy. It was ranked as the third worldwide institution for seismology – in terms of citations and publications[(1)] – in the last Science Watch inquiry in 2010 . INGV's laboratories include world-class microscopic, geochemical and rock deformation facilities[(2)].

The research will be funded by European Union FP7 project ASTARTE (Assessment STrategy And Risk reduction for Tsunamis in Europe, http://www.astarte-project.eu). Depending on the successful candidates availability and performance during the first two years, the one-year extension of the position in PTHA, might be negotiated within ASTARTE, and the extension for up to two additional years for the seismic source modeling position, might be negotiated within ERC consolidator grant NOFEAR (New Outlook on seismic Faults: from EARthquake nucleation to arrest). A synopsis of both projects can be found below.

Gross per-year salary will be formed as follows: living allowance: euros 42.028,00; mobility allowance, only for non-residents in Italy: Euros 9.290,00 for a researcher without family obligations; euros 13.272,00 for a researcher with family obligations (married, or with a relationship recognised by the Italian law or by the law of the country of provenance of the researcher, or with dependent children).

The submission deadline for both applications is 24 May 2014. Material to be submitted includes a CV and recommendation letters by two referees. Refer to the following website for details on the submission, and on the selection procedure:

http://istituto.ingv.it/l-ingv/opportunita-di-lavoro-e-collaborazione/assegni-di-ricerca-e-borse-di-studio-2014

The selection will commence as soon as possible after the submission deadline. It will be based on a preliminary evaluation of candidate qualification and on a 'Skype with webcam' formal interview. The posts will be available as soon as possible upon completion of the selection procedure.

Informal inquiries or request for clarifications concerning the application procedure for both positions may be addressed to Stefano Lorito (stefano.lorito@ingv.it).

The subject of the two research projects, and further details are described in what follows for each of the two calls.

(1) http://archive.sciencewatch.com/ana/st/earthquakes2/institutions/

(2) http://www.roma1.ingv.it/laboratories/hp-ht-lab/high-pressure-high-temperature-laboratory-of-experimental-volcanology-and-geophysics/view?set_language=en

Call 1): Seismic source numerical modelling

The goal of this Post-Doctoral research are: to implement realistic and accurate methods to model earthquake source rupture with complex geometry and rheology; to improve tsunami generation stage modeling in the frame of Probabilistic Tsunami Hazard Analysis (PTHA). The successful applicant should be an independent researcher who will take a leading role in developing, adapting and implementing state of the art numerical methods for seismic source modeling. International leading teams will participate to improve and test these methods in a collaborative effort. A highly interdisciplinary environment will allow to coordinate the modelling with other research activities which will provide input parameters and comparative results, such as:

(1) Experimental measurement of rock properties, in particular high velocity sliding friction, using one of the most advanced world-wide friction testing machine installed at INGV (SHIVA, which is designed to simulate seismic slip in the laboratory[3]

(2) Field observations and LASERSCAN digital mapping of fault architecture, structure and geometry;

(3) Rock-analogue experiments simulating dynamic rupture within small-scale models of fault. These will provide calibration and comparative tests for the numerical code;

(4) Revision of the source process of mega-thrust tsunamigenic earthquakes (e.g. Tohoku Mw 9.0 2011);

(5) Analysis of the impact of the improved source modeling on PTHA and related uncertainties.

The research project will be coordinated by

Dr. Stefan Nielsen Durham University Earth Sciences stefan.nielsen@durham.ac.uk	Dr. Stefano Lorito (ASTARTE PI for INGV) INGV Seismology and Tectonophysics Dept. Roma1 stefano.lorito@ingv.it
Dr. Giulio Di Toro (NOFEAR PI) Università degli Studi di Padova Dipartimento di Geoscienze giulio.ditoro@unipd.it	Dr. Alessio Piatanesi INGV Seismology and Tectonophysics Dept. Roma1 alessio.piatanesi@ingv.it

Applicants should preferably have completed a PhD in Earth sciences, geophysics, physics, mathematics, engineering or related fields, or expect to do so by February 2014. Applicants without a PhD will be considered in very exceptional circumstances (i.e., sound knowledge of modeling techniques).

Candidates should be skilled in numerical analysis and modeling, typically involving elastodynamics. Experience in the use of advanced methods such as partition of unity, discontinuous Galerkin, boundary integral elements, finite elements, finite volumes and complex meshing algorithms are desirable.

(3) http://roma1.rm.ingv.it/laboratories/hp-ht-lab/laboratori/laboratorio-hp-ht/usems/the-shiva-apparatus

Call 2): Probabilistic Tsunami Hazard Analysis (PTHA)

The goal of this Post-Doctoral research is to develop innovative methods for PTHA and related epistemic uncertainties, with applications to the Italian coasts. The successful applicant will join a multi-disciplinary team of researchers with different backgrounds, ranging from seismic source characterization and modeling, tsunami science, hazard, multi-hazard and multi risk assessments. The team is involved in several related European and Italian research projects and it also leads the implementation of the National Tsunami Warning Centre (Centro Allerta Tsunami, CAT) at the 24/7 seismic monitoring centre of INGV Rome. During 2014 CAT will start operating as a candidate Tsunami Watch Provider in the frame of NEAMTWS (http://neamtic.ioc-unesco.org).

The research project will be coordinated by

Dr. Roberto Basili INGV, Seismology and Tectonophysics Dept. Roma1 roberto.basili@ingv.it	Dr. Stefano Lorito INGV, Seismology and Tectonophysics Dept. Roma1 stefano.lorito@ingv.it	Dr. Jacopo Selva INGV, Bologna Section jacopo.selva@bo.ingv.it

We invite applicants with background in geophysics, physics, geology, mathematics, or related fields.

Requirements:

- Degree in Earth sciences, physics, mathematics or related fields
- A PhD degree at the time of the appointment in Earth sciences, physics, mathematics or related fields is preferable. Applicants without a PhD will be considered in very exceptional circumstances (e.g., sound knowledge of the required disciplines).
- Experience, skills and knowledge (Essential):
    - Basic knowledge on the analysis/modeling of seismic sources
    - Basic knowledge on Probabilistic Hazard Assessments in the fields of natural hazards or in probabilistic modeling in Geosciences
    - Experience in scientific programming (e.g. Matlab, Python, Fortran, MPI)
    - Excellent written and spoken English skills
    - Motivation to work in an international and interdisciplinary team
- Experience, skills and knowledge (Desirable)
    - Experience in seismic or tsunami Probabilistic Hazard Assessments
    - Experience in tsunami modeling
    - Experience in Bayesian Inference

Synopsis of ASTARTE *(http://www.astarte-project.eu):*

The ultimate goals of ASTARTE are to reach a higher level of tsunami resilience in the North-East Atlantic (NEAM) region, which includes the Mediterranean Sea, to improve preparedness of coastal populations and, ultimately, to help saving lives and assets. The main objectives are: (i) Assessing long term recurrence of tsunamis; **(ii) Improving the identification of tsunami generation mechanisms; (iii) Developing new cost-effective computational tools for hazard assessment;** (iv) Ameliorate the understanding of tsunami interactions with coastal structures; (v) Enhance tsunami detection capabilities, forecast and early warning skills in the NEAM region; (vi) Establishing new approaches to quantify vulnerability and risk and to identify the key components of tsunami resilience and their implementation in the NEAM region.

Synopsis of NOFEAR:

With an average toll of 80.000 deaths per year over the last decade, earthquakes remain one of the most dreadful geohazards. The advancement of earthquake risk assessment and forecasting methods (probability estimates that a mainshock may occur in terms of hypocentre location, magnitude and time) calls for a sound physical basis. The nucleation, propagation and arrest of an earthquake rupture results from the interplay of stress perturbations, micro- to macro-scale friction- and rupture-related processes and fault zone geometrical complexity. Most of the information about these parameters is out of reach of seismic waves and geophysical analysis. Here we aim at enhancing our knowledge of earthquake physics (from nucleation to arrest) by means of a multidisciplinary approach that includes:
1) experiments to investigate earthquake nucleation by reproducing crustal (pressure, temperature, presence of fluids, stress perturbations, etc.) deformation conditions with the most powerful earthquake simulator installed worldwide (SHIVA);
2) experiments to investigate rupture propagation on simulated faults using natural rocks and small-scale analogue models;
3) field studies of exhumed seismogenic sources to quantify the geometrical complexity of natural fault zones;
4) advanced numerical simulation techniques that will integrate the above information and allow up-scaling to natural faults. The numerical models will produce physically-based earthquake simulations that will be compared with high-resolution seismic data.
By reproducing crustal deformation conditions (stress, temperature, fluid pressures, etc.) in the laboratory and by monitoring acoustic emissions, gases, electromagnetic waves, etc., produced by the rock samples during deformation, a by-product of our research will be the systematic investigation of precursory phenomena (seismic, chemical, and electromagnetic) associated to earthquake nucleation processes.