



**Open call for four PhD fellowships in Experimental Condensed Matter Physics at University of L'Aquila and Forschungszentrum Jülich within the National Interest Doctorate "Materials, Sustainable Processes, and Systems for the Energy Transition" of Politecnico Torino (deadline July, 17<sup>th</sup> 2023)**

**THE NATIONAL INTEREST DOCTORATES**

National Interest Doctorates are new Italian doctoral programmes designed and established by a consortium of Universities and high-quality research institutions of recognized international standing. These programs involve the sharing of educational and research activities, the regulation of financial support mechanisms, and the exchange and mobility procedures for doctoral candidates, with the aim of contributing to the advancement of research. See <https://www.dottoratinazionali.it/> for further details. Specifically, the National Interest Doctorate in "**Materials, Sustainable Processes, and Systems for the Energy Transition**" has been activated for the 39<sup>th</sup> PhD cycle and it is administratively based at the Politecnico Torino. This program is a collaborative effort among a consortium of prestigious institutions, which include Politecnico Torino (administrative headquarters), Consiglio Nazionale delle Ricerche (National Research Council), Istituto Italiano di Tecnologia (Italian Institute of Technology), Istituto Nazionale di Ricerca Metrologica (National Institute of Metrological Research), Università degli Studi dell'Aquila (University of L'Aquila), Università degli Studi di Bologna (University of Bologna), Università degli Studi di Napoli Federico II (University of Naples Federico II), Università degli Studi di Palermo (University of Palermo), Università di Roma La Sapienza (University of Rome La Sapienza), Università degli Studi del Salento (University of Salento), Università degli Studi di Torino (University of Turin).

These top-level Italian institutions will work together to provide a unique learning environment, where doctoral candidates can engage in innovative research and education in materials, sustainable processes, and systems for the energy transition.

Candidates are exposed to a wide range of academic and research activities, including workshops, seminars, lab work, field studies, and conferences. They have the opportunity to work with experts in their field and use state-of-the-art facilities to conduct research that contributes to the advancement of energy transition technologies. Financial support mechanisms are in place to ensure candidates can focus on their studies and research. These include additional funds to support research activities and travel allowances for attending conferences and research visits at partner institutions. The program also encourages exchange and mobility procedures, providing doctoral candidates with opportunities to study and conduct research at partner institutions both in Italy and abroad. This allows candidates to expand their academic network, gain diverse perspectives, and enhance their research skills in an international context. Overall, the National Interest Doctorate in "Materials, Sustainable Processes, and Systems for the Energy Transition" aims to equip candidates with the knowledge and skills to contribute significantly to the energy transition, helping to address one of the most pressing challenges of our time, with advantages compared to a traditional PhD.

### PHD FELLOWSHIPS AT UNIVERSITY OF L'AQUILA, ITALY AND FORSCHUNGSZENTRUM JÜLICH, GERMANY

The doctoral candidates funded by University of L'Aquila will be recruited by Politecnico Torino and will work at the University of L'Aquila. Founded in 1596 and located in L'Aquila, administrative center of the Abruzzo Region, University of L'Aquila (UNIVAQ) is a public teaching & research institution offering a full range of academic programs, with 19,000 enrolled students. L'Aquila is located at only 100 km from Rome (capital city of Italy), whose center can be reached in only 75 minutes by car. The main part of the PhD research (18 months) will be performed at Department of Physical and Chemical Sciences (DSFC) of University of L'Aquila, under the supervision of Prof. Antonio Politano ([antonio.politano@univaq.it](mailto:antonio.politano@univaq.it)). See the group webpages on ResearchGate and Google Scholar <https://www.researchgate.net/profile/Antonio-Politano> (ResearchGate)

<https://scholar.google.com/citations?user=pTRV048AAAAJ&hl=en> (Google Scholar)

See also the Twitter profile <https://twitter.com/Surface2d>

A unique opportunity for the selected doctoral candidates is the 12-month research period at Forschungszentrum Jülich in Germany. Forschungszentrum Jülich (FZJ), a member of the Helmholtz Association, is a national research institution based in Germany that conducts interdisciplinary research. It is one of the largest research institutions in Europe with approximately 6,800 employees across ten institutes and 80 subinstitutes. More specifically, the doctoral candidates will work on the Peter Grünberg Institute (PGI, formerly directed Peter Grünberg, Nobel Prize in Physics). PGI at FZJ

has the main goal to discover and understand new phenomena in condensed matter, the development of novel materials and functional structures at the nano- and quantum-scale as well as innovation in experimental methods.

Forschungszentrum Jülich has been central in the development of High-Resolution Electron Energy Loss Spectrometer (HREELS). HREELS is a surface sensitive technique, which is well established for measuring for example vibrations of adsorbed species, surface phonons, and plasmons. Traditional HREELS is a dedicated setup, achieving angular resolution by mechanically rotating a single channel energy analyser. Operating such a setup is both time consuming and limits the angular resolution.

Very recently, Forschungszentrum Jülich has realized a new HREELS spectrometer with parallel readout of momentum and energy, which represents a significant technical upgrade with great potential in the investigation of collective excitations in quantum materials, with a giant improvement of several aspects of data acquisition in term of acquisition time, momentum and energy resolution, and control of experimental parameters. This state-of-the-art instrument is uniquely equipped to reveal the dispersion of plasmons and phonons in new quantum materials by probing a wide range of wave vectors, from the center to the boundary of the Brillouin zone in a single frame. Such a state-of-the-art instrument, unique in the world, will be available for the selected four doctoral candidates, providing them a highly competitive tool for top-level research

## REQUIREMENTS

- Master's degree in Physics or related subjects. **Candidates remain eligible even if they are expected to receive their master's degree by October 31st, 2023.**
- An excellent expertise in Surface Science and, more generally, in two-dimensional and topological materials, nanoscience, synchrotron light, and electron spectroscopies (in particular, HREELS, but also XPS and ARPES), for both *in situ* experiments in ultra-high vacuum and *operando* conditions
  - Knowledge of software for advanced data processing
  - Aptitude for teamwork
  - Excellent communication and social skills
  - Fluency in English – written and oral

## CONDITIONS OF EMPLOYMENT

The successful candidate will receive a **net monthly salary of 1195 euro for the period in Italy and 1792 euro for the period in Germany**

**Starting date** : November, 2<sup>nd</sup> 2023

## APPLICATION PROCEDURE – DEADLINE JULY, 17th 2023

- **Application Submission:** The application process is done through an online system called Apply available from (<https://www.polito.it/didattica/dottorato-di-ricerca-e-scuola-dispecializzazione/ammissione-al-dottorato/ammissione/bando->

di-concorso-dottorato-nazionale). . All documents must be included in a single .pdf file and uploaded in the "Attachments" section of the Apply system. The application must contain all the necessary elements for the evaluation of the title that you intend to produce and to verify its truthfulness.

- **Application Fee:** For each doctoral course for which you intend to apply, a non-refundable payment of € 30.00 must be made online at the end of the electronic registration procedure. The payment can be made by credit card (or other forms of payment provided by the PagoPA platform), which results in an immediate payment, or pre-printed payment notices (MAV on the PagoPA platform), which result in a deferred payment. The registration procedure is considered validly concluded only after the payment has been made, after which it is no longer possible to modify your application.
- **Evaluation Process:** The evaluation process consists of the assessment of the documentation attached to the application and an interview. The evaluation is carried out by a judging commission appointed by Rectoral Decree. The judging commission can assign a maximum of 100 points, as it follows:
  - I. Titles (Max. 30 points)
  - II. Report on scientific interests and motivations to carry out the doctorate (Max. 30 points)
  - III. Interview (Max. 40 points)

Only candidates who obtain at least 40 points from the sum of the evaluations of the titles, the report, and the reference letters are admitted to the interview.

- **Interview:** The interview is about the professional and academic curriculum, the scientific and cultural interests of the candidate, and it verifies the possession of the basic disciplinary knowledge necessary for the attendance of the doctoral course and for the execution of the specific research themes provided by the thematic scholarships indicated by the candidate through the Apply procedure or also not optioned but directly verified by the Commission during the interview. The interview is considered passed with a minimum score of 28 points.
- **Results:** The list of candidates admitted to the interview is published on the Politecnico di Torino website at the webpage <https://www.polito.it/didattica/dottorato-di-ricerca-e-scuola-di-specializzazione/ammissione-al-dottorato/ammissione/risultati-e-graduatorie>

#### DETAILED INFORMATION

**Contact person:** prof. Antonio Politano ([antonio.politano@univaq.it](mailto:antonio.politano@univaq.it))

**Call:** <https://www.polito.it/en/education/phd-programmes-and-postgraduate-school/admissions-to-phd-programmes/admissions/call-for-applications-national-phd-programmes>