1 Early Stage Researcher position available as PhD scholarship, University of Milan

The position is part of a Marie Skłodowska-Curie ITN European Training Network of 15 ESR PhD students (ColOpt)

University of Milan (UMIL), Department of Physics

One doctoral position is available in the European Training Network (ColOpt) funded in the framework of H2020 Marie Skłodowska-Curie ITN programme to which PhD students are to be recruited. After the selection procedure, the admission process to doctoral education will commence.

The ColOpt network

The network “Collective effects and optomechanics in ultra-cold matter” (ColOpt) involves twelve different partners from six European countries (Austria, France, Germany, Italy, UK, Switzerland). The research program of ColOpt focuses on collective interactions of light with laser-cooled cold and quantum-degenerate matter. A particular novelty is the integration of classical and quantum self-organization. It will explore innovative control of matter through optomechanical effects, identify novel quantum phases, enhance knowledge of long-range coupled systems and advance the associated trapping, laser and optical technologies, establishing new concepts in quantum information and simulation.

Project description

The position opened at the Applied Quantum Mechanics group of the Department of Physics of the Università degli Studi di Milano is aimed at the theoretical study of Collective atomic recoil lasing in 3D ultra-cold atomic clouds. The candidate will explore emergent behaviors arising via collective scattering at high densities of scatterers. Inducing cooperativity in a coherent system of ultra-cold atoms driven by external lasers may enhance enormously their response to the external input, with large impact at the frontiers of the atomic physics, synchronization dynamics, transport in highly scattering media and disordered systems, as well as gates and memory devices for quantum information. More specifically, it will investigate the transition from isotropic spontaneous emission to directional collective recoil lasing in free space, to understand the onset of cooperativity in a disordered system when the atomic recoil becomes the dominant process.

Research group

The PhD student will be placed at the Department of Physics, University of Milan, in the Applied Quantum Mechanics group (users.unimi.it/agm) under the supervision of dr. Nicola Piovella. The University of Milan (www.unimi.it) is a public teaching and research-intensive university, the only Italian among the 21 prestigious members of LERU (League of European Research Universities), and an internationally high-ranked university for scientific productivity. The Department of Physics www.fisica.unimi.it is one of the largest and most productive Physics Departments in Italy with a PhD School in “Physics, Astrophysics and Applied Physics” which offers a broad range of courses on core physics disciplines and complementary skills (phd.fisica.unimi.it). The School has been active at the University of Milano since 1983, and it currently involves about 60 students as well as about 70 faculty as supervisors and/or teachers. The recruited PhD student will be enrolled in the PhD program. The group of Nicola Piovella has a long dated expertise in theoretical studies on quantum optics and cold matter physics, including cooperative scattering of light, collective recoil lasing and free electron lasers.

Ideal candidate
We are looking for an excellent and highly motivated candidate with a physics degree and strong interest and experience in at least some of the areas of atomic physics, nonlinear optics, laser physics and the emerging quantum technologies. We expect dedication and enthusiasm for experimental research combined with openness and curiosity and the ability and willingness to work in a team. Computational skill with the main scientific numerical programs (Fortran, Mathematica, Matlab) will be appreciated.

Training provided

The research training provided will comprise a broad portfolio of technical and transferable skills training on local and network level. The project will be part of a vibrant and stimulating international and inter-sectorial collaboration preparing excellently for a broad range of academic and industrial careers. Strong participation of non-academic partners and the interaction of academic and industrial partners is meant to raise awareness of career opportunities and to foster a culture of knowledge exchange and fruitful interaction between the academic and private sector, in particular to drive the emerging quantum technologies. The researcher is expected to attend about two network events per year and to interact with the partners at these meetings, via electronic media and secondments. Planned secondments are to our partners in Nice (INLN, France), Sao Carlos (IFSC, Brazil), Innsbruck (UINN, Austria), Universitat des Saarlandes (USAAR, Germany) and to NPL (UK).

The successful candidate will be an employee of the Università degli Studi di Milano and will be paid in accordance with the MSCA rules. The contract period will be for 36 months. The candidate will be enrolled in the PhD program of the Department of Physics under the supervision of dr. Nicola Piovella. CoOpt is aiming to have the positions filled till August 2017 but there is flexibility of an earlier or potentially slightly later start, if required by personal circumstances.

Admission criteria

In order to apply for a place in the PhD programme, students must have a second-level degree or an equivalent qualification by study level (Master’s Degree) from a foreign University. Candidates can be of any nationality but need to demonstrate transnational mobility, i.e. move from one country to another when taking up their appointment. At the time of recruitment by the host organisation, candidates must not have resided or carried out their main activity (work, studies, etc.) in the country of their host organisation for more than 12 months in the 3 years immediately before the reference date. Compulsory national service and/or short stays such as holidays are not taken into account. In addition, the candidates must be in the first four years (full-time equivalent research experience) of their research careers and have not been awarded a doctoral degree. This time is measured from the date when the researcher obtained the degree entitling him/her to embark on a doctorate, either in the country in which the degree was obtained or in the country in which the researcher is recruited.

The suitability of the foreign academic qualifications in terms of content is appraised by the Examining Board constituted for admission to each PhD programme, in compliance with the regulations in force in Italy and in the country in which the academic qualification was issued, and the international treaties or agreements pertaining to the conferment of qualifications for the continuation of studies. Good proficiency in written and spoken English is required (level B2).

How to apply

The applicant must send the following documents (if possible included in a single zipped file attachment) to Dr. Nicola Piovella (nicola.piovella@unimi.it) by April 1st, 2017:
1) an updated CV;
2) a letter giving reason for his/her motivation for the post;
3) at least 2 reference letters (in English), at least one of them from one former supervisor and/or lecturer;
4) the scan of the degree (usually the Master Degree) which would formally entitle him/her to embark on a doctorate, either in the country in which the degree was obtained or in the country in which the researcher will be recruited.
5) a document indicating his/her ranking and marks within his/her last year at his/her Master Degree as well as the courses/modules they have attended (optional).
6) a summary of the Master Degree thesis or a brief description of the past scientific activity (this can also be included in the CV).

ColOpt is devoted to promote gender equality and diversity and encourages female researchers to apply.

**Assessment criteria**
Applications must be in English and will be evaluated against the following criteria:
- educational record;
- scientific quality of the applicant’s CV;
- expected individual impact and benefit to the fellow and to the project.
- previous experience in the subject of ColOpt research programme.

For more information contact dr. Nicola Piovella at nicola.piovella@unimi.it