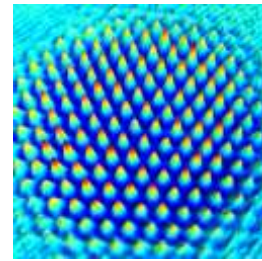




The European Training Network



## ColOpt

### Collective effects and optomechanics in ultra-cold matter

**is inviting applications of highly qualified and ambitious early stage researchers for three year research or research & development projects. In total 15 positions are available at 12 partners. Candidates hosted at university nodes are expected to participate in the PhD programme of their host institution.**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 721465 and is starting on 1/1/2017.

#### Project description

ColOpt will train early-stage researchers (ESR) in fundamental science and applications in the areas of cold atom and quantum physics, optical technologies and complexity science to promote European competitiveness in emergent quantum technologies. It consists of nine research-strong academic nodes and three leading technology companies from six European countries, supported by two partners in Brazil and the USA, five further non-academic partners and one public-private partnership.

Collective, nonlinear dynamics and spontaneous self-organization are abundant in nature, sciences and technology and of central importance. Building on this interdisciplinary relevance, a particular novelty of ColOpt is the integration of classical and quantum self-organization. The research program focuses on collective interactions of light with laser-cooled cold and quantum-degenerate matter. We 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. Four scientific work packages will look into spatial self-organization, novel trapping schemes and complex light fields, collective scattering and coupled dipoles and the advancement of the underpinning laser technology.

#### 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. Major secondments to partners, in particular inter-sectorial placement are an intrinsic part of the network experience.

### **Who can apply**

We are looking for excellent and highly motivated candidates with a physics (or possibly for the industrial R&D projects a closely related degree as electric engineering) and strong interest and experience in at least some of the areas of atomic physics, nonlinear optics, laser physics and quantum physics and the emerging quantum technologies. We expect dedication and enthusiasm for experimental or theoretical research combined with openness and curiosity and the ability and willingness to work in a team. Researchers with an excellent BSc degree and the appropriate background can be considered without having a Master degree by some of the partners.

As the project is funded within the Marie Skłodowska Curie Actions (MSCA), researchers 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, researchers 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 researcher 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.

### **Working conditions and benefits**

The successful candidate will be a full time employee and will be paid minimum in accordance with the MSCA rules. The contract period will be for 36 months.

ColOpt 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.

### **How to apply**

Applications are made to the individual nodes with the contact details and weblinks for applications given below. Deadlines for applications are between February and April 2017 and applications are considered until the positions are filled.

Typical material required are a CV and 1-page cover letter (including names and contact details of at least two references) and a copy of your BSc and MSc (if applicable) degree certificate and transcript. If an applicant wants to be considered across the network, if unsuccessful at a particular node, please mention that in your application so that the information can be shared across the network.

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

For more information contact Prof. Thorsten Ackemann at [thorsten.ackemann@strath.ac.uk](mailto:thorsten.ackemann@strath.ac.uk).

## List of CoOpt beneficiaries and contact and application details

The list will be updated with links as soon as detailed application information is coming in from the participating partners.

1. [Department of Physics](#), University of Strathclyde, Glasgow, Scotland, UK  
(coordinator)  
Main contact: Prof. [Thorsten Ackemann](#)  
*Self-organized spin and density ordering of thermal atoms in cavities*  
Main contact: [Dr Gordon Robb](#)  
*Optomechanics and nonlinear optics involving orbital angular momentum*
2. [Department of Physics and Astronomy](#), University of Glasgow, Glasgow, Scotland, UK  
Main contact: [Dr. Sonja Franke-Arnold](#)  
*Phase coherent generation and atomic storage of structured light*
3. [Institut Non Lineaire de Nice](#), CNRS, Valbonne, France  
Main contact: [Dr. Robin Kaiser](#)  
[PhD on Radiation pressure instabilities in cold atoms](#)  
[PhD on Cooperative scattering of light in cold atomic clouds](#)
4. [Dipartimento di Fisica](#), Universita degli Studi di Milano, Milano, Italy  
Main contact: [Prof. Nicola Piovella](#)  
*Collective recoil lasing in 3D ultracold atomic clouds*
5. [Institut fuer Angewandte Physik](#), Westfaelische Wilhelms-Universitaet Muenster, Muenster, Germany  
Main contact: [Prof. Cornelia Denz](#)  
*Structured light for optical trapping*
6. [Physikalisches Institut](#), Eberhard Karls Universitaet Tuebingen, Tuebingen, Germany  
Main contact: [Dr. Sebastian Slama](#)  
*Novel dipole traps for ultracold atoms*
7. [Theoretical Physics](#), FR 7.1, Universitaet des Saarlandes, Saarbruecken, Germany  
Main contact: [Prof. Giovanna Morigi](#)  
*Quantum interference in optically dense media*  
*Quantum correlations between spins and motion in cavity optomechanics*
8. [Institute for Quantum Optics](#), ETH Zuerich, Zuerich, Switzerland  
Main contact: [Prof. Tilman Esslinger](#)  
[Experimental PhD position in quantum simulations of long-range interacting many-body systems](#)
9. [Institute for Theoretical Physics](#), Universitaet Innsbruck, Innsbruck, Austria  
Main contact: [Prof. Helmut Ritsch](#)  
[PhD opportunity in theory of cavity assisted atomic selfordering](#)
10. [M Squared Laser Ltd.](#), Glasgow, Scotland, UK  
Main contact: [Dr. Nils Hempler](#)  
*Ti:Sapphire and VECSEL technology for cold atom applications*
11. [Toptica Photonics AG](#), Munich, Germany  
Main contact: [Dr. Juergen Stuhler](#)  
*High power tunable diode lasers for rubidium applications*
12. [Holoeye Photonics AG](#), Berlin, Germany  
Main contact: [Dr. Grigory Lazarev](#)  
*Optimization of LCOS spatial light modulators towards photonic applications*