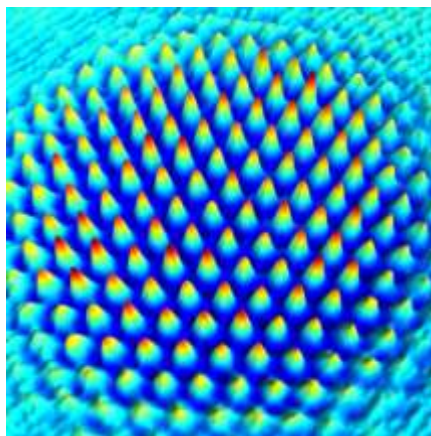


## Collective effects and optomechanics in ultra-cold matter (CoOpt)

CoOpt is European Training Network (ETN) funded within the Innovative Training Network scheme H2020-MSCA-ITN-2016 of the Marie Skłodowska Curie Actions (MSCA). It 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 academic nodes and three 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 CoOpt 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

1. Spatial self-organization.
2. Novel trapping schemes and complex light fields.
3. Collective scattering and coupled dipoles.
4. Laser technology.



[Spontaneously emerging ordered phase from optomechanically mediated light-matter interaction.](#)  
(Institut Non Lineaire de Nice and University of Strathclyde)

CoOpt combines cutting-edge science with training in complex instrumentation and methods to the highest level of technical expertise, both experimentally and theoretically, and fosters the development of transferable skills and critical judgement. Each ESR will be exposed to a broad spectrum of experimental, theoretical and industrial environments, to obtain core competence in one of them and the collaborative experience and skills to thrive in a truly international and intersectorial framework. ESRs will develop the capabilities to analyse and understand complex interactions, and will gain awareness of societal and entrepreneurial needs and opportunities. Taken together, this will enable them to excel in a variety of sectors of our diverse and rapidly changing society.

Subject to the finalization of the signature process, the expected starting date is 1/1/2017.

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Academic partners in non-EU countries are

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Further partners deliver specialized training and provide secondment opportunities: Rofin-Sinar Laser GmbH, Quantel SA, Barracuda Networks AG, Torggler and Hofinger, Forschungszentrum für Künstliche Intelligenz GmbH, National Physics Laboratory (NPL).