Winter school

Collective Effects, Structured Light and Quantum Matter

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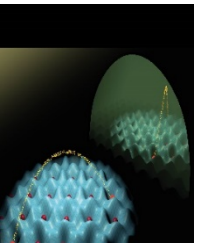
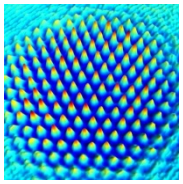
Welcome to Herrsching am Ammersee



Winter (spring?) school

Collective Effects, Structured Light and Quantum Matter

- ColOpt European Training Network
- Housekeeping
- Aim and scope of school
- Speakers
- Remarks on program
- Social event at Kloster Andechs
- Sponsors



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ColOpt

ColOpt European Training Network

- ColOpt = **Collective Effects and optomechanics in ultracold matter**
- Cohort of **15 early stage researchers**, post-Master, pre-Doc
- Research and training network (ETN)
  - Individual research project at institution, stand-alone and collaborative
  - Network training events (≈ network grad school)
- Funded by the EU H2020 Marie Sklowskda-Curie Actions
- Multiple partners: 12 beneficiaries
  + 2 academic third country partners
  + 8 further European partners
- Inter-sectorial (academic + industry)
- 4 year project (1/1/2017-31/12/2020)
- Website https://www.colopt.eu/

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ColOpt Beneficiaries

- Nine academic beneficiaries
  - o University of Strathclyde (coordination)
  - o University of Glasgow
  - o Institut de Physique de Nice, CNRS
  - o Universita degli Studi di Milano
  - o WWU Muenster
  - o Eberhard Karls Universitaet Tuebingen
  - o Universitaet des Saarlandes
  - o ETH Zuerich
  - o Universitaet Innsbruck
- Three industrial beneficiaries
  - o M Squared Lasers Ltd
  - o Toptica Photonics AG
  - o Holoeye Photonics AG

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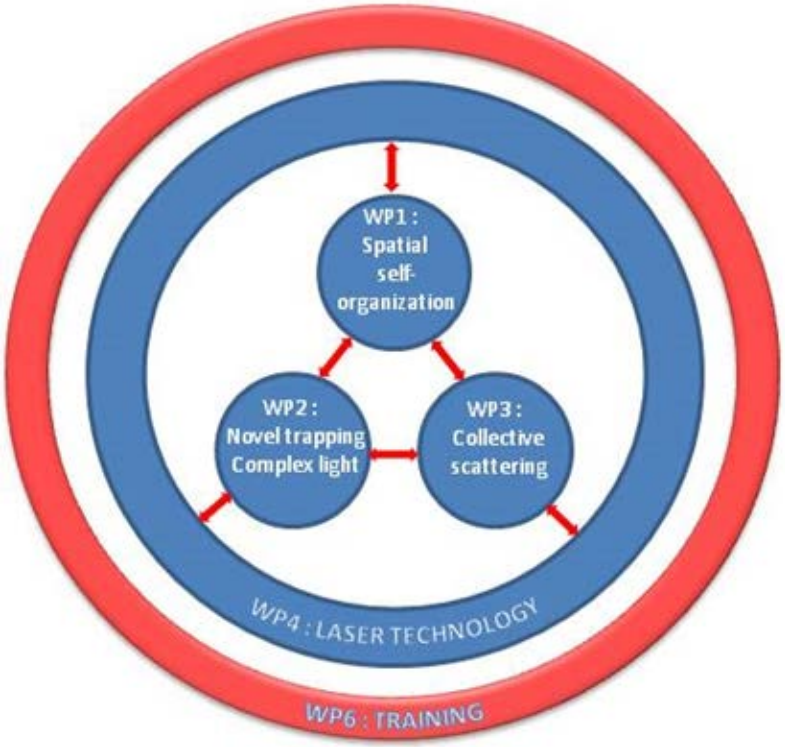
ColOpt Research and Training Vision

Research Vision

to advance the fundamentals and applications of mesoscopic cold atom physics, out-of equilibrium quantum physics, quantum technologies and the understanding of complex nonlinear systems



Training Vision

to train highly competent researchers with a wide range of experimental and theoretical/computational skills relevant to cold atom physics, optics, photonics, and quantum technologies

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ColOpt Objectives

- Connect and integrate classical, semiclassical and quantum self-organization

interdisciplinary

- Demonstrate novel phase transitions and quantum phases: supersolids, long-range coupling, competing length scales and disorder

Quantum simulation

- Advance out-of-equilibrium and nonlinear quantum physics and the corresponding quantum technologies

Open quantum systems

- Advance the knowledge of light-matter interaction including momentum states and cavity cooling

Optomechanics

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ColOpt Objectives II

- Demonstrate unprecedented control of matter via self-assembly and complex structured light fields

Optomechanics and quantum interference in complex light fields

- Provide an understanding of transport properties of light in dense, disordered sample and the possibility of the complete suppression of transport (so-called Anderson localization)

Collective scattering

- Advance the underpinning technology by providing lasers and spatial light modulators with either higher performance or better usability and affordability

(Quantum) Technology

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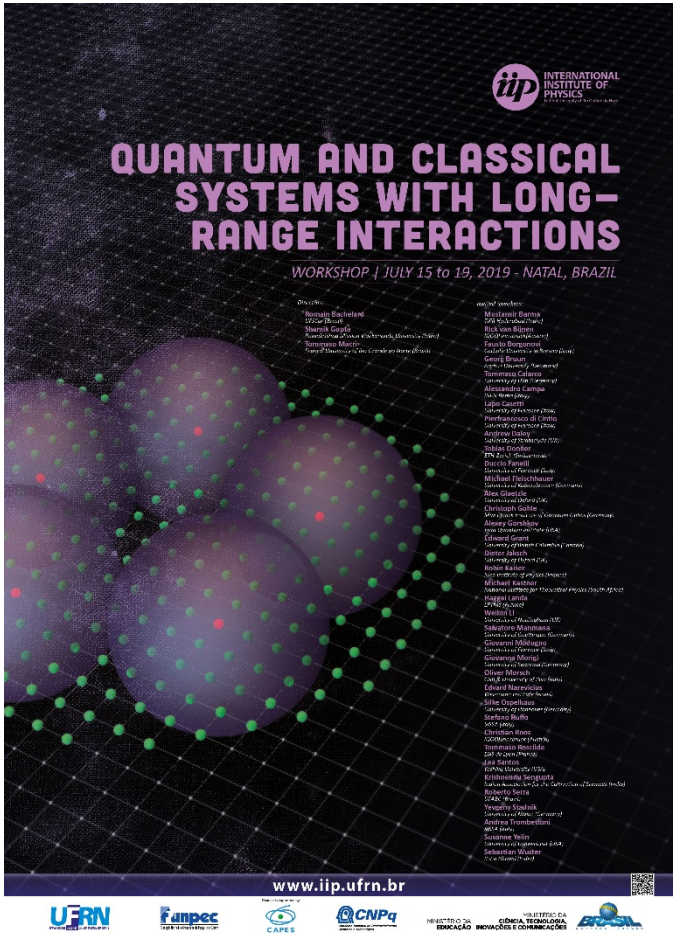
Other partners and upcoming event

- Third country partner 1:
  Mark Saffman (Wisconson-Madison, USA)
- Third country partner 2:
  Philippe Courteille, Romain Bachelard
  (Sao Carlos, Brazil)
- Secondment opportunities,
  scientific collaboration
- Upcoming event
  - Quantum and classical systems with long-range interactions
  - 15-19 July 2019, Natal, Brazil
  - https://www.iip.ufrn.br/eventsdetail.php?inf===QTUFFN



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ColOpt

Winter School: Collective Effects, Structured Light and Quantum Matter

- **Aim:**
  Put ColOpt research into broader context and connect to community
- Program Committee
  - o T Ackemann, G. R. M. Robb (Strathclyde) (chairs)
  - o T. Donner (ETH Zuerich)
  - o R. Kaiser, W. Guerin (INPHYNI, CNRS)
  - o Christoph Raab (TOPTICA)
  - o Francesco Rosati (ESR USAAR)
  - o Valeria Bobkova (ESR UMUEN)
- Organizing committee
  - o **Nicola McRobbie** (Strathclyde)
  - o Valeria Bobkova (ESR UMUEN)
  - o Antonello Matteo (ESR Toptica)
  - o Eric Bourguignon (Toptica)

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Speakers

1. Andrew Forbes (Wits)
Manipulating Structured Light

2. Tilman Esslinger (ETH Zuerich)
Building quantum systems from scratch: supersolids and more

3. Susanne Yelin (Connecticut, Harvard)
Controlling light and matter using cooperative radiation

4. Francesco Piazza (MPI Dresden)
Quantum Nonlinear Optics

5. Peter Barker (UCL)
Levitated quantum optomechanics with nanoparticles

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Young Scientist Speakers

Alexandra Sheremet,
(Institut Langevin, Paris)
Collective light-matter interface coupled to a nanophotonic waveguide

Monika Aidelsburger
(LMU Munich and MPI Quantum Optics)
Artificial gauge fields with ultracold atoms in optical lattices

Graham Bruce
(St Andrews)
Making the most of interference: the application of laser speckle and computer-generated holography to cold atoms, optical trapping and precision metrology

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Career Speakers

Andreas Aumann, BMW
Vice President Product Management BMW i, eMobility
From a PHD in AMO physics to a career in automotive management

Juergen Stuhler, Toptica Photonics
Senior Directior Quantum Technologies
Careers in industrial laser development and quantum technologies

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Some housekeeping

Breakfast:

07:30 – 08:30 hours

Access

- 24 hour with Room key
- Please note the main door is locked at 22:00 hours but your room key opens the door
- Ground floor (lecture and poster area) closes 22.00

Fire alarm

- vacate building, no trials scheduled

Check-out

- Saturday morning: 09.00
- If you leave before Saturday morning, please let us know, if you did not already

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In-house facilities

- Bierstube (honesty bar)
- Terasse (from Wednesday)
- TV and pool rooms
- Laundry room

Other facilities **please ask at reception**:

- Bowling
- Sauna and Steam room (min. 30 minutes notice)
- Gym

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Poster session

Poster Presentations

To help us with the review of the posters we request that you:

- Mount the poster on the board allocated to you.
- Display the poster for the duration of the event

The list of poster board allocations is on display.

- **Prizes for two best posters**

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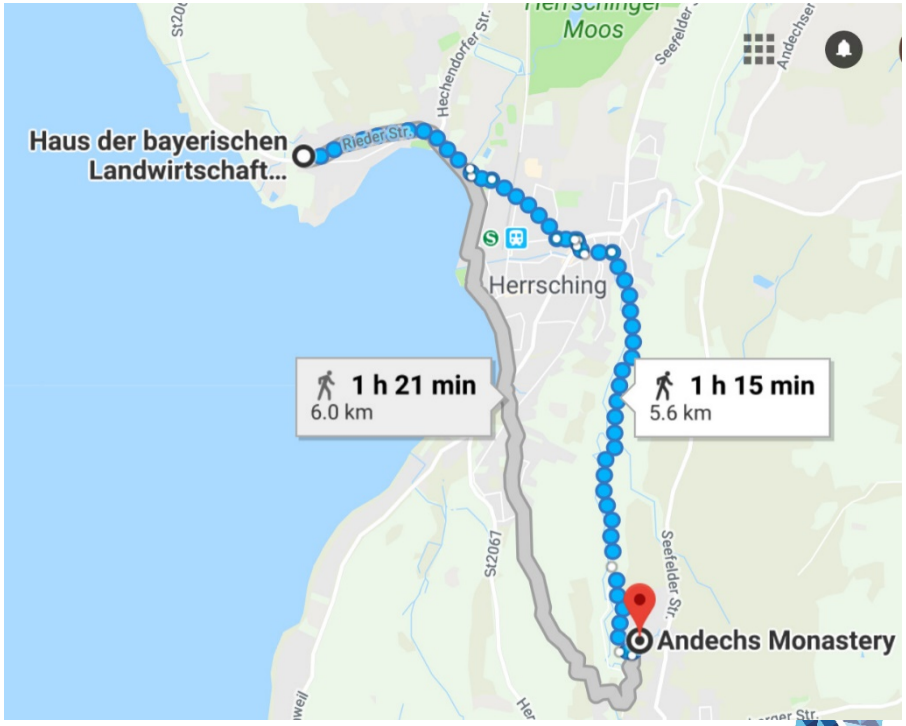
Social event: Kloster Andechs

- Benedictine priory and place of pilgrimage
- Also known for its Kloster brewery
- Bus leaving Tue 16.30 (**earlier than programme**)
- €25 food&drink voucher
- Closing 20.00

Walking?

Kienbachtal



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Sponsors

- Main sponsor: ColOpt
- Optical Society OSA:
  Costs for Andrew Forbes
- MSquared Lasers:
  developing country scholarship
- Scottish University Physics Alliance SUPA
  costs for Graham Bruce, support of Scottish students
- Institute of Physics IOP, Quantum Electronics and Group: poster and talk prizes
- Institute of Physics IOP, Quantum Optics, Quantum Information, and Quantum Control Group: talk prize, speaker support
- Organizational support: Toptica Photonics
- Advertisement: EPS Young Minds

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Any questions?

Everything sorted?!

- Enjoy the science …..
- Make friends …
- Have fun …

Let's roll …

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