

Workshop

Isolated quantum systems and universality in extreme conditions (ISOQUANT)

Universitätszentrum Obergurgl, 19.-24. February 2017

Objectives: In recent years we have witnessed a dramatic convergence of research on quantum systems in extreme conditions across traditional lines of specialization. The associated non-linear dynamics is scale invariant showing universal properties, which are independent of details of the underlying physical system. Common aspects may be observed in diverse applications – ranging from table-top experiments with ultra-cold quantum gases to quark-gluon plasmas created in collisions of ultra-relativistic nuclei at giant laboratory facilities – even though the typical energy scales and microscopic degrees of freedom vastly differ. The workshop will bring together the different theoretical approaches and experimental techniques probing Isolated quantum systems under extreme conditions.

Far from equilibrium dynamics and thermalization in isolated quantum systems

- *Initial state and thermalization process in heavy-ion collisions:* Berges, Masciocchi, Stachel
- *From QCD transport to particle yields:* Pawlowski, Stachel
- *Non-equilibrium dynamics and thermalization in many-body quantum systems:* Schmiedmayer
- *Probing quantum phase transitions with quenches: entanglement generation and universality far from equilibrium* Gasenzer, Oberthaler
- *Dynamics of quantum spin systems with long-range interactions* Weidemüller

Quantum systems with strong fields

- *Precision physics in strong field QED and limits on the time variation of fundamental constants,* Blaum, Crespo, Wetterich
- *Strong-field physics with nuclei and highly charged ions,* Evers, Keitel, Palffy-Buß
- *Quantum dynamics of strong gauge fields and condensates,* Berges, Pawlowski
- *Cold atom gauge theories* Berges, Oberthaler, Jendrzewski

Phase structure, large fluctuations and quantum critical phenomena

- *Strongly correlated fermions,* Jochim, Wetterich,
- *From few to many: ultracold atoms in reduced dimensions,* Enss, Jochim
- *Fermi-Bose mixtures at large mass ratios,* Enss, Salmhofer, Weidemüller,
- *Probing the QCD phase structure with heavy quarks,* Braun-Munzinger, Pawlowski, Stachel
- *Flow and fluctuations in relativistic heavy ion collisions* Flörchinger, Masciocchi

Additional Lectures)

Sebastian Diehl (Köln)	RG – open systems
Philipp Hauke (Innsbruck)	Quantum simulation – Gauge fields
Hanns-Christoph Nägerl (Innsbruck)	Strongly interacting quantum systems
Anton Andronic (GSI)	Heavy-ion collisions
Marianna Safronova (Delaware)	Precision metrology

Participants at the workshop are encouraged to bring a Poster to discuss their own work. We expect the poster sessions, which will run throughout the week, to be a substantial element of the school.

Venue: Obergurgl, located at the end of the Ötztal in Tyrol, is a prominent winter and summer resort. The school will be held at the University Centre Obergurgl, which is associated with the University of Innsbruck.

Participation fee: 570€ for Students, 650€ for postdocs and other scientists. The participation fee includes 5 nights accommodation in double rooms (single room add 170€), breakfast and dinner.

Jörg Schmiedmayer (VCQ, TU-Wien)
Jürgen Berges (Univ. Heidelberg)

The workshop is supported by the SFB 1225 ISOQUANT, the ERC QuantumRelax and ...