ExtreMe Matter Institute EMMI

www.gsi.de/emmi

GSI

EMMI

- founded in 2008 in framework of
  Helmholtz Alliance (2008 - 2015)
  Cosmic Matter in the Laboratory

HELMHOLTZ ASSOCIATION
Alliance on Cosmic Matter in the Laboratory

- now continued as part of GSI:
  taking the momentum of the alliance into the future
  - annual budget of 500 kEuro

EMMI Partner Institutions

- GSI Helmholtz Centre for Heavy Ion Research
- Forschungszentrum Jülich
- Technische Universität Darmstadt
- Goethe-Universität Frankfurt
- Ruprecht-Karls-Universität Heidelberg
- Universität Münster
- Max-Planck-Institut für Kernphysik (MPIK), Heidelberg
- FIAS Frankfurt Institute for Advanced Studies
- Université VI (Pierre et Marie Curie), Paris
- Lawrence Berkeley National Laboratory, Berkeley
- Joint Institute for Nuclear Astrophysics (JINA)
- University of Tokyo
- RIKEN, Saitama

EMMI

... and its Partners

GSI

Westfälische Wilhelms-Universität Münster

TECHNISCHE UNIVERSITÄT DARMSTADT

JÜLICH FORSCHUNGSZENTRUM

GOETHE UNIVERSITÄT FRANKFURT AM MAIN

BERKELEY LAB
Lawrence Berkeley National Laboratory

RIKEN NISHINA CENTER

JINA-CEE

東京大学 THE UNIVERSITY OF TOKYO

UPMC SORBONNE UNIVERSITÉS

FIAS Frankfurt Institute for Advanced Studies

UNIVERSITÄT HEIDELBERG ZUKUNFT SEIT 1386

MAX-PLANCK-INSTITUT FÜR KERNPHYSIK

HGSFP

HGS-HIRe for FAIR
Helmholtz Graduate School for Hadron and Ion Research

H-QM Helmholtz Research School Quark Matter Studies

Organisation

13 **Partner Institutions**

Management:

Scientific Director: Peter Braun-Munzinger

Scientific Coordinator: Carlo Ewerz

+ administrative support

31 further experts as **Associated Partners**

Steering Committee (representatives of Partners)
as main steering body

Scientific Advisory Committee (8 external experts)

Main Research Areas of EMMI

Matter under extreme conditions of temperature, density and pressure, in particular

- quark-gluon plasma and phase diagram of QCD & new hadronic states
- neutron matter
- plasma physics
- atomic physics and ultracold gases

… and related topics

Aim:
bringing together the best minds from these communities

Emergence of common concepts

Common structures and underlying theoretical concepts for these strongly coupled systems, for example

- from BEC to BCS
- from QGP to ultracold Fermi gases
- from conformal field theory to QCD via black holes (AdS/CFT)
- from neutron star matter to strongly coupled electromagnetic plasmas
- hydrodynamics, turbulence, ...
- ...

Goals

central goal of EMMI:

act as think tank & provide intellectual environment
for extreme matter research (at GSI and beyond)

aiming at:

- interdisciplinary scientific events of highest quality
- strong promotion of early-career researchers
- network among two Helmholtz centres and
  eleven top national and international laboratories and
  universities

EMMI Scientists

- more than 100 senior researchers participating in EMMI, more than 400 scientists in total

- 14 new positions (professorships / tenured) created by partners:
  10 at TUD, F, MPI-K, MS, HD, LBNL
  4 EMMI Fellow positions at GSI

- EMMI supported PhD students associated with surrounding graduate schools (H-QM, HGS-HIRe, HGSFP)

EMMI Programs

- EMMI Workshops
- EMMI Programs
- EMMI Rapid Reaction Task Force meetings (RRTFs)
- joint workshops with ECT* Trento

- Visiting Professor program
- Visiting Researcher program

Interdisciplinary Events: examples

Helmholtz Alliance
Extremes of Density and Temperature: Cosmic Matter in the Laboratory

ExtreMe Matter Institute EMMI

Relaxation, Turbulence, and Non-Equilibrium Dynamics of Matter Fields
— From Quantum Fluids to High-Energy Physics —

RETUNE

Internationales Wissenschaftsforum, Universität Heidelberg
June 21-24, 2012

Speakers

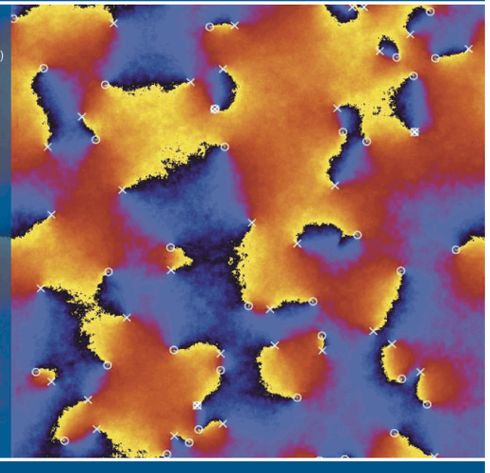
Alberto Amo (Paris)
Brian Anderson (Tucson)
Vanderlei Bagnato (Sao Carlos)
Carlo Barenghi (Newcastle)
Jürgen Berges (Heidelberg)
Natalia Berloff (Cambridge)
Jean-Paul Blaizot (Saclay)
Elena Bratkovskaya (Frankfurt)
Matthew Davis (Queensland)
Sergej Demokritov (Münster)
Vladimir Eltsov (Aalto)
Gregory Falkovich (Rehovot)
Kenji Fukushima (Keio)
Andrei Golov (Manchester)
Ulrich Heinz (Columbus)
Kerson Huang (Cambridge, MA/Singapore)
Jonathan Keeling (St. Andrews)
Larry McLerran (Brookhaven)
Sergey Nazarenko (Warwick)
Boris Nowak (Heidelberg)
Anton Rebhan (Wien)
Jörg Schmiedmayer (Wien)
Gora Shlyapnikov (Orsay)
Johanna Stachel, (Heidelberg)
Igor Tkachev (Moscow)
Makoto Tsubota (Osaka)
Joe Vinen (Birmingham)
Christof Wetterich (Heidelberg)
Michael Wouters (Antwerpen)

International Scientific Advisory Committee

Carlo Barenghi (Newcastle)
Jürgen Berges (Heidelberg)
Larry McLerran (Brookhaven)
Makoto Tsubota (Osaka)

Organizing Committee

Natalia Berloff (Cambridge)
Thomas Gasenzer (Heidelberg)
Jan M. Pawlowski (Heidelberg)



Topics

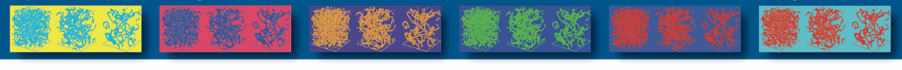
Relaxation dynamics of classical matter fields
Dynamical evolution of quenched systems
Dynamics and relaxation of driven systems to non-equilibrium steady states

in the realms of:

Ultracold Atomic Gases
Superfluid Helium
Condensates in Solid-State Systems
Heavy-Ion Collisions and the Quark-Gluon Plasma
Cosmic Inflation and Reheating

Information
http://www.thphys.uni-heidelberg.de/~smp/RETUNE2012

More about EMMI
www.gsi.de/emmi



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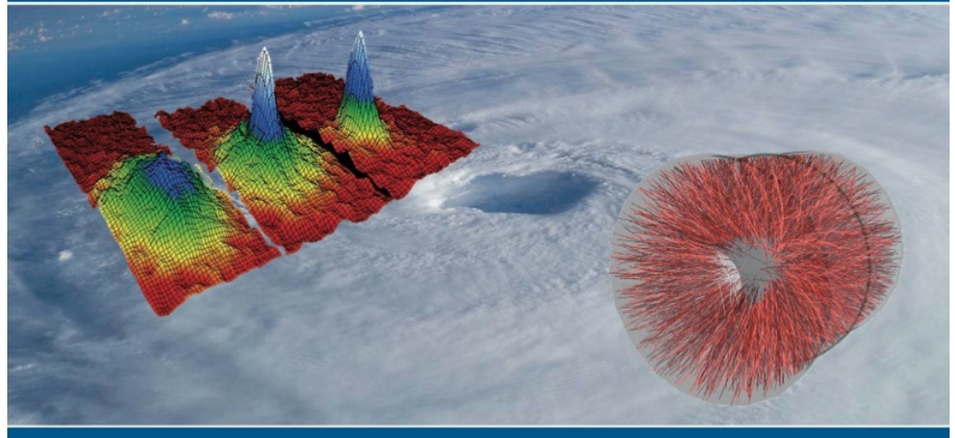
Helmholtz Alliance
Extremes of Density and Temperature: Cosmic Matter in the Laboratory

ExtreMe Matter Institute EMMI

Quark-Gluon Plasma meets
Cold Atoms - Episode III

Workshop at Waldemar-Petersen-Haus
Hirschegg, Austria
August 25 - 31, 2012



Lecturers
Jens Braun, TU Darmstadt
Peter Braun-Munzinger, EMMI, GSI
Kenji Fukushima, Keio University
Thomas Gasenzer, Heidelberg University
Larry McLerran, Brookhaven National Lab
Thomas Schäfer, North Carolina State University
Florian Schreck, Innsbruck University & IQOQI
Achim Schwenk, EMMI, TU Darmstadt
Lorenz von Smekal, TU Darmstadt
Johanna Stachel, Heidelberg University
Michael Thies, Erlangen University
John Thomas, North Carolina State University

Organizers
Michael Buballa
Selim Jochim
Jan M. Pawlowski
Dirk Rischke

Registration deadline
July 15th, 2012

Registration and further information
http://www-aix.gsi.de/conferences/emmi/QGPmCA2012

More about EMMI
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EMMI RRTFs

- concentrate on focussed problem in intense discussion
- 15 - 25 expert participants
- aim: summary of results, optimally with publication on arXiv and/or in journal

EMMI RRTFs: examples

- Thermalization in a Nonabelian Plasma (2011)
- Quark Matter in Compact Stars (2013)
- Direct-Photon Flow Puzzle (2014)
- Non-Exponential Two-Body Weak Decays (2014)
- Resonances in QCD (2015)
- Extraction of heavy-flavor transport coefficients in QCD Matter (2016)

ExtreMe Matter Institute EMMI

Call for Proposals

EMMI Workshops, Programs, Rapid Reaction Task Forces

The ExtreMe Matter Institute EMMI invites proposals for workshops, programs, and Rapid Reaction Task Forces in the research areas of EMMI:

- quark gluon plasma & phase diagram of QCD, new hadronic states
- neutron matter
- electromagnetic plasmas of high energy density
- ultracold quantum gases and extreme states in atomic physics

all understood in a broad sense.

Further information at www.gsi.de/emmi