

**some remarks on EMMI RRTF:
Fluctuations and Correlations of conserved charges in nuclear
collisions – Challenges and Future Prospects**

pbm

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EMMI

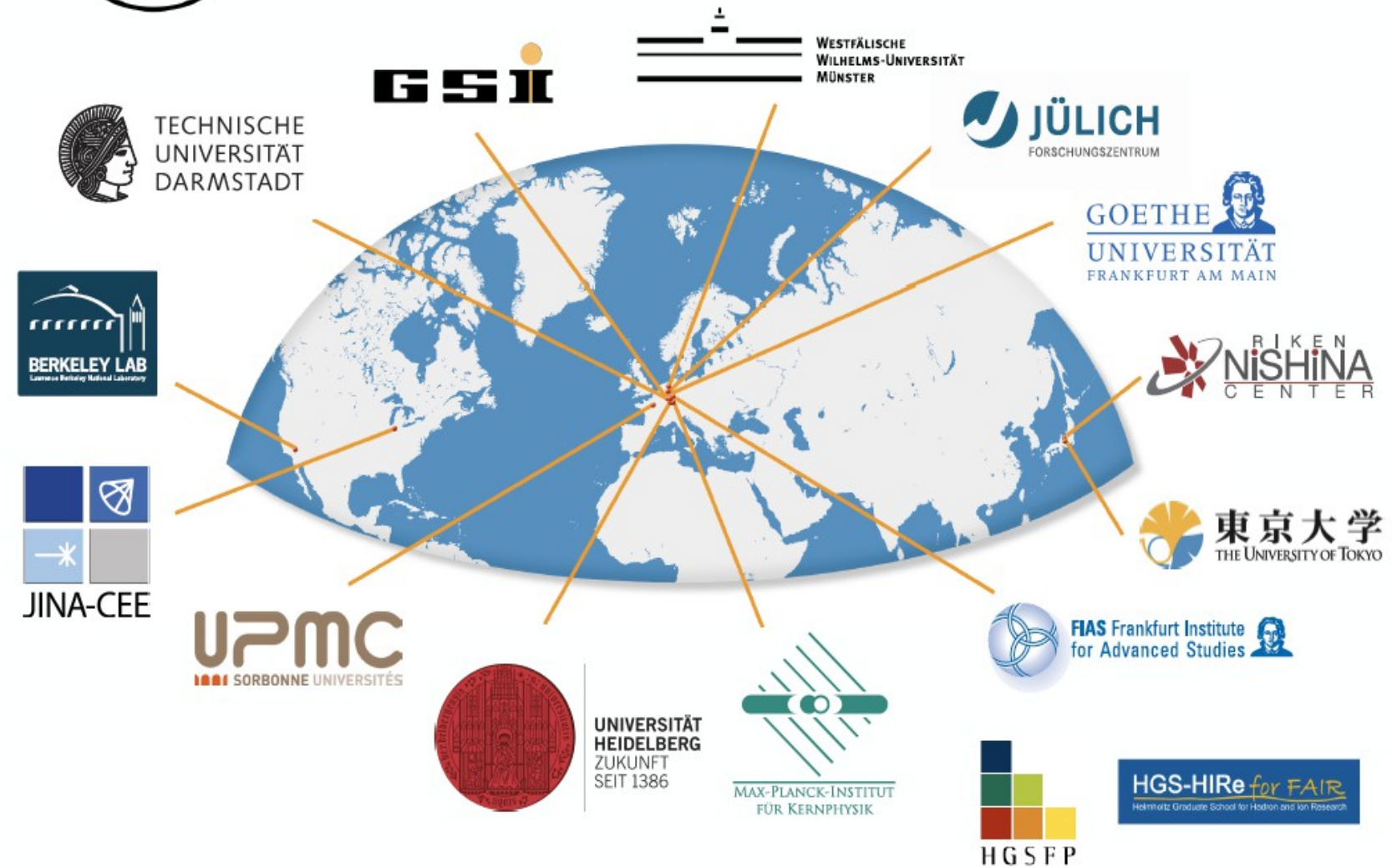
- founded in 2008 in framework of Helmholtz Alliance (2008 - 2015)
Cosmic Matter in the Laboratory



- since 2016 continued as part of GSI:
taking the momentum of the alliance into the future



... and its Partners



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 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

RRTF concept goes back to **Alexander von Humboldt**:

*Humboldt was revolutionizing the sciences. In September 1828 he invited hundreds of scientists from across Germany and Europe to attend a conference in Berlin. Unlike previous such meetings at which scientists had endlessly presented papers about their own work, Humboldt put together a very different program. **Rather than being talked at, he wanted the scientists to talk with each other.** [...] ‘Without a diversity of opinion, the discovery of truth is impossible’, he reminded them in his opening speech.*



in Andrea Wulf, *The Invention of Nature*, 2016

Carlo Ewerz made me aware of this statement by Humboldt

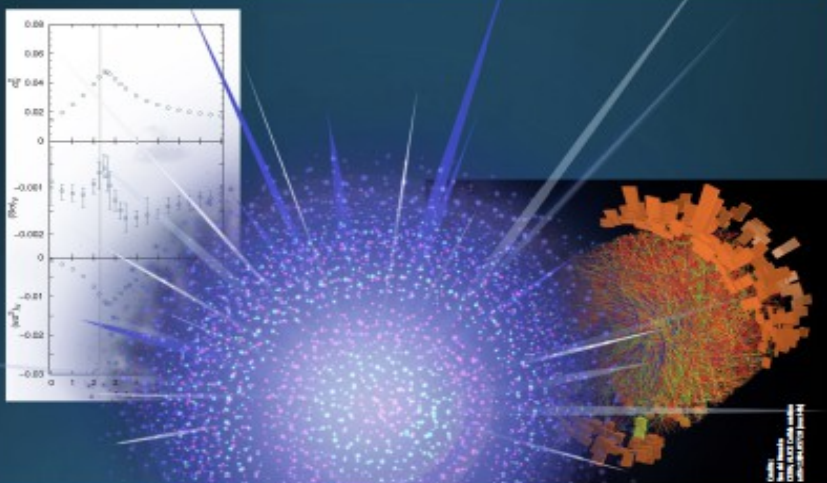
Recent RRTFs

ExtreMe Matter Institute EMMI

EMMI RRTF

Dynamics of critical fluctuations: theory – phenomenology – heavy-ion collisions

GSI, Darmstadt, Germany
April 8-12, 2019



Topic:

- dynamical modelling of critical fluctuations in QCD
- coupling of the critical dynamics to the bulk evolution in HIC
- proper treatment of the order parameter(s) in and out of the scaling region
- experimental observables and challenges
- connection with cold atomic gases at phase transitions

Organizers:

Marcus Blichmann, Subatech
Alexander Kalweit, CERN
Marlene Nahrgang, Subatech

Information:

www.gsi.de/emmi/workshops

More about EMMI:

www.gsi.de/emmi



ExtreMe Matter Institute EMMI

EMMI Rapid Reaction Task Force

Nuclear Physics Confronts Relativistic Collisions of Isobars

Heidelberg University, Germany, May 30 – June 3 & October 12 – 14, 2022

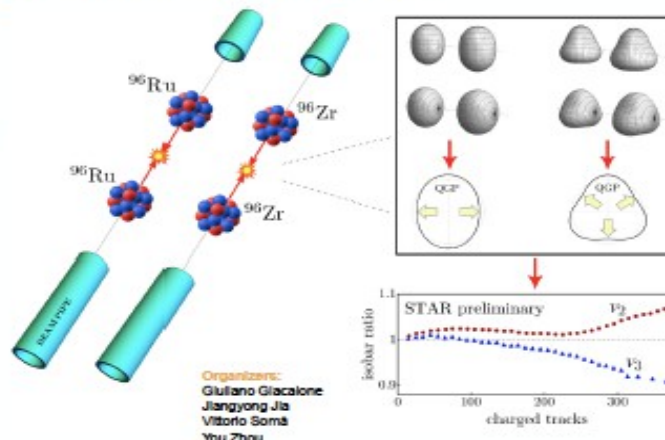
High-energy collisions of the $A=96$ isobars ^{96}Zr and ^{96}Ru have been performed in 2018 at the Relativistic Heavy Ion Collider (RHIC) as a means to probe effects of local parity violation in the strong sector, that would manifest as deviations from unity in the ratio of observables taken between $^{96}\text{Zr}+^{96}\text{Zr}$ and $^{96}\text{Ru}+^{96}\text{Ru}$ collisions. Recently released measurements of such ratios reveal deviations from unity. However, such observations are primarily caused by the two collided isobars having different radial profiles and intrinsic deformations. To make progress in understanding RHIC data, we will gather nuclear physicists across the energy spectrum to answer the following question: Does the combined effort of state-of-the-art low-energy nuclear structure physics and high-energy heavy-ion physics allow us to understand the observations made in isobar collisions at RHIC?

Heavy Ion Collisions:

Federica Capellino
Hannah Eicher
Frédérique Grassi
Eduardo Grossi
Jan Hammelmann
Andreas Kirchner
Matthew Luzum
Jakl Noronha-Hostler
Jean-Yves Ollitrault
Nils Saß
Björn Schenke
Chun Shen
Huichao Song
Derek Teaney
Wilke van der Schee

Nuclear Structure:

Anatoli Afanasjev
Benjamin Bally
Jean-Paul Ebran
Dean Lee
Tamara Nikšić
Takaharu Otsuka
Luís Robledo
Tomás Rodríguez
Wouter Ryssens
Yusuke Tsunoda



Organizers:

Giuliano Giacalone
Jiangyong Jia
Vittorio Somà
Yuu Zhou

Website:

<https://indico.gsi.de/event/14430/>

Information:
www.gsi.de/emmi/rmf

More about EMMI:
www.gsi.de/emmi



an example of a recent RRTF write-up

Dynamics of critical fluctuations: Theory – phenomenology – heavy-ion collisions #1

Marcus Bluhm (SUBATECH, Nantes and Darmstadt, EMMI), Alexander Kalweit (CERN), Marlene Nahrgang (SUBATECH, Nantes and Darmstadt, EMMI), Mesut Arslanok (Heidelberg U.), Peter Braun-Munzinger (Darmstadt, EMMI and Heidelberg U. and Darmstadt, GSI) et al. (Jan 23, 2020)

Published in: *Nucl.Phys.A* 1003 (2020) 122016 • e-Print: [2001.08831](#) [nucl-th]



Fluctuations and Correlations of conserved charges in nuclear collisions

Challenges and Future Prospects

what is needed:

- high precision data on similar data sets by more than one collaboration
ALICE 5 TeV STAR 0.2 TeV
HADES 2.2 GeV STAR 3 GeV CBM 5 GeV
- theoretical investigations implementing experimental cuts and selections
centrality, p_T , y , ...
- new ideas

**remember: without a diversity of opinion,
the discovery of truth is impossible
Alexander von Humboldt, 1828**