# The QCD Phase Diagram: From Theory to Experimental Signatures

Wednesday, 8 October 2025 - Saturday, 11 October 2025

## **Book of Abstracts**

## **Contents**

| Welcome speech  | 1 |
|---|---|
| Selected Results from RHIC BES-II   | 1 |
| TBA   | 1 |
| Search for the QCD Critical Endpoint at a Low Temperature from Lattice QCD  | 1 |
| Phase diagram at intermediate densities: constraints from lattice QCD   | 1 |
| Large density QCD phase structure from strangeness fluctuations   | 1 |
| Probing Nucleon-Nucleon Short Range Correlations by Bremsstrahlung gamma-rays in Heavy Ion Collisions   | 2 |
| Manifestation of scale symmetry in medium   | 2 |
| TBA   | 2 |
| Probing QCD phase structure and thermodynamics via finite density observables   | 2 |
| TBA   | 2 |
| Emergent conformality in dense QCD matter: some lessons from a holographic QCD model  |   |
|   | 3 |
| Determination of High-Density Symmetry Energy in the Multi-Messenger Era  | 3 |
| Chiral phase transition under rotation and acceleration   | 3 |
| Searching for rare particles in heavy ion collisions  | 3 |
| QCD phase transitions at high baryon density  | 3 |
| Fluctuations and correlations of quark spin near CEP  | 4 |
| Complex heavy quark potential from lattice QCD - where do we stand?   | 4 |
| The quark spectral function and (heavy) quark diffusion   | 4 |
| First Principle QCD within fRG approach   | 4 |
| Correlations and fluctuations in a magnetized quark matter with and without inverse magnetic catalysis effect at finite temperature and density | 4 |

| Leading-Order QCD EoS in Strong Magnetic Fields at Nonzero Baryon Chemical Potential                         | 4 |
|--|---|
| Finite-volume analysis and universal scaling signatures near the chiral phase transition in (2+1)-flavor QCD | 5 |
| QCD phase transitions under extreme conditions   | 5 |
| TBA  | 5 |
| TBA  | 5 |
| TBA  | 5 |
| FRG study of chiral phase transition with repulsive interactions   | 6 |
| transport properties and phase diagram of nuclear matter   | 6 |
| Effects of Chiral Phase Transition on Light Nuclei and Dilepton Production                                   | 6 |
| Stochastic charge transport in relativistic hydrodynamics  | 6 |
| Dissecting the moat regime at low energies   | 6 |
| Distangling the nature of radial flow and the momentum fluctuations at the RHIC-STAR experiment              | 7 |
| Dileptons and Direct Photons in Beam Energy Scan: Recent and Future  | 7 |
| Dilepton emission as a new probe of critical end point   | 7 |
| QCD equation of state from dee learning  | 7 |
| Discriminating the signal of critical point from the conservation background                                 | 7 |
| Baryon Electric Charge Correlation as a Magnetometer of QCD  | 8 |
| model H in stochastic fluids   | 8 |
| Baryon-strangeness Correlation and QCD Phase diagram   | 8 |
| Workshop closing   | 8 |

#### Session I / 10

#### Welcome speech

#### Session I / 11

#### Selected Results from RHIC BES-II

Author: Nu Xu1

¹ CCNU

 $\textbf{Corresponding Author:} \ nxu@lbl.gov$ 

Session I / 12

#### **TBA**

Author: Jan M. Pawlowski<sup>1</sup>

<sup>1</sup> Heidelberg University

Corresponding Author: j.pawlowski@thphys.uni-heidelberg.de

Session II / 13

# Search for the QCD Critical Endpoint at a Low Temperature from Lattice QCD

Author: Heng-Tong Ding<sup>1</sup>

<sup>1</sup> Central China Normal University

 $\textbf{Corresponding Author:} \ hengtong.ding@ccnu.edu.cn$ 

Session II / 14

# Phase diagram at intermediate densities: constraints from lattice QCD

Author: Szabolcs Borsanyi<sup>1</sup>

<sup>1</sup> University of Wuppertal

Corresponding Author: borsanyi@uni-wuppertal.de

Session II / 15

### Large density QCD phase structure from strangeness fluctuations

| Author: Paolo Parotto¹                   |  |
|--|--|
| <sup>1</sup> Università and INFN Torino  |  |
| Corresponding Author: parotto@to.infn.it |  |

Session III / 16

# Probing Nucleon-Nucleon Short Range Correlations by Bremsstrahlung gamma-rays in Heavy Ion Collisions

Author: Zhigang XiaoNone

Session III / 17

#### Manifestation of scale symmetry in medium

**Author:** Yong-Liang Ma<sup>1</sup>

<sup>1</sup> Theoretical Physics Center for Science Facilities, CAS.

Corresponding Author: ylma@ihep.ac.cn

Session III / 18

#### **TBA**

Author: Andreas Geißel1

<sup>1</sup> TU Darmstadt

Corresponding Author: andreas.geissel@tu-darmstadt.de

Session IV / 19

## Probing QCD phase structure and thermodynamics via finite density observables

**Author:** Yi LuN<sup>one</sup>

Session IV / 20

#### **TBA**

Author: Franz SattlerNone

#### Session I / 21

#### Emergent conformality in dense QCD matter: some lessons from a holographic QCD model

Author: Kenji Fukushima<sup>1</sup>

<sup>1</sup> The University of Tokyo

Corresponding Author: fuku@nt.phys.s.u-tokyo.ac.jp

Session I / 22

#### Determination of High-Density Symmetry Energy in the Multi-Messenger Era

Author: Lie-Wen Chen<sup>1</sup>

1 S

Corresponding Author: lwchen@sjtu.edu.cn

Session I / 23

#### Chiral phase transition under rotation and acceleration

Author: Xu-Guang Huang<sup>1</sup>

<sup>1</sup> Fudan University

Corresponding Author: huangxuguang@fudan.edu.cn

Session II / 24

### Searching for rare particles in heavy ion collisions

Author: Pengfei Zhuang<sup>1</sup>

<sup>1</sup> Tsinghua University

 $\textbf{Corresponding Author:} \ zhuangpf@mail.tsinghua.edu.cn$ 

Session II / 25

## QCD phase transitions at high baryon density

Author: fei gao1

<sup>&</sup>lt;sup>1</sup> Beijing Institute of technology

Corresponding Author: fei.gao@bit.edu.cn

Session II / 26

#### Fluctuations and correlations of quark spin near CEP

Author: Hao-Lei ChenNone

Session III / 27

## Complex heavy quark potential from lattice QCD - where do we stand?

Author: Alexander Rothkopf<sup>1</sup>

<sup>1</sup> Albert Einstein Center for Fundamental Physics

Corresponding Author: rothkopf@itp.unibe.ch

Session III / 28

#### The quark spectral function and (heavy) quark diffusion

Author: Jonas WesselyNone

Session III / 29

### First Principle QCD within fRG approach

Author: Chuang Huang  $N^{\text{one}}$ 

Session IV / 30

Correlations and fluctuations in a magnetized quark matter with and without inverse magnetic catalysis effect at finite temperature and density

Author: Shijun Mao<sup>1</sup>

<sup>1</sup> Department of physics of Tsinghua University

Corresponding Author: maosj08@mails.tsinghua.edu.cn

Session IV / 31

#### Leading-Order QCD EoS in Strong Magnetic Fields at Nonzero **Baryon Chemical Potential**

Author: Arpith Kumar<sup>1</sup>

<sup>1</sup> Central China Normal University

Corresponding Author: arpithk.phy@gmail.com

Session IV / 32

### Finite-volume analysis and universal scaling signatures near the chiral phase transition in (2+1)-flavor QCD

Author: Sabarnya Mitra<sup>1</sup>

<sup>1</sup> Bielefeld University

Corresponding Author: smitra@physik.uni-bielefeld.de

Session I / 33

#### QCD phase transitions under extreme conditions

Author: Mei HuangNone

Session I / 34

#### **TBA**

Author: Guo-Liang Ma1

<sup>1</sup> Fudan University

Corresponding Author: glma@fudan.edu.cn

Session I / 35

#### **TBA**

Author: Fabian Rennecke<sup>1</sup>

<sup>1</sup> Justus Liebig University Giessen

Corresponding Author: fabian.rennecke@theo.physik.uni-giessen.de

Session II / 36

#### **TBA**

Author: Yuxin Liu<sup>1</sup>

¹ PKU

Corresponding Author: yxliu@pku.edu.cn

Session II / 37

## FRG study of chiral phase transition with repulsive interactions

Author: Defu Hou<sup>1</sup>

<sup>1</sup> CCNU

Corresponding Author: houdf@mail.ccnu.edu.cn

Session II / 38

#### transport properties and phase diagram of nuclear matter

Author: Jun XuNone

Session III / 39

## **Effects of Chiral Phase Transition on Light Nuclei and Dilepton Production**

Author: KaiJia Sun¹

<sup>1</sup> Institute of Modern Physics, Fudan University

 $\textbf{Corresponding Author:} \ kjsun@fudan.edu.cn$ 

Session III / 40

## Stochastic charge transport in relativistic hydrodynamics

Author: Baochi Fu<sup>1</sup>

<sup>1</sup> Peking University

Corresponding Author: fubaochi@pku.edu.cn

Session III / 41

#### Dissecting the moat regime at low energies

Author: Shi YinNone

Session IV / 42

## Distangling the nature of radial flow and the momentum fluctuations at the RHIC-STAR experiment

Author: Chunjian Zhang<sup>1</sup>

<sup>1</sup> Fudan University

Corresponding Author: chunjianzhang@fudan.edu.cn

Session IV / 43

## Dileptons and Direct Photons in Beam Energy Scan: Recent and Future

Author: Chi YangNone

Session IV / 44

### Dilepton emission as a new probe of critical end point

Author: Gaoqing Cao<sup>1</sup>

<sup>1</sup> Sun Yat-sen University

Corresponding Author: caogaoqing@126.com

Session I / 45

## QCD equation of state from dee learning

Author: LongGang Pang<sup>1</sup>

<sup>1</sup> Central China Normal University

Corresponding Author: lgpang@mail.ccnu.edu.cn

Session I / 46

# Discriminating the signal of critical point from the conservation background

Author: Shuzhe Shi1

<sup>1</sup> Tsinghua University

Corresponding Author: shuzhe-shi@tsinghua.edu.cn

Session I / 47

## Baryon Electric Charge Correlation as a Magnetometer of QCD

Author: Jin-Biao GuN<sup>one</sup>

Session II / 48

#### model H in stochastic fluids

Author: Jingyi Chao<sup>1</sup>

¹ jiangxi normal u

Corresponding Author: chaojingyi@jxnu.edu.cn

Session II / 49

## Baryon-strangeness Correlation and QCD Phase diagram

Author: Rui WenN<sup>one</sup>

Session II / 50

## Workshop closing

Author: Wei-jie FuN<sup>one</sup>