Heavy-Ion Physics
ALICE + Connections

Raimond Snellings
for the ALICE group

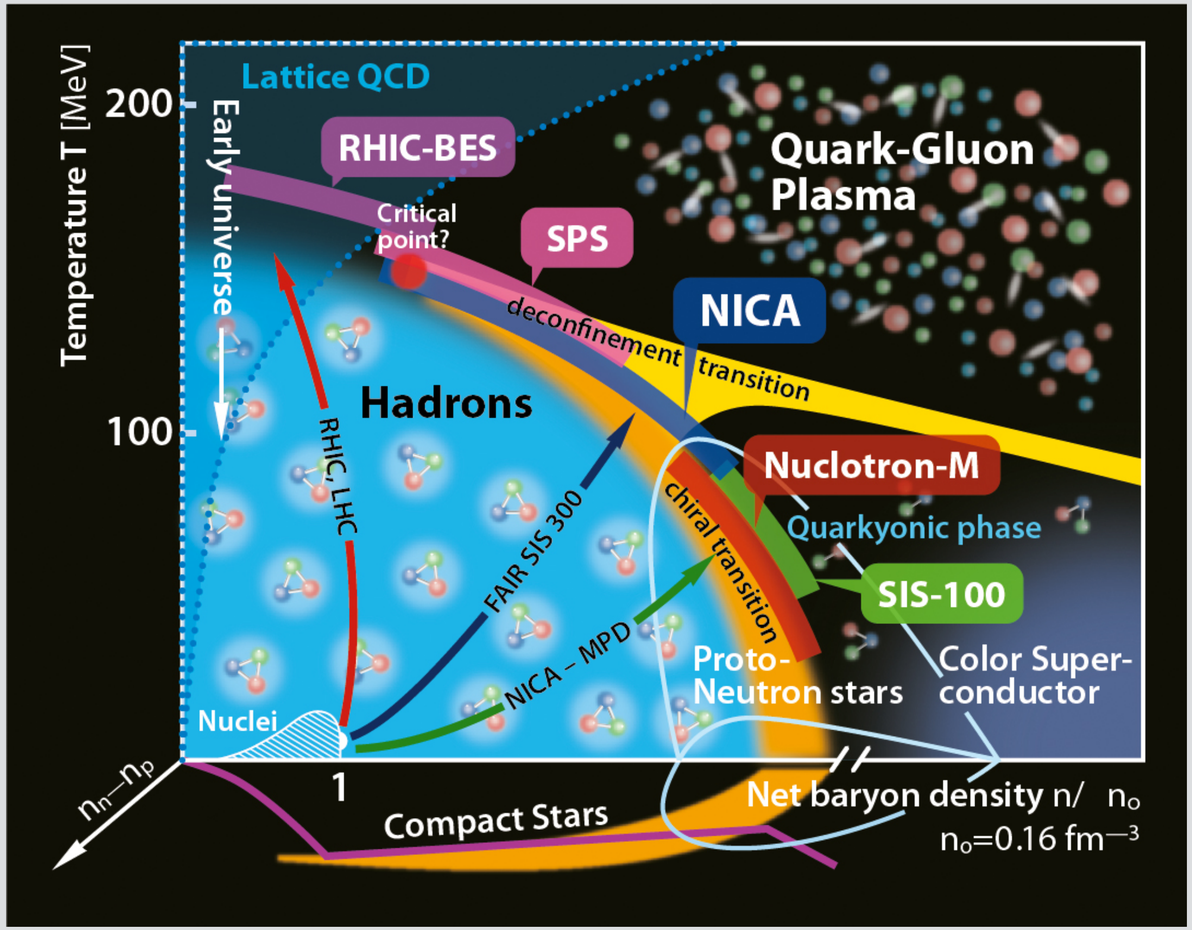
Programme leadership: Prof. Raimond Snellings
7 staff, 4 Postdocs, 18 PhD
Publications: 211
Theses: 19
University partners: Utrecht University
Investment Phase 1&2: 6.3 M
Personal Grants: 4.23M

Nikhef

Universiteit Utrecht

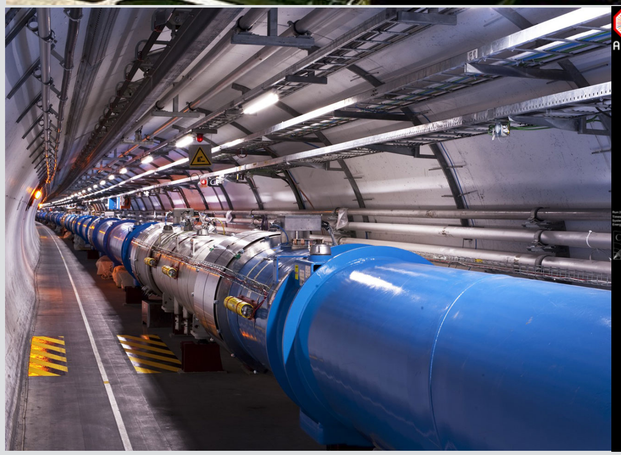
The ALICE Programme

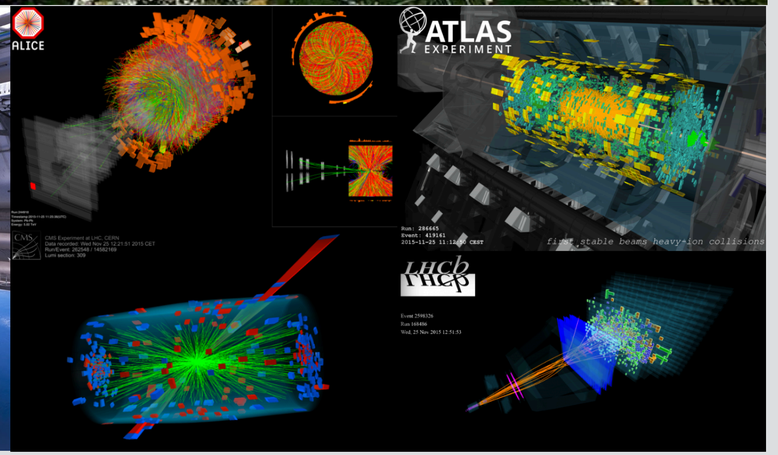
- Scientific Question: What happens to matter when you heat and compress it to extreme magnitudes which existed e.g. in the primordial universe?
  - Lattice QCD predicts a phase transition to a quark-gluon-plasma at an energy density of about 1 GeV/fm^3 and at a temperature of about 10^{12} K
    - Temperatures 10^5 larger than the core of the sun (connections: early universe)
    - Magnetic fields of order 10^{18} Gauss (strongest magnetic fields known of order 10^8 in the lab and 10^{15} in nature (connections: neutron stars))
    - Low-x gluon matter (connections: EIC)



Experimental input needed to understand this new form of matter!

- The properties of the quark-gluon-plasma are in principle calculable from the QCD Lagrangian using lattice QCD
  - However, lattice QCD calculations are currently not yet advanced enough to calculate most dynamical properties
  - Develop new tools e.g. connections: AdS/CFT (Utrecht Theory Group)
- Create a hot and dense system in the lab for which hydrodynamics/ thermodynamics applies
  - Collide heavy-ions at the highest possible energies
  - Measure what happens with state-of-the-art experimental setups





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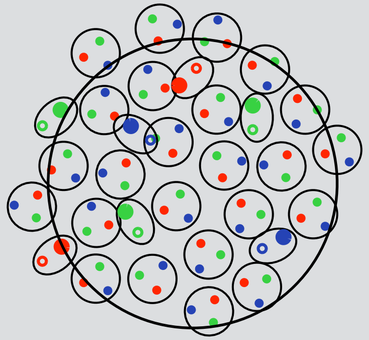


Quark Gluon Plasma
deconfined !

Independent quarks and gluons?

New emerging collective degrees of freedom?

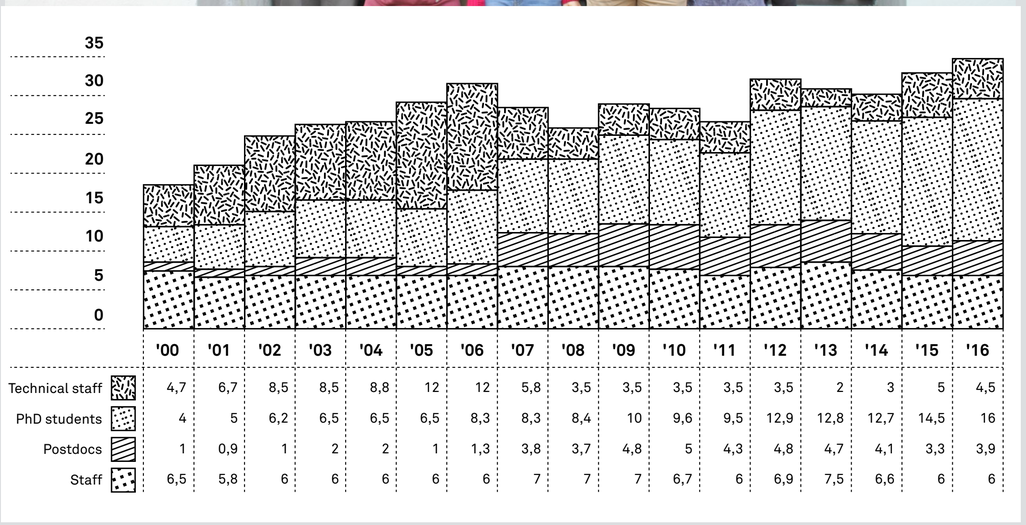
We find strong evidence for new collective degrees of freedom in PbPb, even indications for similar effects in small systems

Our current understanding of this new state of matter is still far from complete

(see talks Barbara and Goran)

The Nikhef ALICE group

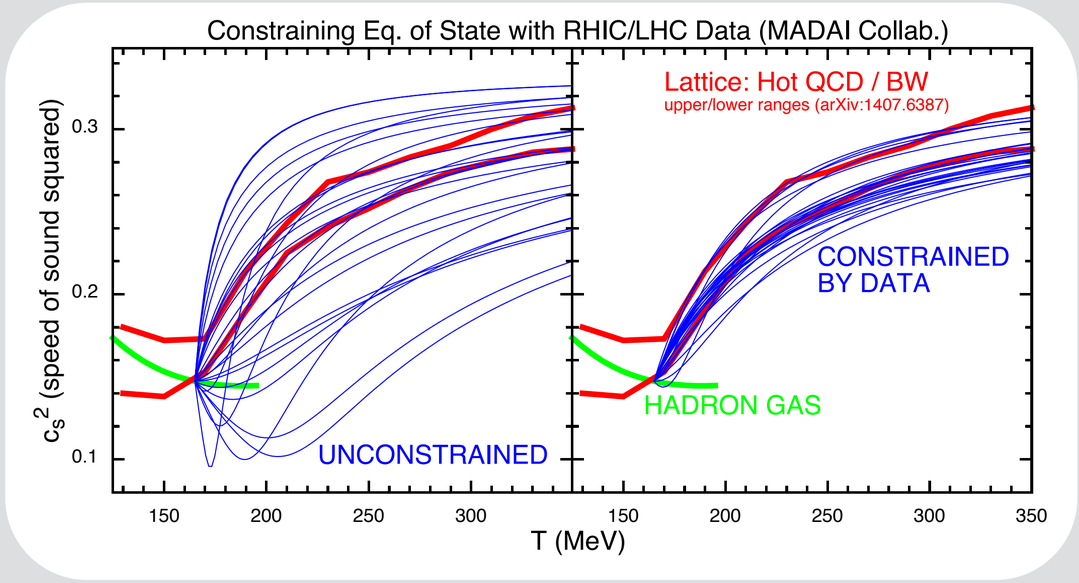
- The Dutch ALICE team (~2% of ALICE) is analysis-wise one of the most productive teams in ALICE (1 or more PA's from our group for 25% of all ALICE published papers)
  - Our group produced the highest cited ALICE publications (after the Higgs papers overall coming from the LHC)
  - Deputy spokesperson, (2017) Physics coordinator,….

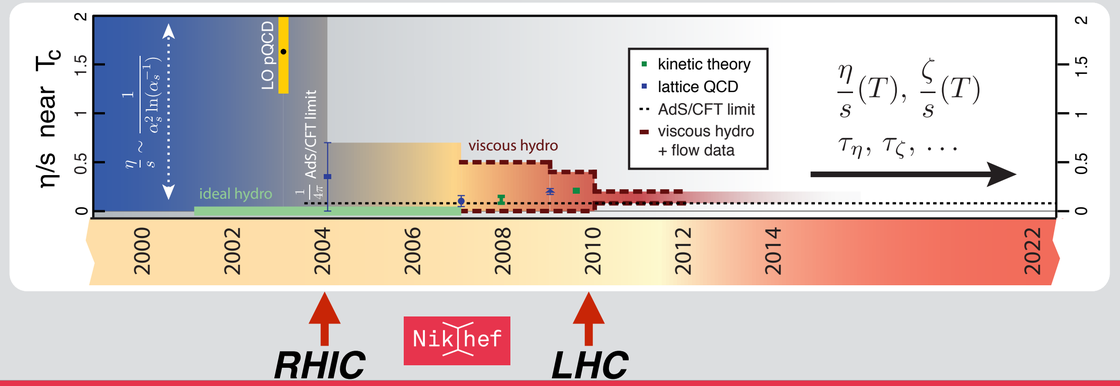


	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16
Technical staff	4,7	6,7	8,5	8,5	8,8	12	12	5,8	3,5	3,5	3,5	3,5	3,5	2	3	5	4,5
PhD students	4	5	6,2	6,5	6,5	6,5	8,3	8,3	8,4	10	9,6	9,5	12,9	12,8	12,7	14,5	16
Postdocs	1	0,9	1	2	2	1	1,3	3,8	3,7	4,8	5	4,3	4,8	4,7	4,1	3,3	3,9
Staff	6,5	5,8	6	6	6	6	6	7	7	7	6,7	6	6,9	7,5	6,6	6	6

Some Open Questions:

- Collective Flow Nikhef
  - already strong constraints on shear viscosity, open questions initial state, hadronization, …
- Hard and EM Probes Nikhef
  - jet structure measurements can be used to constrain interference in the jets, medium properties, thermalisation, degrees of freedom, …
- Heavy flavour Nikhef
  - special role as it is a well calibrated probe and contributes to better understanding of collective flow and jet-medium interactions
- Correlations Nikhef
  - Understanding the magnetic field in these collisions and the strong cp violation





The ALICE Upgrade in LS2

- We would like to characterise this complex almost perfect liquid (EoS, transport parameters) and understand how it emerges from multibody QCD

Rare probes: jets, heavy flavour, electromagnetic probes

Nikhef Nikhef Nikhef

Nikhef is leading these Physics Working Groups in ALICE

- Improve statistics: new faster ITS
- Improve S/B: new ITS; smaller pixel size inner layers, less material budget and optimised number of layers

Upgrade to full energy

Increase in luminosity
10x more data

high luminosity LHC
100x more data

LS1
2014

LS2
2019-2020

LS3
2024-2026

See next talks from Goran and Barbara

Current program (upgrade and people) funded to 2021
ALICE programme approved to 2029

Meetings in the Netherlands

XII Workshop on Particle Correlations and Femtoscopy
Nikhef, Amsterdam, The Netherlands
June 12th - 16th 2017

- Site: https://indico.cern.ch/event/539093/
- Contact: wpcf2017-loc@nikhef.nl
- Address: Science Park 105,1098 XG Amsterdam, The Netherlands
- Phone: +31 (0)20 592 2000

Scientific Program

- Femtoscopy at RHIC and LHC: links to QGP physics
- Femtoscopy in A+A, p+p , p+A and e+-e- collisions at relativistic energies
- Femtoscopy at intermediate energies: links to the EoS of asymmetry nuclear matter
- Charge fluctuations, correlations and balance functions
- Fluctuation in initial conditions
- Collective flow and correlations
- Resonance decays at RHIC and LHC
- Resonance decay spectroscopy in low and intermediate energy reactions
- Chiral magnetic effect and wave
- New methods and facilities

International Advisory Committee

M. Bleicher (Frankfurt, Germany)
A. Bialas (Cracow, Poland
W. Broniowski (Cracow, Poland
P. Christakoglou (Nikhef, The Netherlands)
T. Csörgő (Budapest. Hungary)
I. Dremin (Moscow, Russia)
P. Danielewicz (MSU, USA)
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Y. Hama (USP, Sao Paulo, Brazil)
T. Hirano (Tokyo, Japan)
K. Homma (Hiroshima, Japan)
T. Humanic (OSU, USA)
A. Kisiel (WUT, Poland)
R. A. Lacey (Stony Brook, USA)
R. Lednicky (Dubna, Russia)
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S. S. Padula (UNESP, Brazil)
J. Pluta (WUT-Krakow, Poland)
S. Pratt (MSU, USA)
Y. Sinyukov (BTPI-NAS, Ukraine)
R. Snellings (UU, The Netherlands)
M. Sumbera (ASCR, Czech Rep.)
G. Verde (INFN-Catania Italy)
W. A. Zajc (Columbia, New York, USA)

Local Organising Committee

Joan Berger (Nikhef)
Panos Christakoglou (Nikhef)
Paul Kuijer (Nikhef)
Raimond Snellings (Utrecht University)

Sponsored by

- Stichting voor Fundamenteel onderzoek der Materie (FOM)
- Nationaal instituut voor subatomaire fysica (Nikhef)

FOM Nikhef

ALICE Physics Week in Amsterdam

4-8 December 2017
Other Institutes
Europe/Zurich timezone

Search...

ALICE Physics Week
4-8 December 2017
Amsterdam
The Netherlands

Alice Physics Week
December 2017

The ALICE Physics Week 2017 will be held in Amsterdam, the Netherlands, from 4-8 December 2017. The conference venue is in the De Nieuwe Liefde, a conference centre located in Amsterdam downtown.

At the ALICE Physics Week we will review recent analyses and discuss their impact on our understanding of the Quark Gluon Plasma and multi-body QCD. All presentations are in a plenary session, so that results from different groups can be compared and discussed together to provide a broader view of the physics and interpretations.

We will also use this opportunity to discuss the physics program of ALICE for Run 3 and 4, during which we expect to collect large data samples plans with the upgraded detector.

Starts 4 Dec 2017, 09:00
Ends 8 Dec 2017, 17:00
Europe/Zurich

Other Institutes
De Nieuwe Liefde
Conference Center, Amsterdam

Registration
You have registered for this event.
See details

- Home
- Timetable
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- Registration
- Registration and payment
- Participant List
- Videoconference Rooms
- Accommodation
- Social event
- Upload your presentation
- Map

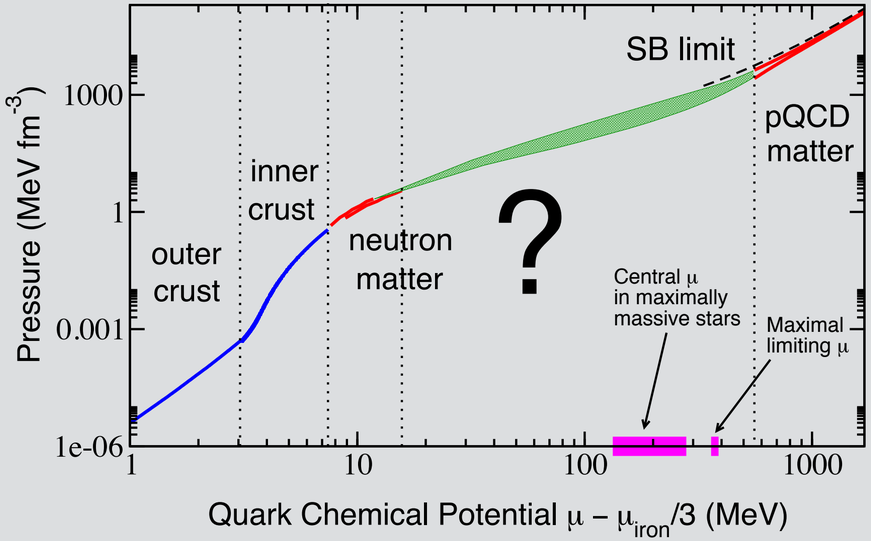
Local Organizing Committee
apw2017-loc@nikhef.nl

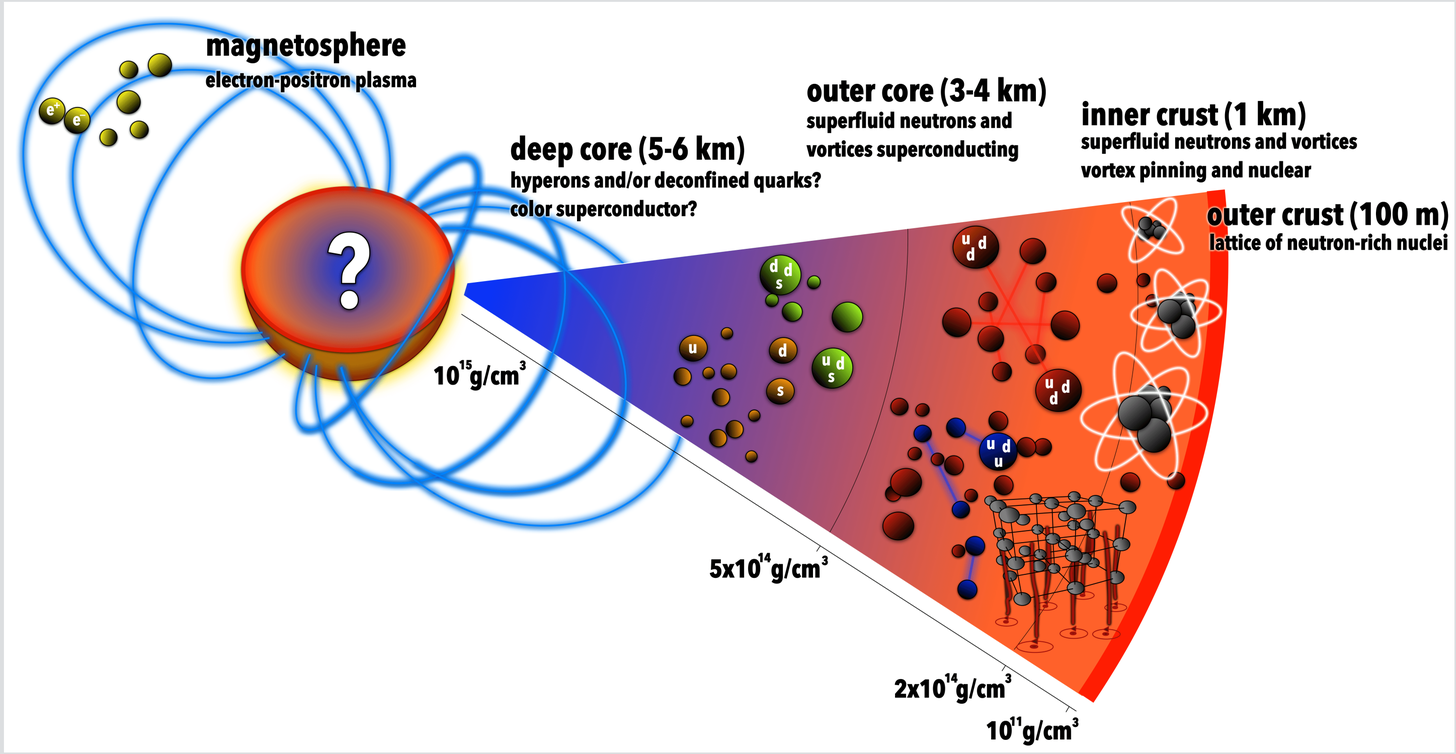
We took on the organisation of many big meetings this year

Nikhef ALICE group retreat

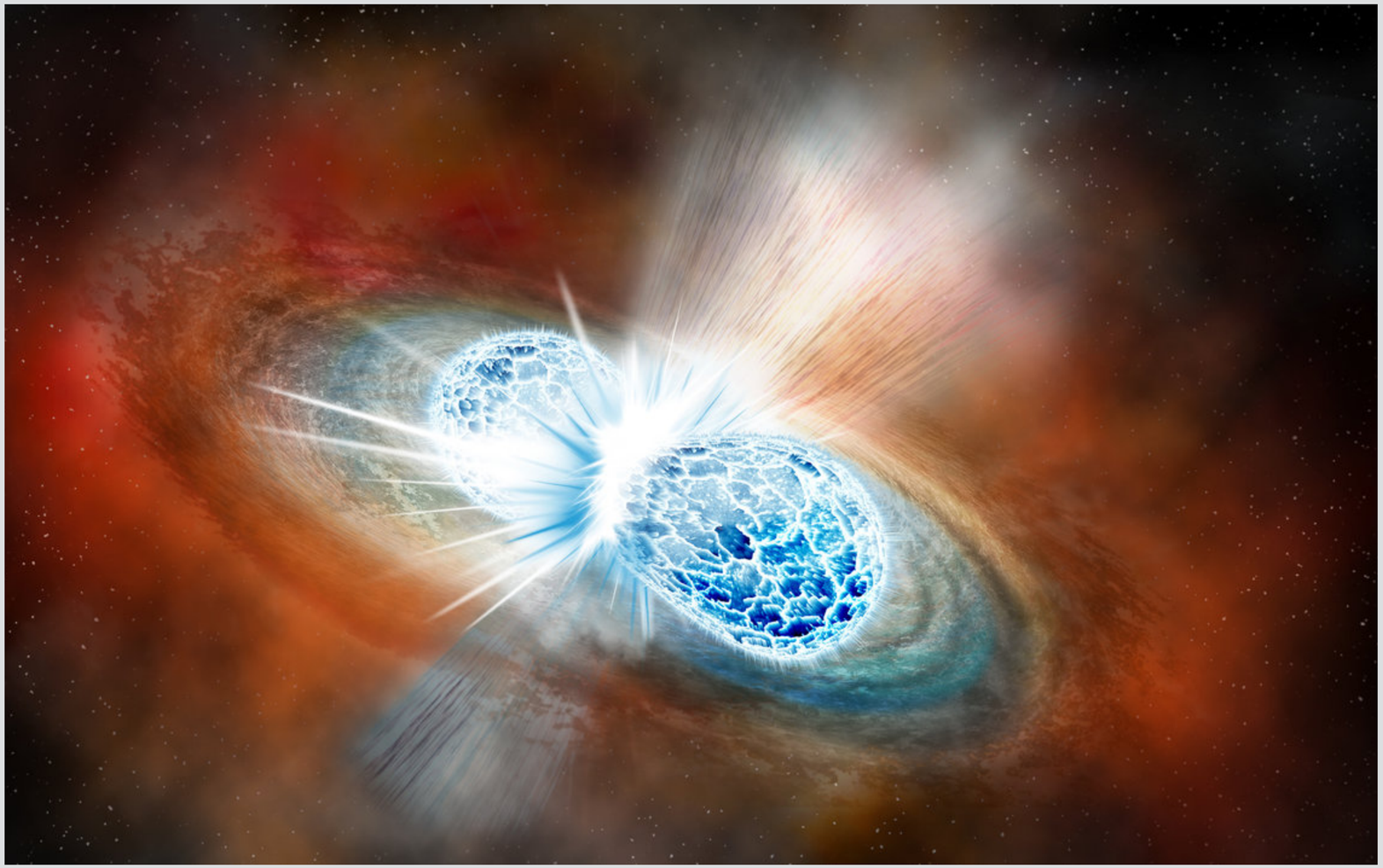
Connections: Neutron Stars

- Densest objects in nature
- The balance of gravity and QCD
  - A neutron star is a macroscopic laboratory of QCD
  - Deep core could be QGP





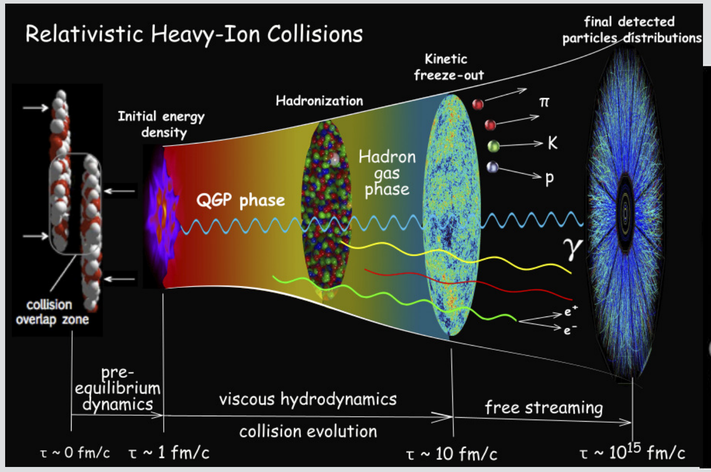
Connections: Neutron Star Mergers

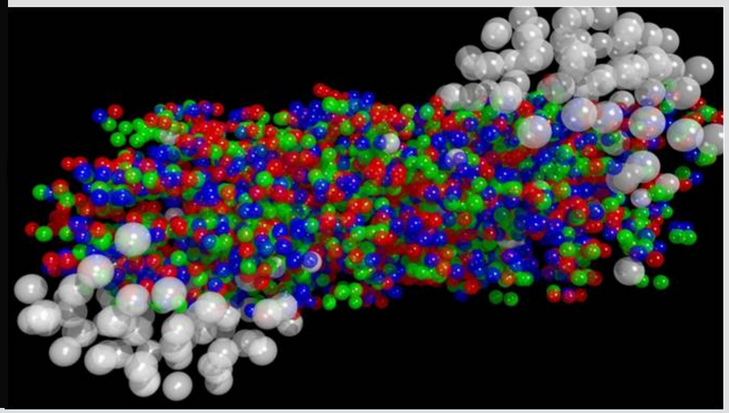


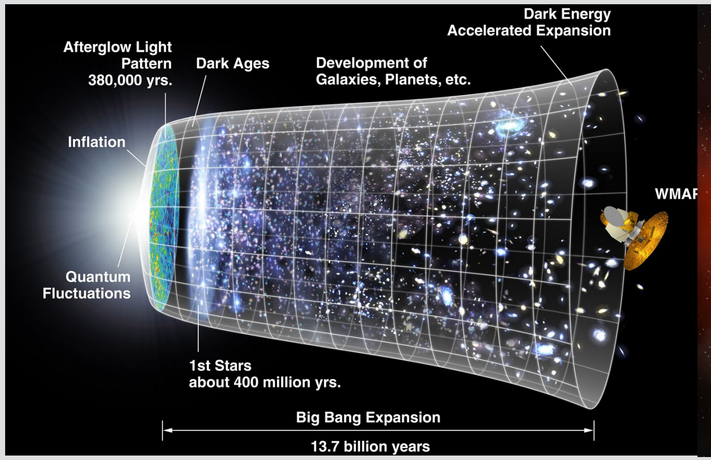
- First neutron star merger observed in Virgo/Ligo
  - Already providing constraints on the EoS
- Detailed understanding of the dynamics is required to understand the properties of the neutron star interior
  - EoS, transport parameters, ..
  - Very similar to heavy-ion collisions

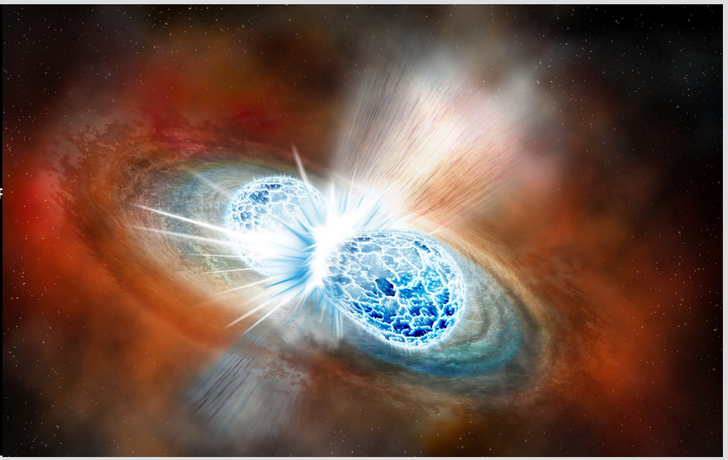
ALICE in the LHC Wonderland

- Colliding heavy-ions at the LHC allows us to create a new state of matter
- Its emergent properties are surprising and completely different than predicted, now they can be measured and modelled for the first time
  - Still many important open questions
- The Nikhef ALICE group is one of the most productive groups with strong contributions to the collaboration
  - Physics analysis, hardware contributions, and writing high-impact papers
  - Leadership roles in the collaboration (hardware and management)
- Currently most exciting time in our field, for which we had to prepare for decades









Backup:

Leadership

Our group members have had leading positions in many physics- as well as detector hardware topics in ALICE.

Physics Working Group Convenors (A. Grelli, R. Snellings, T. Peitzmann, M. van Leeuwen and P. Christakoglou)

Physics Analysis Group Convenors (P. Christakoglou, A. Grelli)

Editorial Board (P. Christakoglou, A. Mischke, R. Snellings)

Upgrade Coordinator (T. Peitzmann 2011-2013)

Project Leader of the Outer Layers of the Inner Tracking System Upgrade (P. Kuijer),

Management Board Members (T. Peitzmann)

Deputy Physics Coordinator (M. van Leeuwen)

Physics Coordinator (M. van Leeuwen)

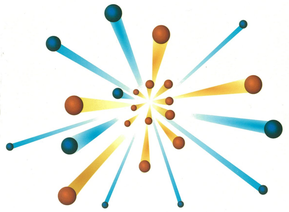
Azimuthal Anisotropy of Strange and Charm Hadrons

Measured in Pb–Pb Collisions at 2.76 TeV

Carlos Eugenio Pérez Lara

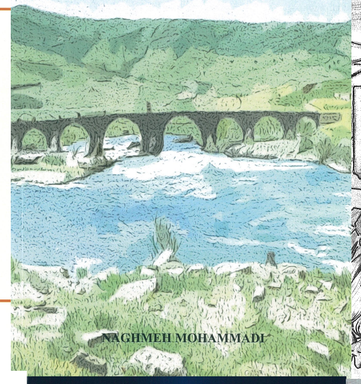
Front cover: Flowers in Orange by Alicia Pérez Canoa, Setauket, NY, USA

Jet-like heavy-flavour particle correlations in proton-proton and lead-lead collisions in ALICE



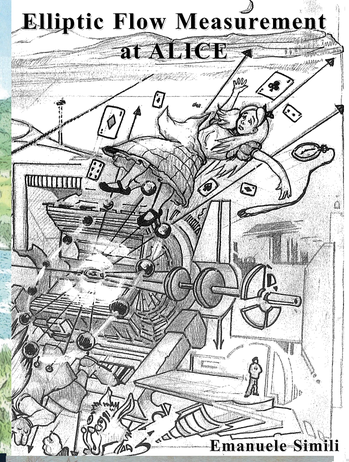
Deepa Thomas

Higher Harmonic Anisotropic Flow of Identified Particles



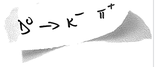
NAGHMEH MOHAMMADI

Elliptic Flow Measurement at ALICE



Emanuele Simili

Open charm analysis with the ALICE detector in pp collisions at LHC



Cristian Ivan

BALANCE FUNCTIONS:

Multiplicity and transverse momentum dependence of the charge dependent correlations in ALICE

Alis Rodríguez Manso

Elliptic flow at different collision stages

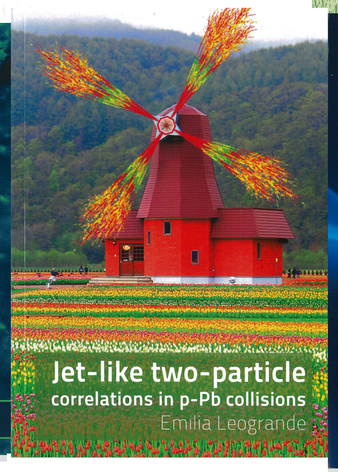
Andrea Dubla

Identified particle yield associated with a high-p_T trigger particle at the LHC

Misha Veldhoen

Two-particle azimuthal correlation in d+Au and p+p collisions at $\sqrt{s_{NN}}$ = 200 GeV in STAR

F.Benedosso



Low-mass dielectron measurement in Pb-Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV with ALICE at the LHC

Alberto Caliva'

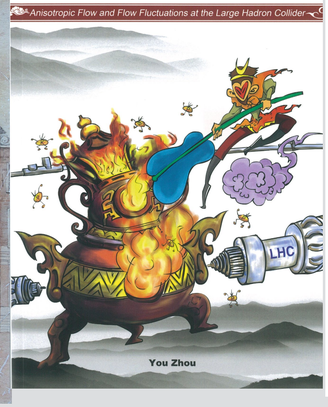
Anisotropic flow of identified hadrons in heavy-ion collisions at the LHC:

from detector alignment and calibration to measurement

Mikołaj Krzewicki

Making the QGP soup?

Anisotropic Flow and Flow Fluctuations at the Large Hadron Collider



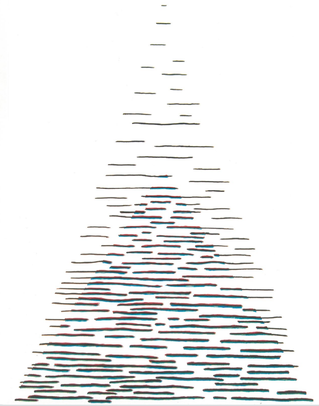
You Zhou

Anisotropic Flow Measurements in ALICE at the Large Hadron Collider

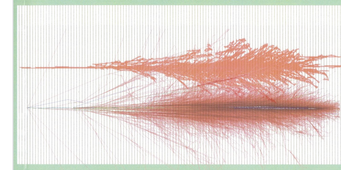
Ante Bilandžić

Digital Calorimetry Using Pixel Sensors

Martijn Reicher



Measurements with a High-Granularity Digital Electromagnetic Calorimeter

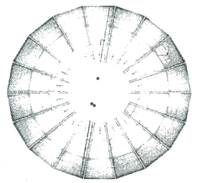


Chunhui Zhang

Azimuthal angular correlations of D mesons and charged particles with the ALICE detector at the LHC

Sandro Bjelogrlić

Measurement of pions, kaons and protons with the ALICE detector in pp collisions at the LHC



Marek Chojnacki