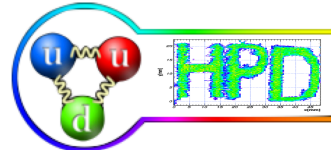




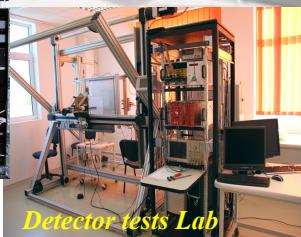
MINISTERUL CERCETĂRII ȘI INOVĂRII



End of the year Seminar Hadron Physics Department



Data Centre



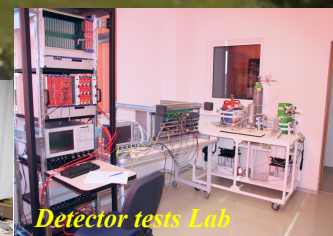
Detector tests Lab



Detector Lab
assembling clean rooms



Technological transfer
Lab



Detector tests Lab



Bonding Lab

“With no doubt this department has to be ranked excellent as it has an outstanding impact and visibility in both science and technology within the various international collaborations where it is involved” - 2012 International Evaluation Committee

Outlook

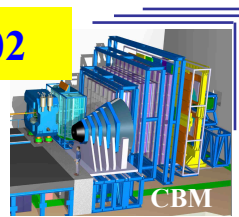
- *Introduction - 70th anniversary of IFAR - precursor of IFIN-HH*
- *2019 HPD achievements*
- *Physics*
- *ALICE-TPC upgrade at CERN*
- *R&D related to the CBM Experiment at FAIR*
- *Applied Physics & Technological Transfer*
- *Publications, Invited lectures, Conferences, Meetings*
- *Training & Teaching*
- *Financial aspects*
- *Final considerations*

Hadron Physics Department at 70th IFAR Anniversary

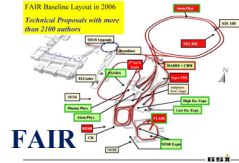
1949 - Horia Hulubei, PhD student of Jean Perrin, has founded the Institute of Physics of Romanian Academy, precursor of National Institute of Physics and Nuclear Engineering

Experiments

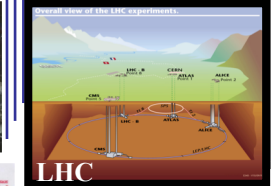
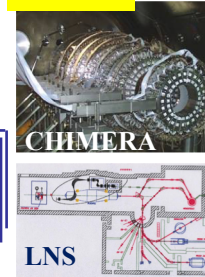
2002



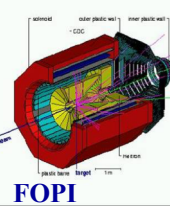
1999



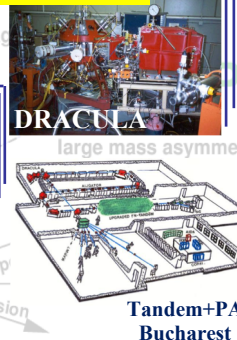
1998



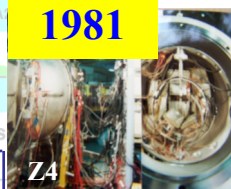
1987



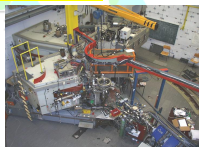
1984



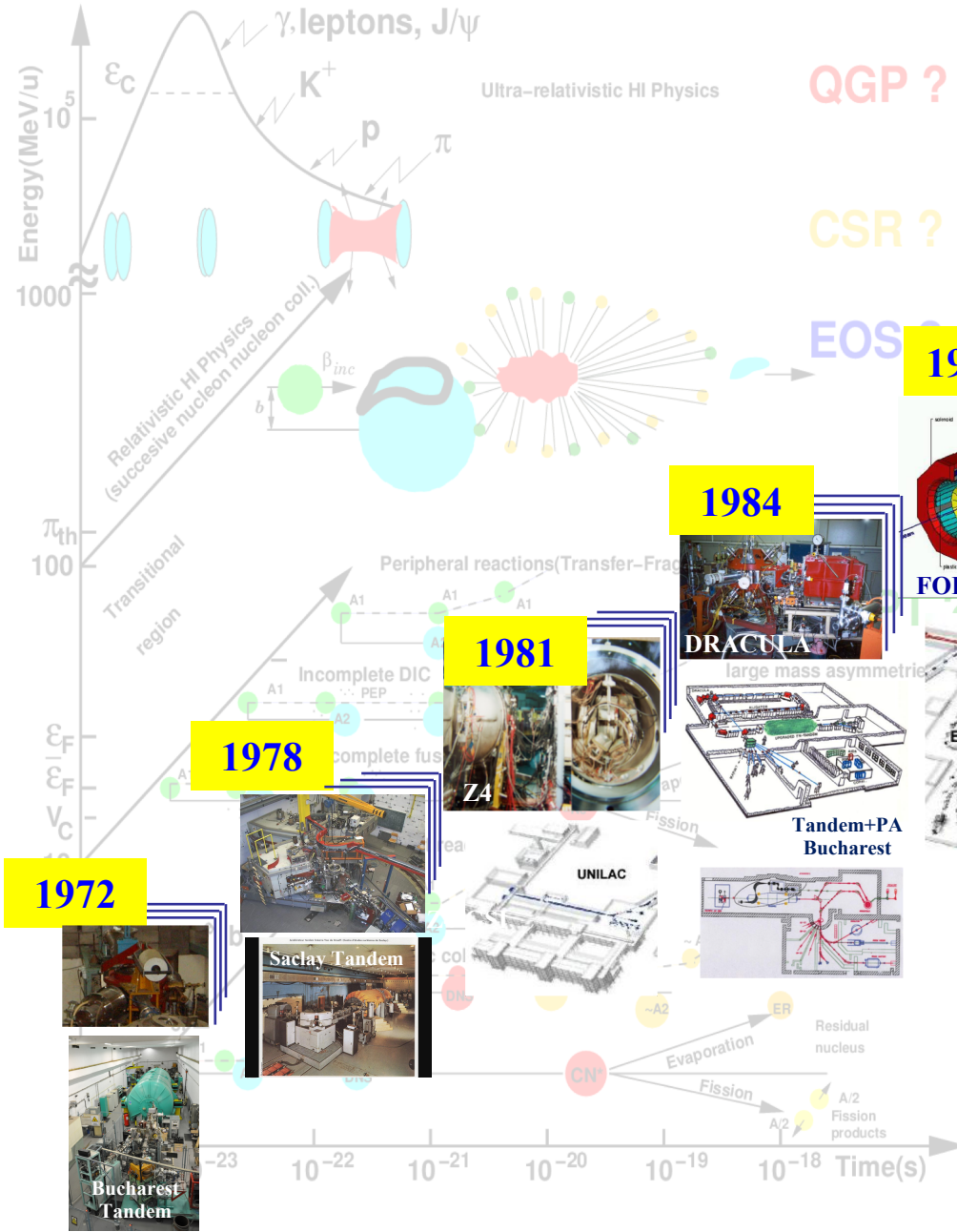
1981



1978



1972

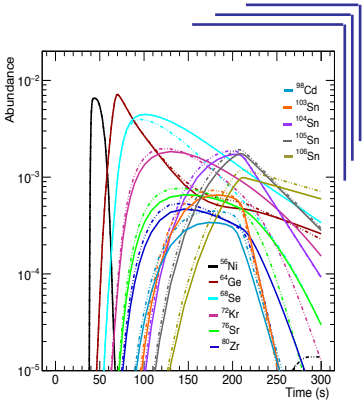


Physics - Nuclear Structure and Dynamics

Beyond-mean-field approach to

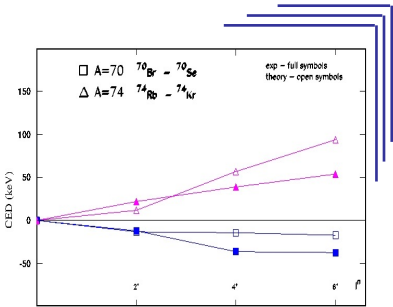
- shape coexistence phenomena in medium mass proton-rich and neutron-rich nuclei
- isospin-symmetry- breaking effects
- weak interaction processes
- impact of rp-process waiting point nuclei on X-ray burst nucleosynthesis.

2019



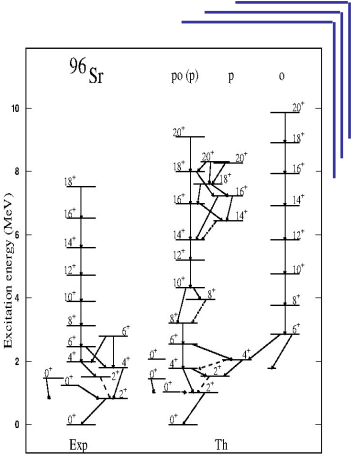
Phys. Rev. C 100, 015810 (2019)

2015



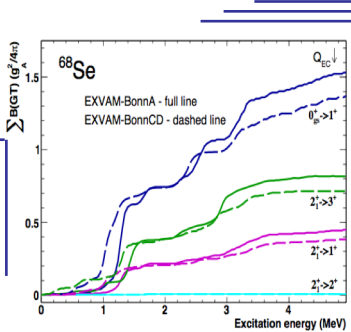
Phys. Rev. C 91, 014302 (2015)

2012



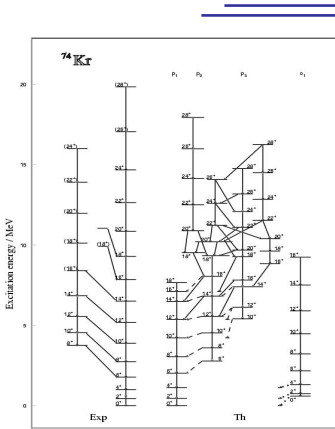
Phys. Rev. C 85, 034337 (2012)

2009



Phys. Rev. C 80, 044319 (2009)

1999



Prog. Part. Nucl. Phys 43, 485 (1999)

2002-present

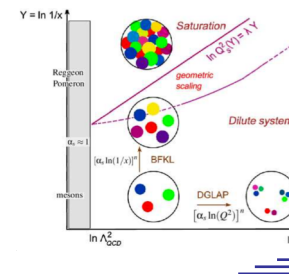
[illegible]

Figure 1: A plot of the inverse slope parameter T_{kin} (GeV) versus the scaled transverse momentum p_T/ρ . The y-axis ranges from 0.02 to 0.2 GeV, and the x-axis ranges from 0.25 to 0.7. Data points are shown for ALICE Pb-Pb collisions at 5.02 TeV (black circles), ALICE Pb-Pb collisions at 2.76 TeV (red circles), ALICE Pb-Pb collisions at 13-27 TeV (blue circles), and PYTHIA8, $s = 2.76$ TeV (with Color Reconnection) (green circles). The plot shows a decreasing trend of T_{kin} with increasing p_T/ρ , with a slight increase at higher p_T/ρ values. The ALICE data points are generally higher than the PYTHIA8 data points at lower p_T/ρ values.

Phys.Rev.Lett. 74(1995)5001

1991-1999

Target-Projectile	$\ln \sigma$
$^{12}\text{C} + ^{12}\text{C}$	111.4
$^{12}\text{C} + ^{16}\text{O}$	125
$^{16}\text{O} + ^{16}\text{O}$	126.9
$^{16}\text{O} + ^{20}\text{Ne}$	111.4
$^{20}\text{Ne} + ^{20}\text{Ne}$	126.9
$^{20}\text{Ne} + ^{24}\text{Mg}$	134.9
$^{24}\text{Mg} + ^{24}\text{Mg}$	144.9
$^{24}\text{Mg} + ^{28}\text{Si}$	154.9
$^{28}\text{Si} + ^{28}\text{Si}$	164.9
$^{28}\text{Si} + ^{32}\text{S}$	174.9
$^{32}\text{S} + ^{32}\text{S}$	184.9
$^{32}\text{S} + ^{36}\text{Ar}$	194.9
$^{36}\text{Ar} + ^{36}\text{Ar}$	204.9
$^{36}\text{Ar} + ^{40}\text{Ca}$	214.9
$^{40}\text{Ca} + ^{40}\text{Ca}$	224.9
$^{40}\text{Ca} + ^{44}\text{Ti}$	234.9
$^{44}\text{Ti} + ^{44}\text{Ti}$	244.9
$^{44}\text{Ti} + ^{48}\text{Cr}$	254.9
$^{48}\text{Cr} + ^{48}\text{Cr}$	264.9
$^{48}\text{Cr} + ^{52}\text{Fe}$	274.9
$^{52}\text{Fe} + ^{52}\text{Fe}$	284.9
$^{52}\text{Fe} + ^{56}\text{Ni}$	294.9
$^{56}\text{Ni} + ^{56}\text{Ni}$	304.9
$^{56}\text{Ni} + ^{60}\text{Zn}$	314.9
$^{60}\text{Zn} + ^{60}\text{Zn}$	324.9
$^{60}\text{Zn} + ^{64}\text{Ge}$	334.9
$^{64}\text{Ge} + ^{64}\text{Ge}$	344.9
$^{64}\text{Ge} + ^{68}\text{Se}$	354.9
$^{68}\text{Se} + ^{68}\text{Se}$	364.9
$^{68}\text{Se} + ^{72}\text{Kr}$	374.9
$^{72}\text{Kr} + ^{72}\text{Kr}$	384.9
$^{72}\text{Kr} + ^{76}\text{Xe}$	394.9
$^{76}\text{Xe} + ^{76}\text{Xe}$	404.9
$^{76}\text{Xe} + ^{80}\text{Te}$	414.9
$^{80}\text{Te} + ^{80}\text{Te}$	424.9
$^{80}\text{Te} + ^{84}\text{Po}$	434.9
$^{84}\text{Po} + ^{84}\text{Po}$	444.9
$^{84}\text{Po} + ^{88}\text{At}$	454.9
$^{88}\text{At} + ^{88}\text{At}$	464.9
$^{88}\text{At} + ^{92}\text{Bi}$	474.9
$^{92}\text{Bi} + ^{92}\text{Bi}$	484.9
$^{92}\text{Bi} + ^{96}\text{Tl}$	494.9
$^{96}\text{Tl} + ^{96}\text{Tl}$	504.9
$^{96}\text{Tl} + ^{100}\text{Pb}$	514.9
$^{100}\text{Pb} + ^{100}\text{Pb}$	524.9
$^{100}\text{Pb} + ^{104}\text{Po}$	534.9
$^{104}\text{Po} + ^{104}\text{Po}$	544.9
$^{104}\text{Po} + ^{108}\text{At}$	554.9
$^{108}\text{At} + ^{108}\text{At}$	564.9
$^{108}\text{At} + ^{112}\text{Bi}$	574.9
$^{112}\text{Bi} + ^{112}\text{Bi}$	584.9
$^{112}\text{Bi} + ^{116}\text{Tl}$	594.9
$^{116}\text{Tl} + ^{116}\text{Tl}$	604.9
$^{116}\text{Tl} + ^{120}\text{Pb}$	614.9
$^{120}\text{Pb} + ^{120}\text{Pb}$	624.9
$^{120}\text{Pb} + ^{124}\text{Po}$	634.9
$^{124}\text{Po} + ^{124}\text{Po}$	644.9
$^{124}\text{Po} + ^{128}\text{At}$	654.9
$^{128}\text{At} + ^{128}\text{At}$	664.9
$^{128}\text{At} + ^{132}\text{Bi}$	674.9
$^{132}\text{Bi} + ^{132}\text{Bi}$	684.9
$^{132}\text{Bi} + ^{136}\text{Tl}$	694.9
$^{136}\text{Tl} + ^{136}\text{Tl}$	704.9

Phys.Lett. 397B(1997)25

1978

Phys.Rev. C24(1981)1512

Nucl. Phys. A477(1988)277

The diagram illustrates the process of nuclear fission. A horizontal line represents the initial state. Below it, a yellow circle labeled 'Residual nucleus' is shown. To its right, two yellow circles labeled 'A/2 Fission products' are shown, representing the fragments of the fissioned nucleus.

Phys.Rev. C98(2018)024904

AIP Conference Proceedings
2076(2019) 040001

Detectors

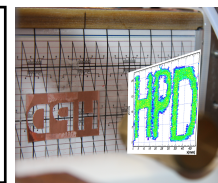
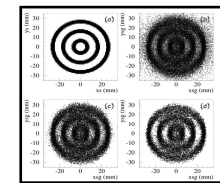
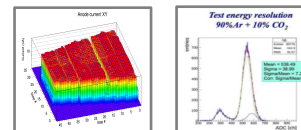
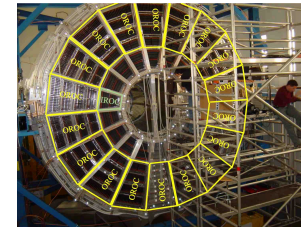
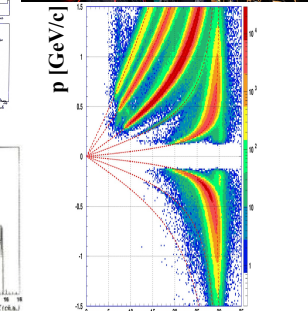
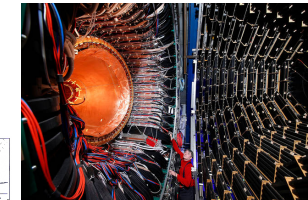
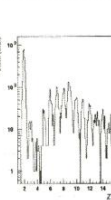
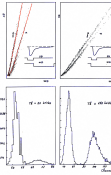
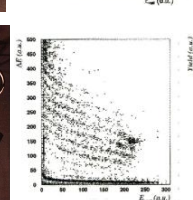
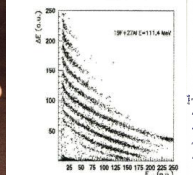
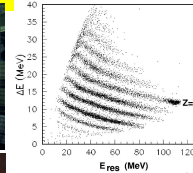
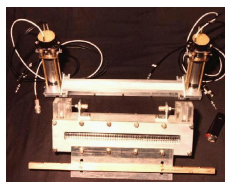
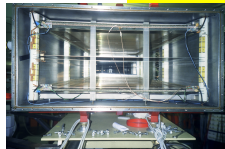
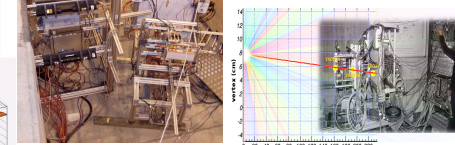
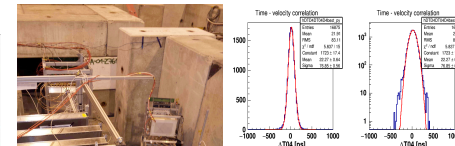
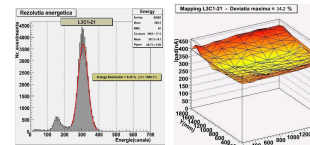
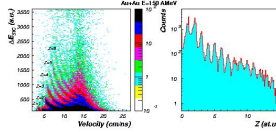
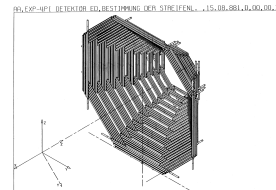
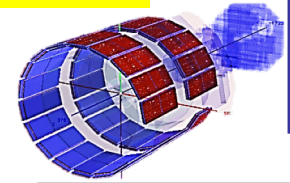
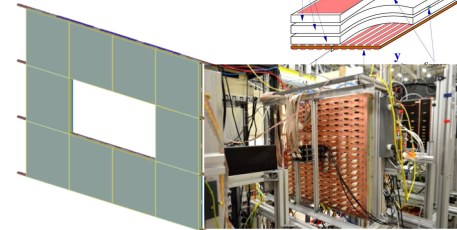
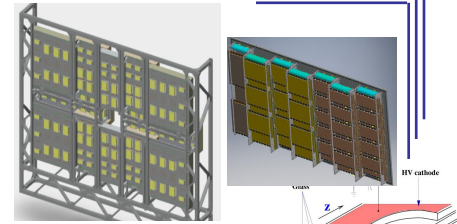
2004-in progress

2004-2019

1987

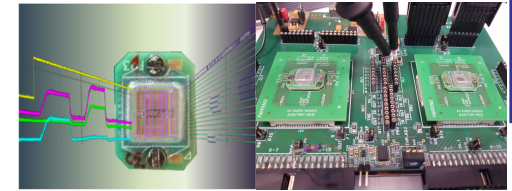
1986

1972

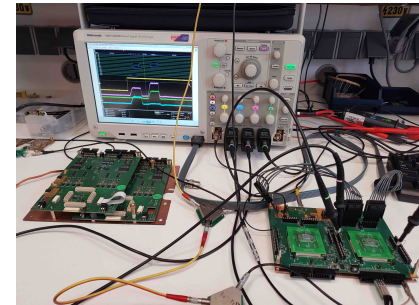
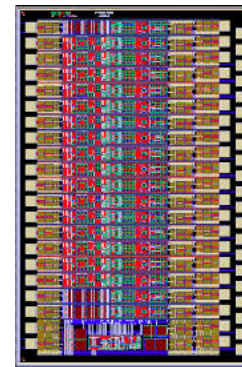


Electronics

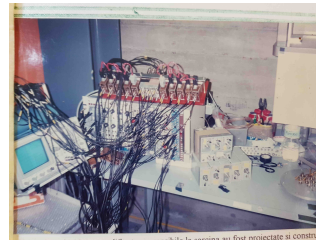
2009



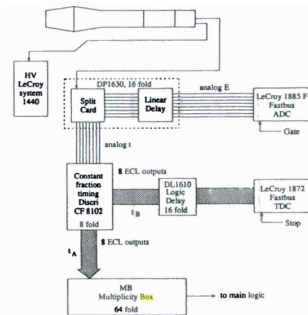
1999



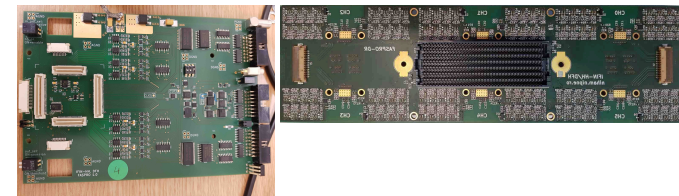
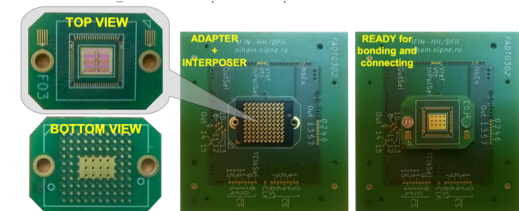
1992



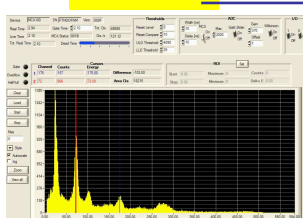
1988



1973

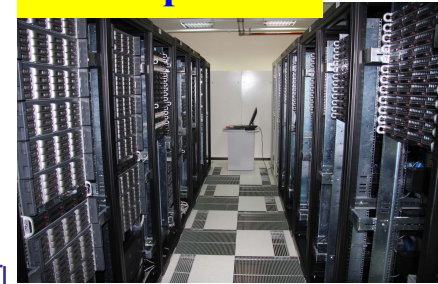


2017

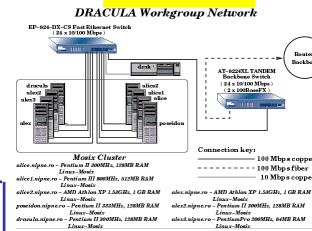


Computing

2006 - present



2003



1992



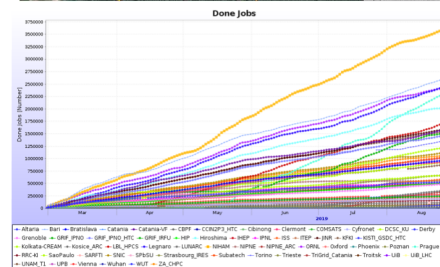
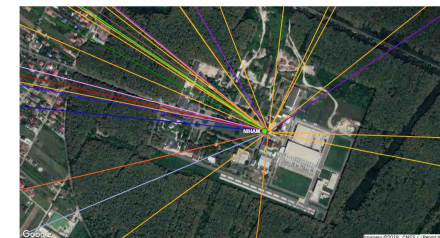
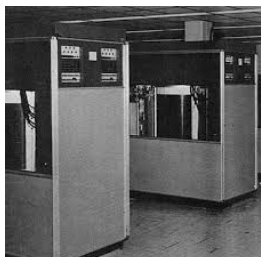
1983



1980



1972

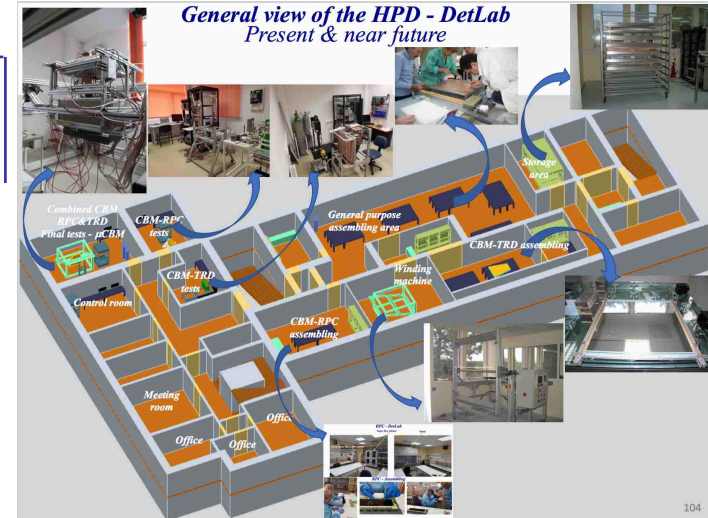


Infrastructure

2017



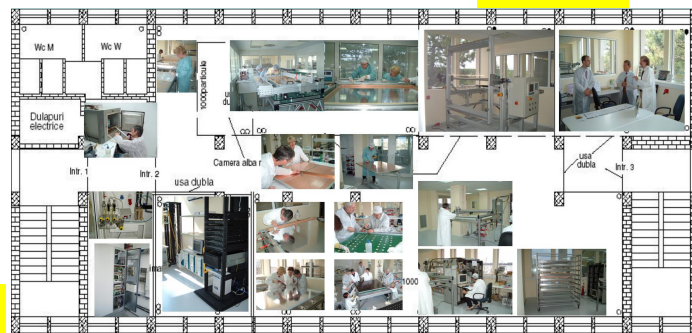
General view of the HPD - DetLab
Present & near future



104



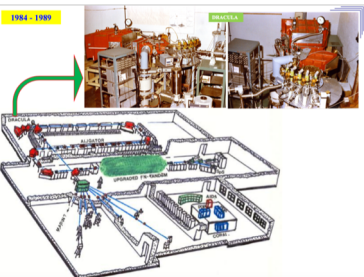
2004



1989



1986



The main, present and former, actors behind the achievements summarized above:

Anton Andronic, Cristian Andrei, Oana Andrei, Valerica Aprodu, Dana Avramescu,
Daniel Bartos, Ionela Berceanu*, Alexaandru Bercuci, Gheorghe Caragheorgheopol,
Vasile Catanescu, Mircea Ciobanu* Petre Dima*, Gheorghe Dima, Constanta Dinca,
Marin Duma*, Gheorghe Giolu*, Andrei Herghelegiu, Elena Ionescu, Iosif Legrand*, Amelia Lindner,
Adrian Mare, Alice Mateescu, Gheorghe Mateescu, Nelu Mihai*, Dorin Moisa*, Gigi Nagel*,
Alexandrina Petrovici, Mihai Petrovici, Amalia Pop, Lucia Prodan, Andrei Radu, Laura Radulescu,
Claudiu Schiaua, Victor Simion, Gabriel Stoicea*, Madalina Tarzila, Petre Zaharia*
(* former members, *deceased)*

2019 achievements

Outreach
L.Prodan
L.Radulescu

HPD activities

Teaching & Training
Doctoral School
Summer Student Program
Diploma, Master & PhD thesis

Physics

NUSTAR ISOLDE

A.Petrovici
O.Radu
A.S.Mare

ALICE

C.Andrei
D.Avramescu
A.Bercuci
A.Herghelegiu
A.Lindner
M.Petrovici
A.Pop

CBM

D.Avramescu
A.Bercuci
A.Lindner
M.Petrovici
A.Pop

Detectors

HCRTD

V.Aprodu
D.Bartos
A.Bercuci
V.Duta
M.Petris
M.Petrovici
L.Prodan
A.Radu
L.Radulescu
V.Simion

HCRRPC

V.Aprodu
D.Bartos
V.Duta
M.Petris
M.Petrovici
L.Prodan
A.Radu
L.Radulescu
V.Simion

R&D CBM

FEE

HCRTD

D.Bartos
G.Caragheorgheopol
V.Catanescu
C.Schiaua

HCRRPC

D.Bartos
G.Caragheorgheopol

Integration

A.Bercuci
D.Bartos
G.Caragheorgheopol
V.Catanescu
C.Schiaua

ALICE

Experiment

-Shifts
C.Andrei
A.Herghelegiu
A.Lindner
A.Pop

TPC upgrade

C.Andrei
V.Aprodu
D.Bartos
G.Caragheorgheopol
V.Duta
A.Herghelegiu
M.Petris
M.Petrovici
A.Pop
L.Prodan
A.Radu
L.Radulescu

IT

GRID

C.Schiaua

NAF

A.Bercuci
C.Schiaua

AR-TT

G.Mateescu
A.Mateescu

Workshop

G.Dima

Adm

Current p.w.

C.Dinca
L.Prodan

Projects aspects

M.Petris A.Petrovici
M.Petrovici A.Pop
G.Rosu

Inv./Acq., Imp/Exp

C.Dinca
G.Rosu
A.Petrovici
M.Petrovici
C.Schiaua

Build.Adm. NU & Safety

V.Duta
L.Radulescu
G.Dima

M&O

-Equipment -Electronics

A.Caragheorgheopol
V.Duta
C.Schiaua

Cleaning

G.Stoian

Financial

G.Rosu

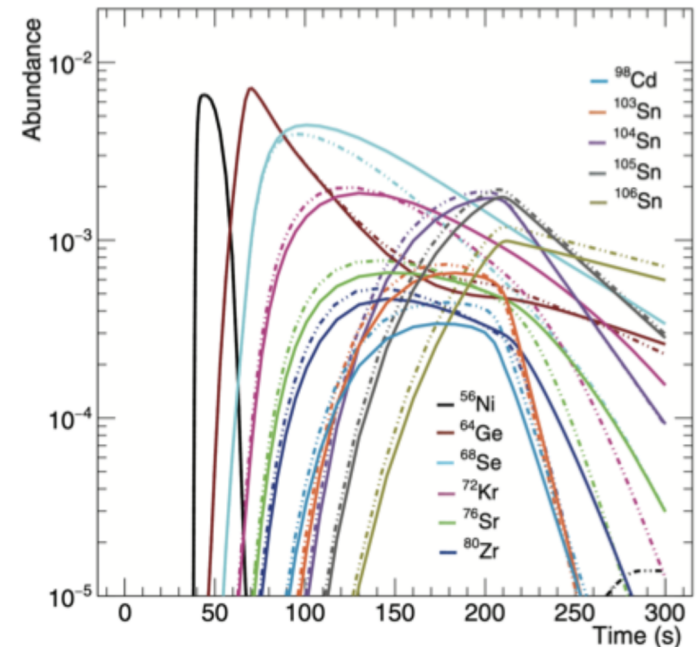
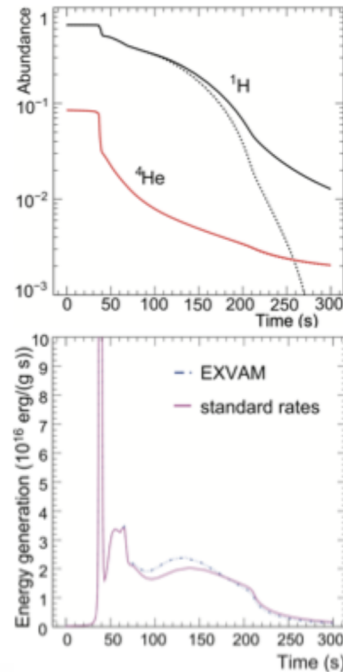
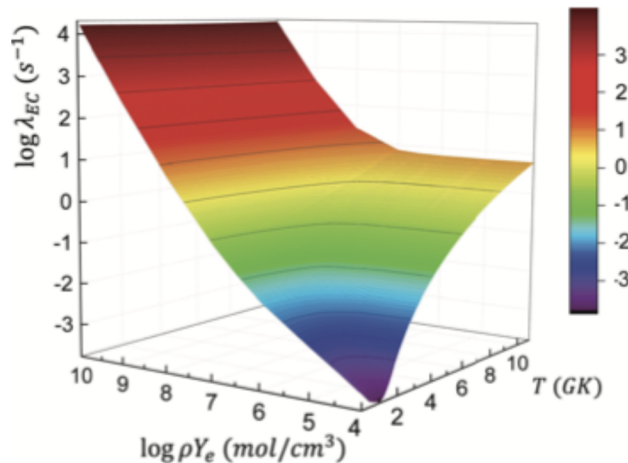
Nuclear Structure and Dynamics

Impact of stellar weak interaction rates of $A \approx 70$ waiting points on *rp*-process nucleosynthesis and energetics

The role of the exotic proton-rich $N \approx Z$ nuclei in the $A = 70$ mass region in: - *rp*-process in type I X-ray bursts
- their associated nucleosynthesis.

The competition between the proton capture rates and the rates of the weak interaction processes at the waiting points:

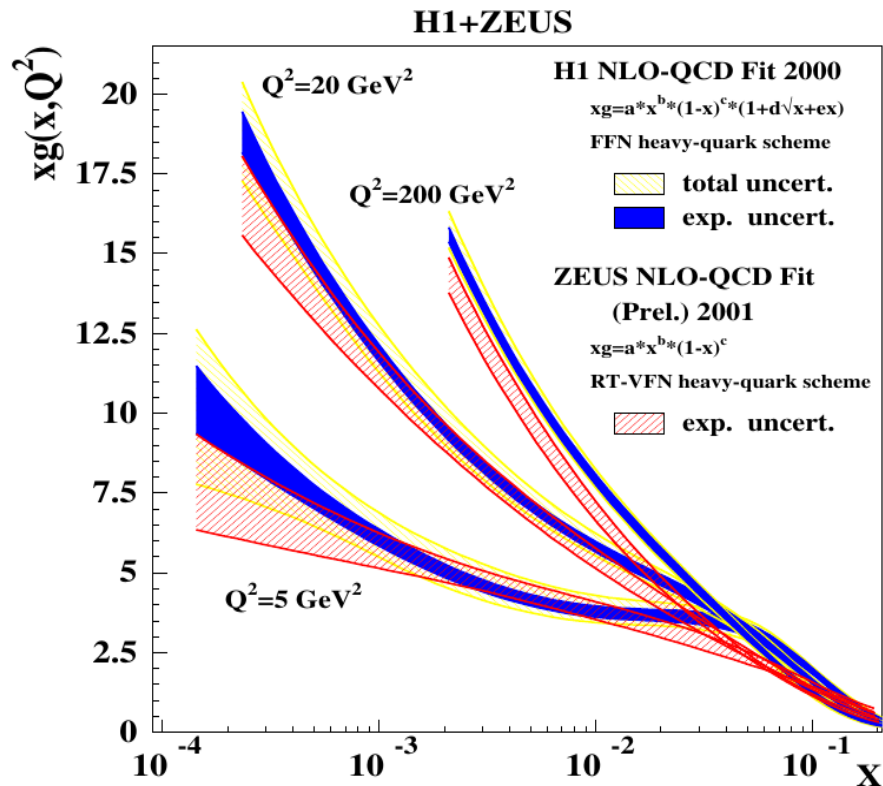
- significantly influence on the nuclear energy production rate $\Rightarrow$ translates into the luminosity curves, the main direct observable of a type I X-ray burst
- robust predictions of Gamow- Teller strength distributions for the ground state and thermally populated low- lying excited states in the stellar environment
- the temperature dependence of the β^+ -decay rates together with the temperature and density evolution of the continuum electron capture rates are needed to realistically evaluate the impact of weak interaction rates of the waiting point nuclei on nucleosynthesis.



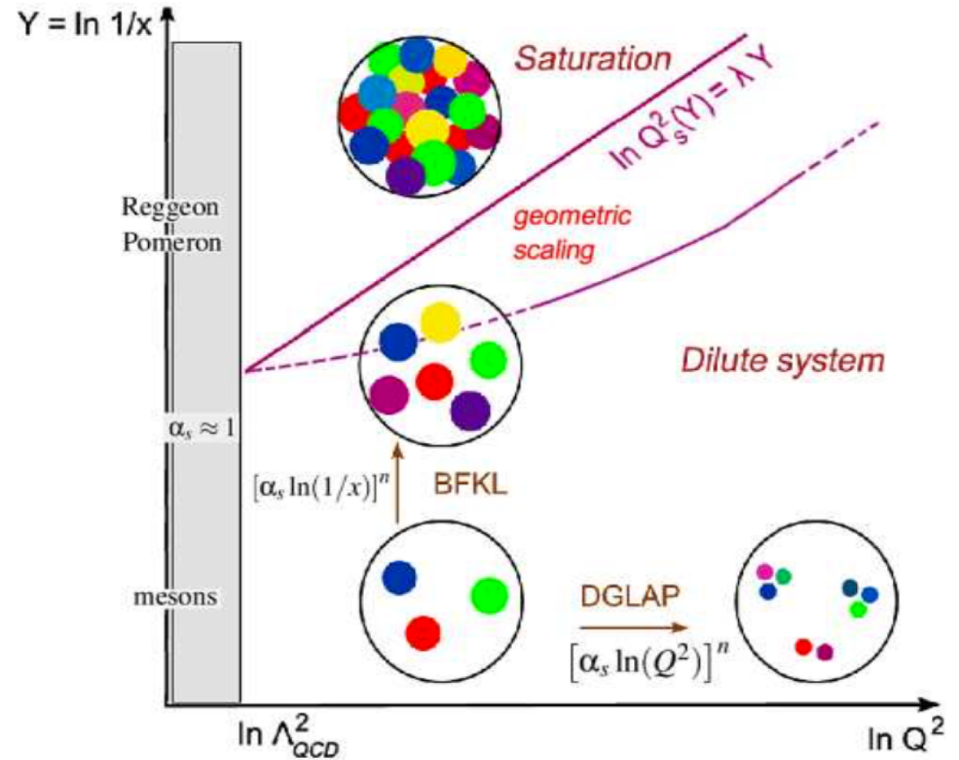
- *Phys. Rev. C*100(2019)015810
- A. Petrovici, talks: ILL-Workshop - Bucharest 2019, ANPC 2019- South Africa, NuSYM2019 - Vietnam
- A. S. Mare, Master Thesis 2019 - currently PhD student
- A. S. Mare, talks: ASC, Faculty of Physics - Bucharest 2019

Strongly Interacting Matter

Physics motivation



M.Dittmar et al., Proceedings HERA-LHC Workshop
 arXiv:[hep-ph]0511119

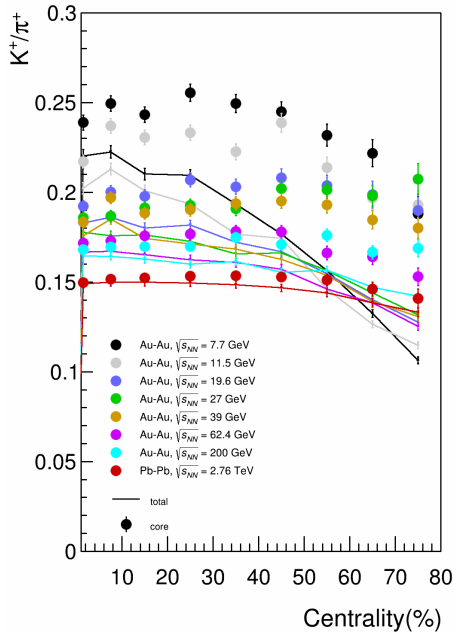
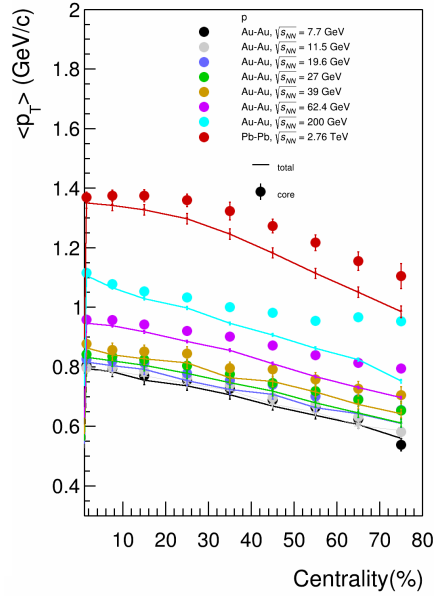


D. d'Enterria, Eur.Phys.J. A31(2007)816

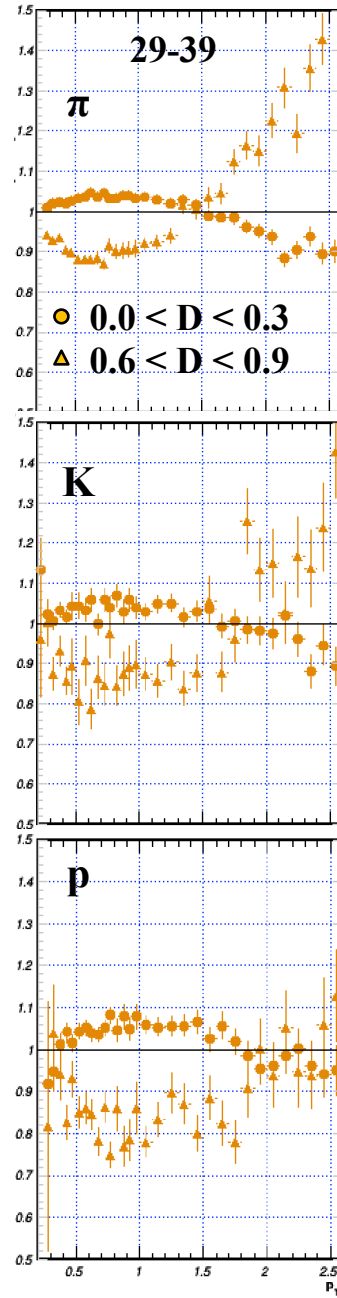
Following A.H. Mueller
 approximations NP A715(2003)20

System	<i>Au-Au</i>	<i>Pb-Pb</i>	<i>Pb-Pb</i>	<i>pp</i>
$\sqrt{s}(GeV)$	200	2700	5020	7000
$\frac{dN_g^{in}}{dyd^2b}(fm^{-2})$	≈ 4.7	≈ 11.8	≈ 15.9	≈ 18.7
f_{in}^g	≈ 0.9	≈ 2.3	≈ 3.1	≈ 3.6

Core-Corona

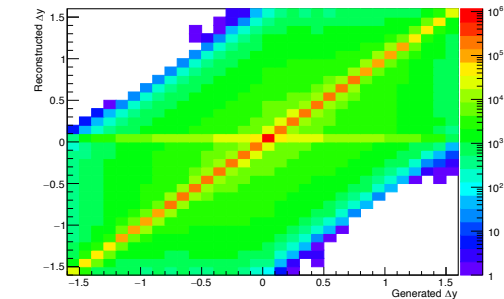
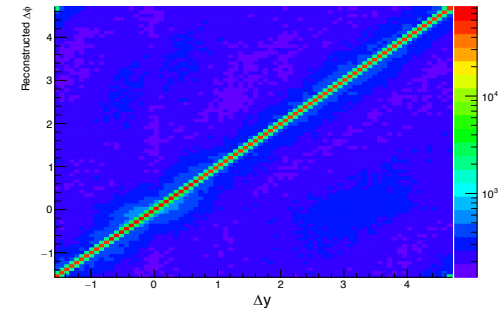
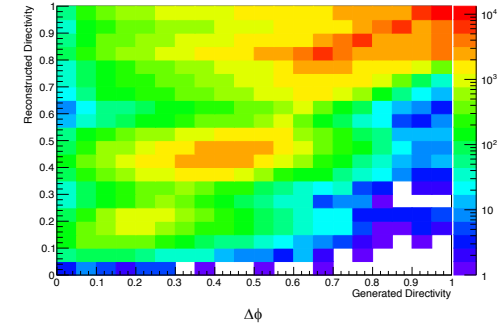
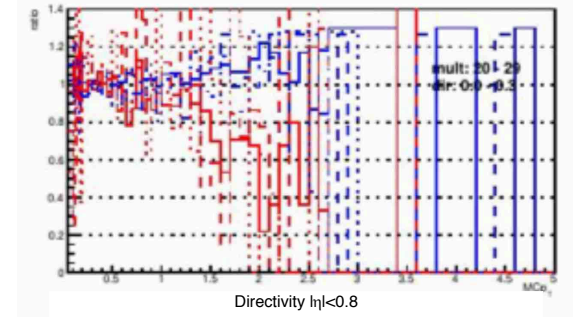


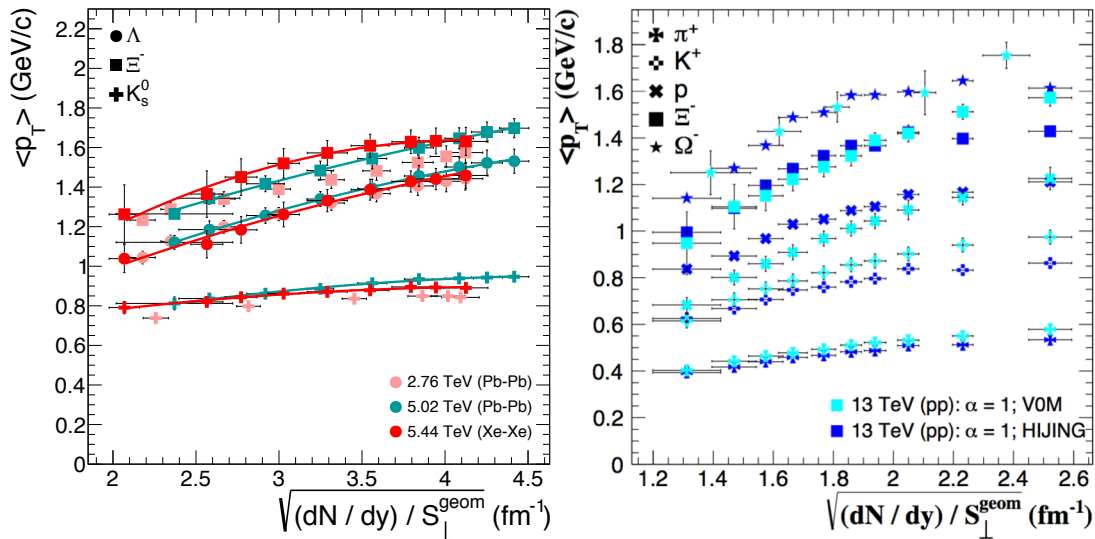
Physics p_T spectra - ratio to mult. cut



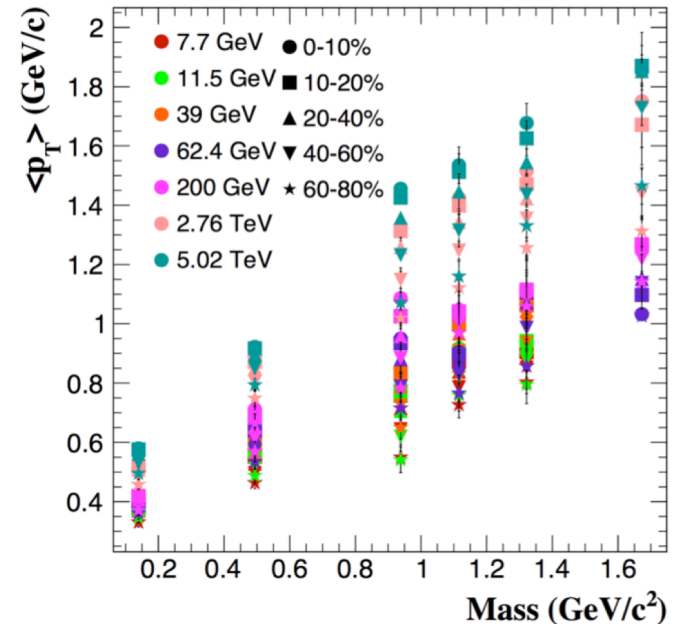
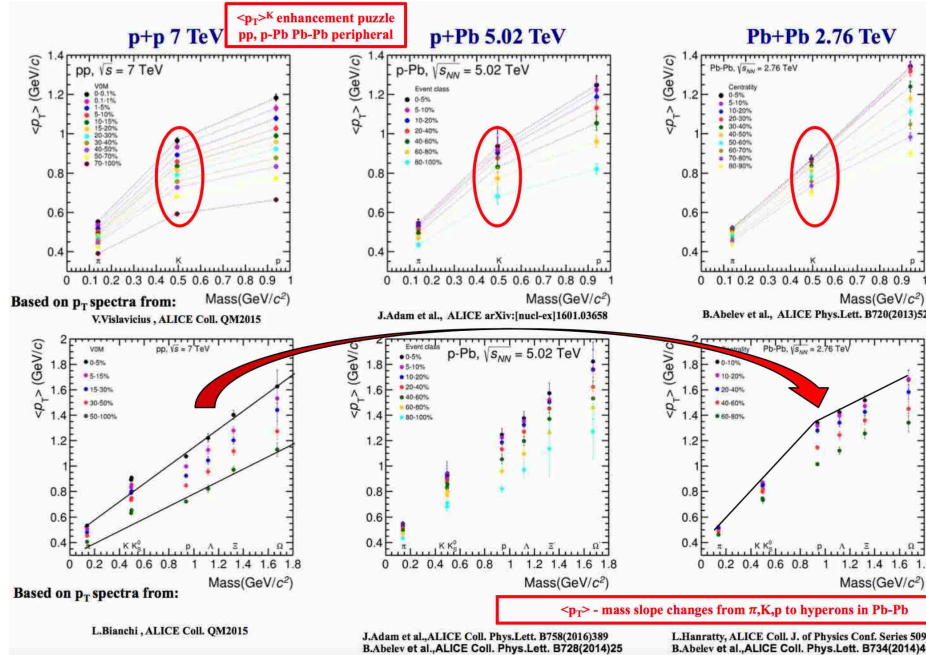
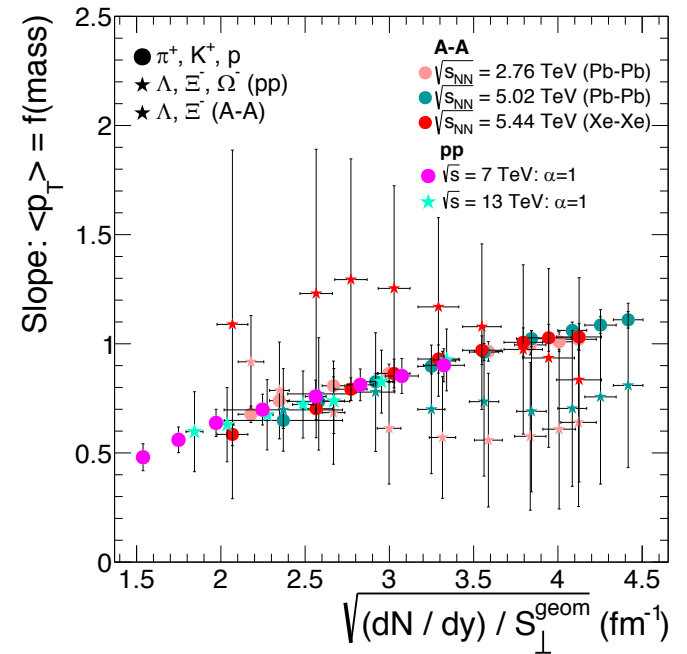
Multi differential analysis

“in-jet” & “out-of-jet” relative to integrated



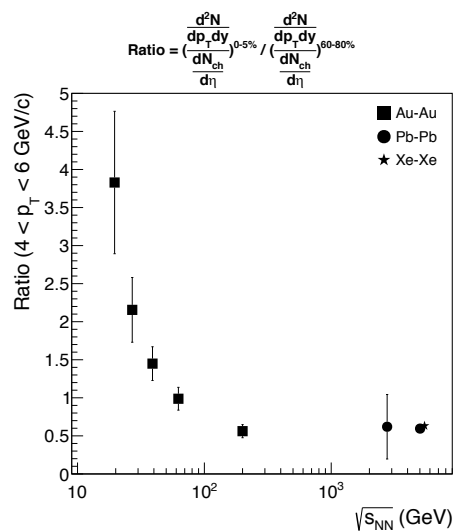
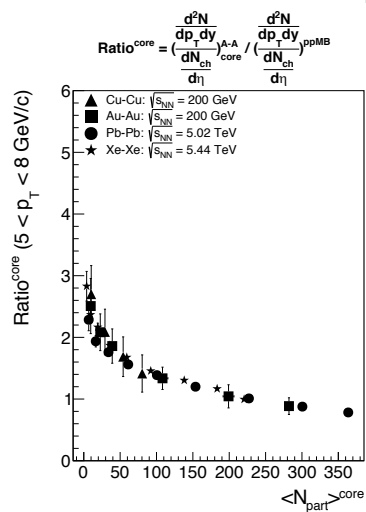
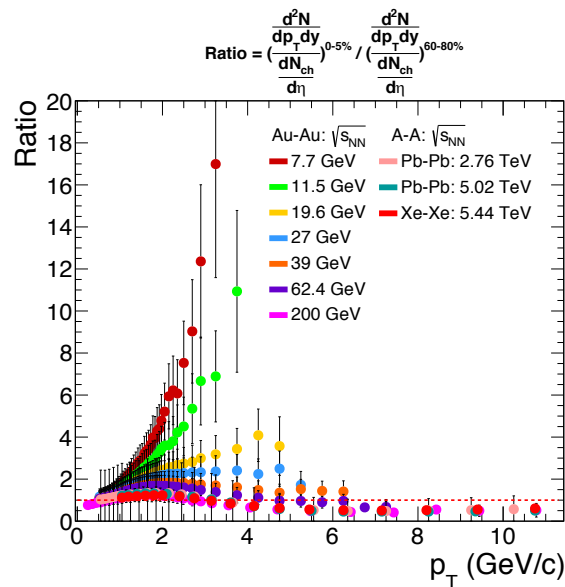
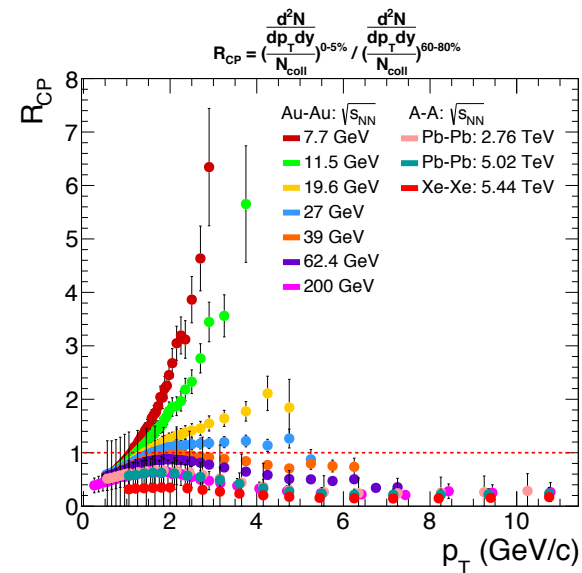


- A. Lindner, Master Thesis 2019 - currently PhD student
- A. Lindner, talk: ASC, Faculty of Physics - Bucharest 2019



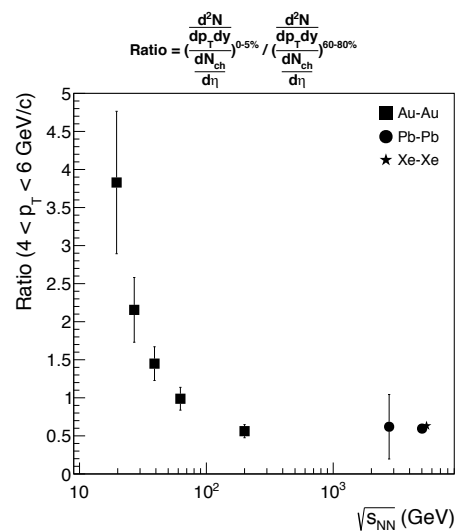
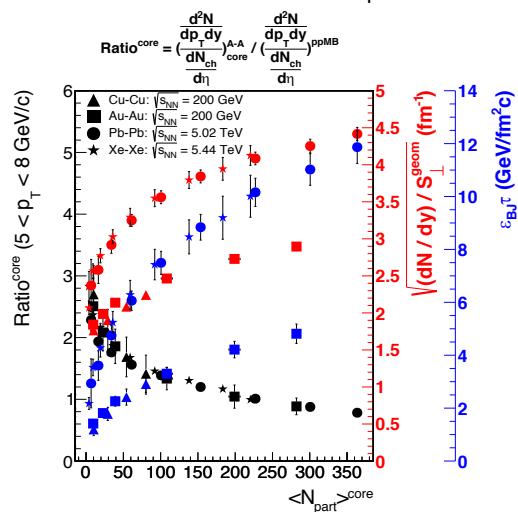
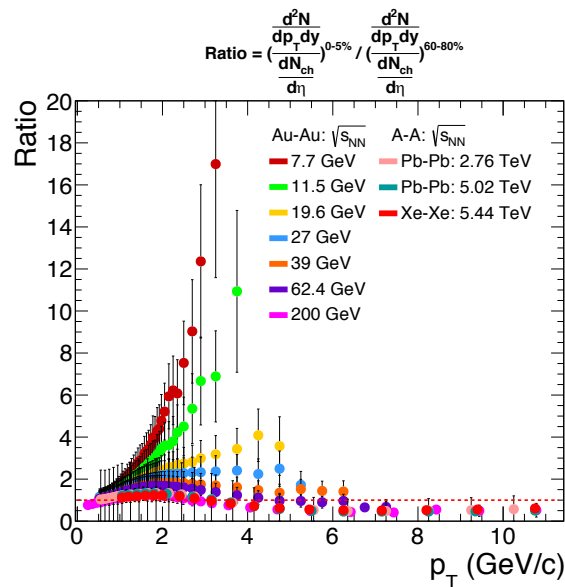
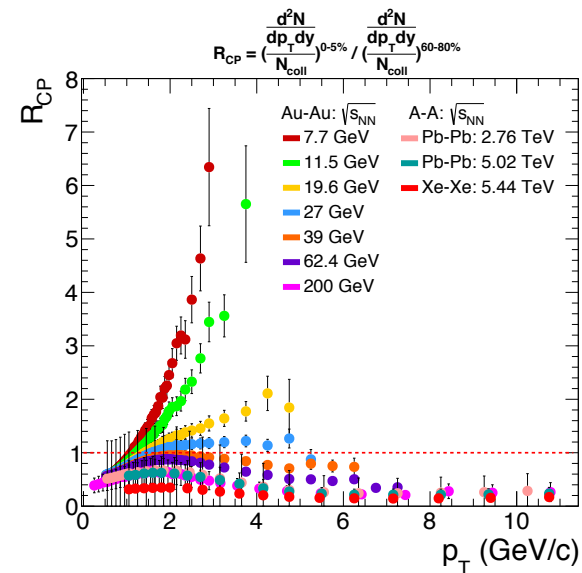
$$R_{AA}, R_{CP} \text{ and } \frac{[\frac{d^2\sigma}{dydp_T} / \langle dN_{ch}/d\eta \rangle]^{(\%bin)}}{[\frac{d^2\sigma}{dydp_T} / \langle dN_{ch}/d\eta \rangle]^{(p+p)^{MB}}}$$

N_{part} scaling



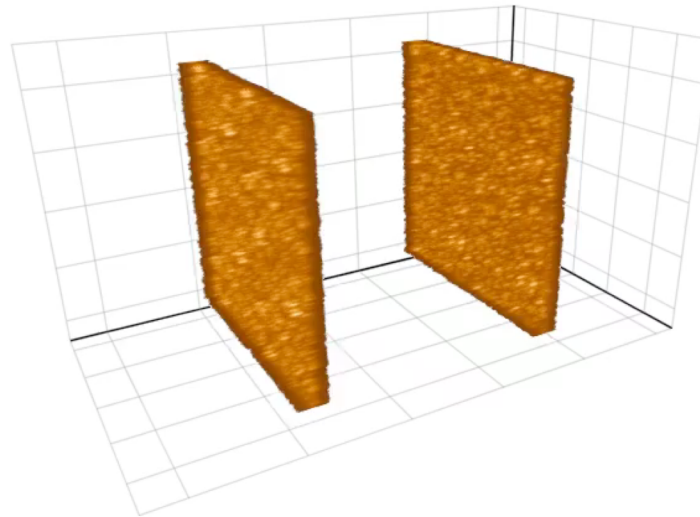
$$R_{AA}, R_{CP} \text{ and } \frac{[\frac{d^2\sigma}{dydp_T} / \langle dN_{ch}/d\eta \rangle]^{(\%bin)}}{[\frac{d^2\sigma}{dydp_T} / \langle dN_{ch}/d\eta \rangle]^{(p+p)^{MB}}}$$

N_{part} scaling



Towards consistent approach for LHC energies

D. Gelfand et al., arXiv:[hep-ph]1605.0718



*Simulating Glasma initial conditions at LHC using
the McLerran-Venugopalan model
and real-time lattice gauge theory*

- *D. Avramescu, IFIN juniors day, Serban Titeica award*

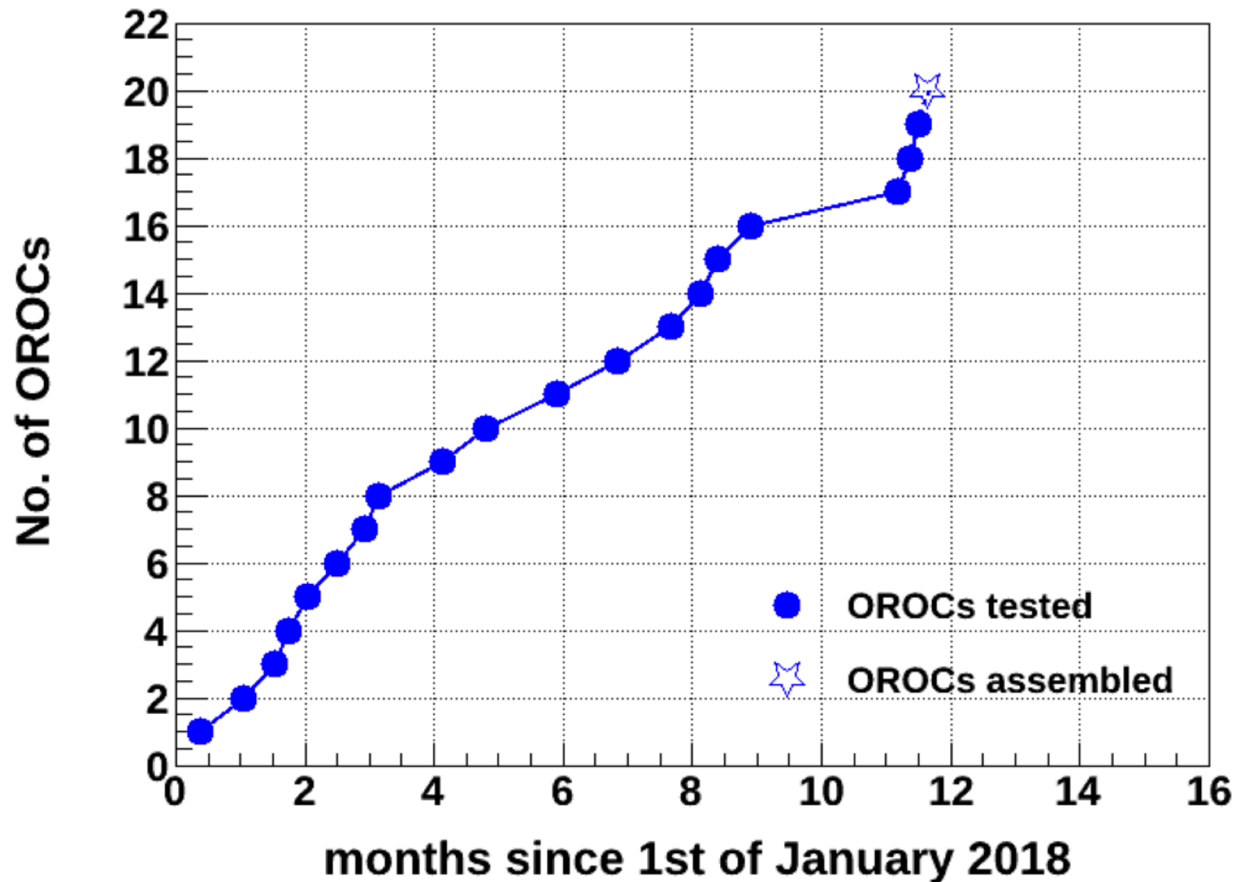
ALICE Upgrade - a must for multidimensional analysis and rare probes

Scale down factors for pp collisions at 7 TeV

AND	pions (no TOF matching condition)	Reduction factor
MB	53534470	-
& multiplicity 40-49	1807777	30
& directivity 0-0.3	327839	5.5
delta phi - outside peaks	87815	3.7
delta y > 1.0 (>1.4)		10 (40)
total	-	6100

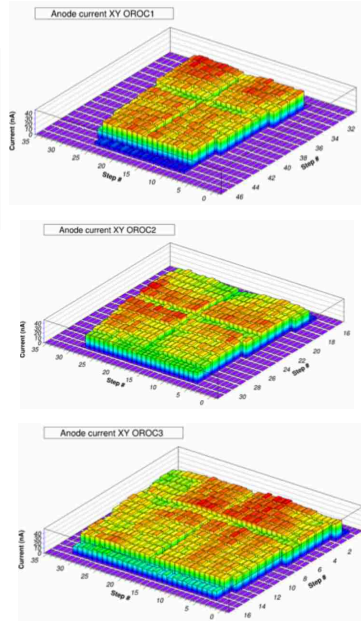
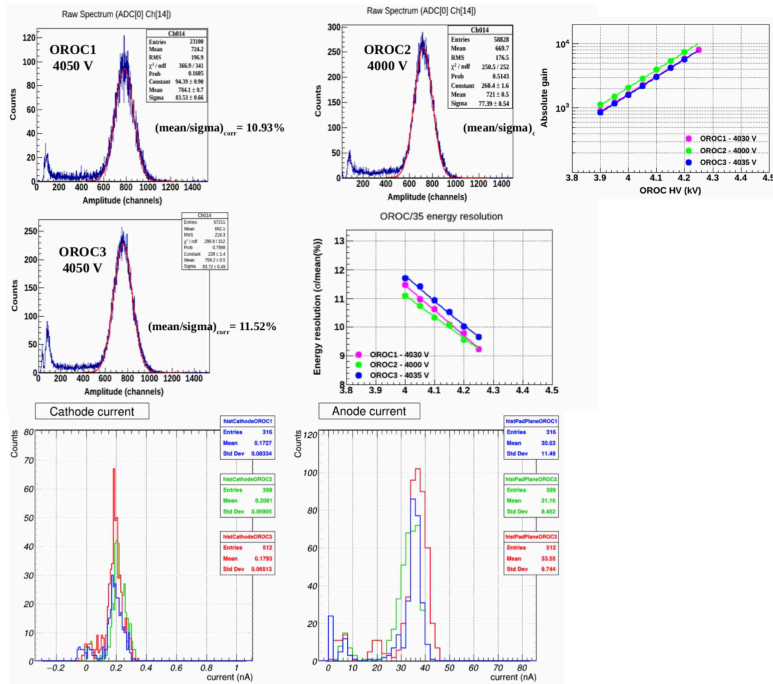
STANDALONE	pions (no TOF matching condition)	Reduction factor
MB	53534470	-
multiplicity 40-49	1807777	30
directivity 0-0.3	2938389	18
delta phi - outside peaks	14768870	3.6
delta y > 1.0	-	10

ALICE TPC Upgrade

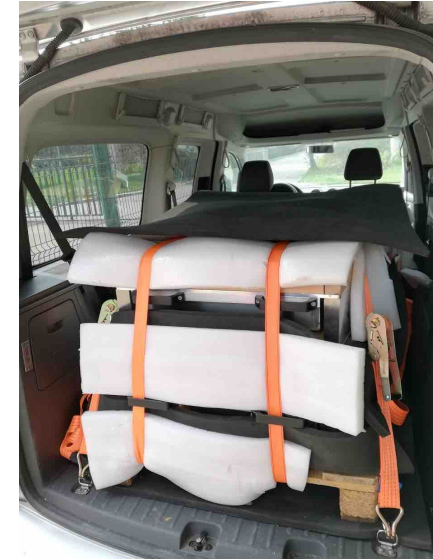


Assembling, Testing & Transport to CERN - SUCCESSFULLY FINALIZED!

20th OROC test results



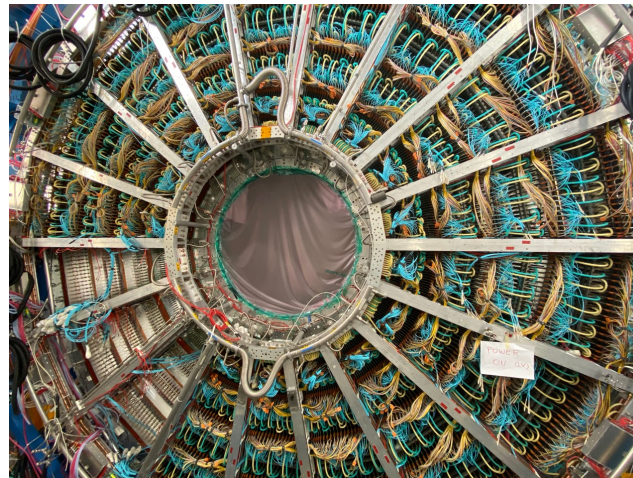
Last transport to CERN



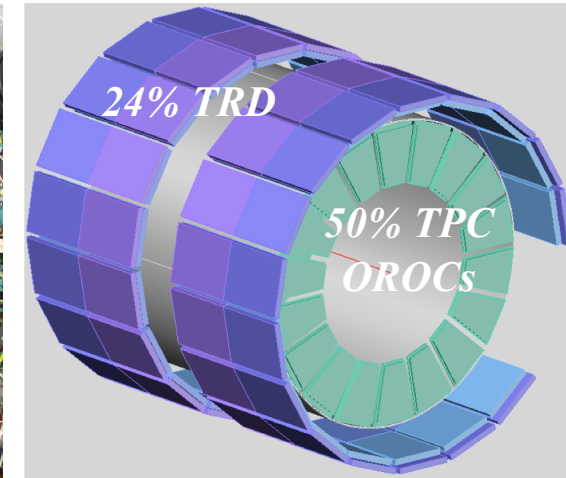
Assembling and testing team



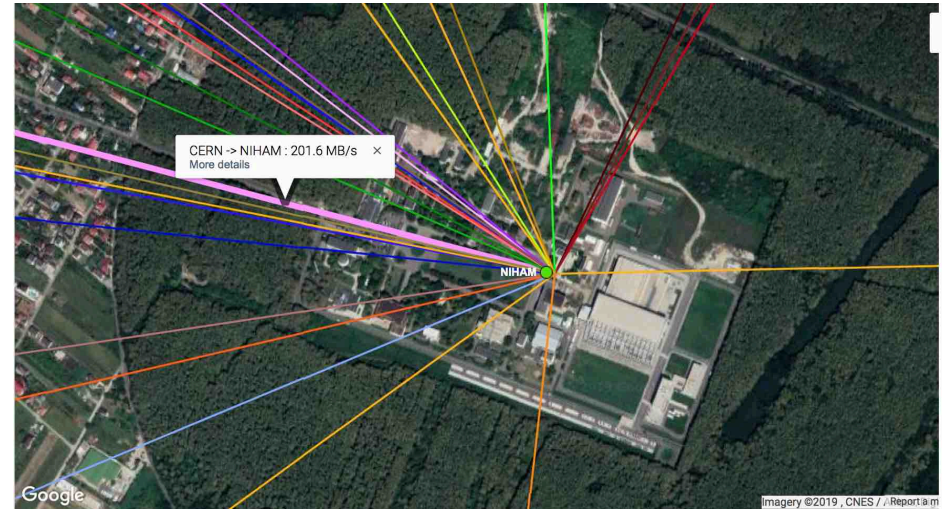
Upgraded TPC ready for tests



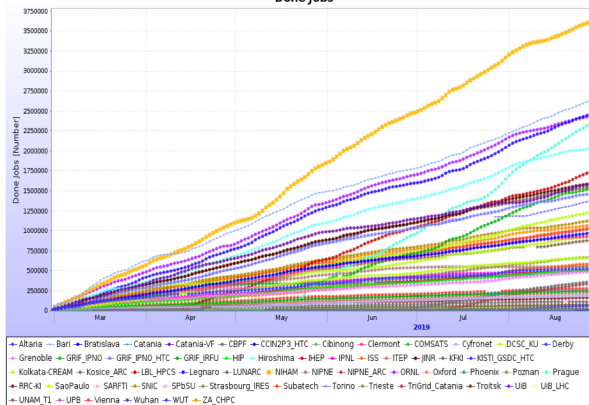
HPD contribution
to the ALICE Experiment



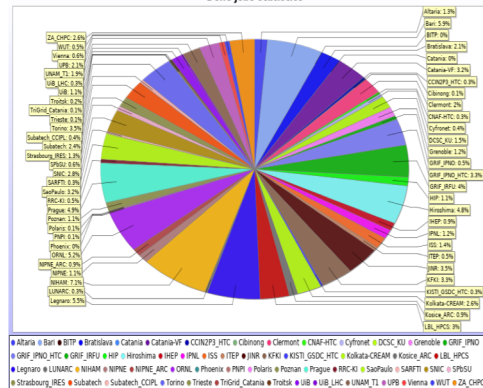
NIHAM Data Centre performance



Done jobs



Done jobs statistics



Contribution to ALICE GRID

HPD contribution ~58% of Romanian TR2 Federation
Done jobs - NIHAM:

- $6.2 \cdot 10^6$

- 6.6% of total Tier2 ALICE contribution

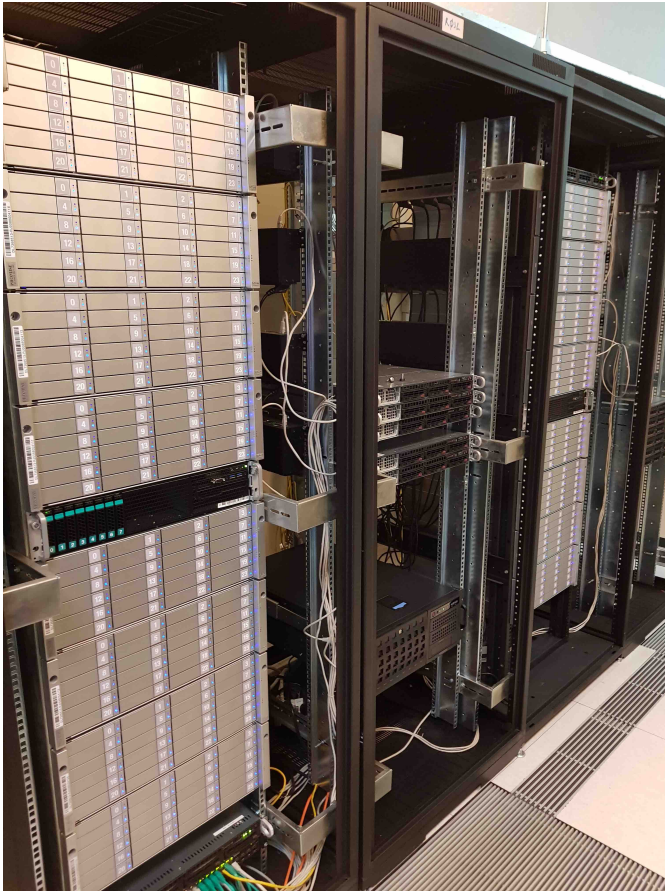
CPU time - NIHAM:

- 6.6 Mhours

- 6.18% of total Tier2 ALICE contribution

NIHAM Upgrades

*A new data storage of 4.6 PB Raw/3.82 PB Effective
was installed and is currently in operation*



*An upgrade with 50% more data storage
will be done in the next months.*

Two new cooling units



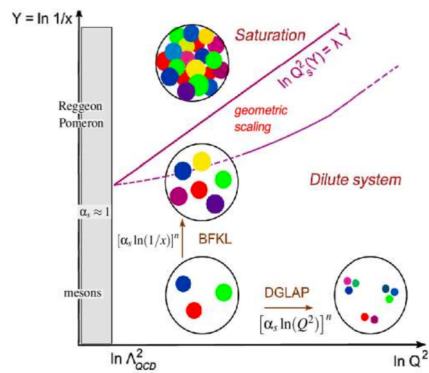
A.

B.



Physics motivation

T



Statistical model:

- for $\mu_B \ll m_N$ the thermal degrees of freedom dominated by mesons
- for higher μ_B more baryons are excited

Chiral transition:

- $\mu_B > \mu_E$ - first order
- $\mu_B < \mu_E$ - crossover
- realistic u, d, s masses

Liquid-gas phase transition:

$$\mu_{NM} \cong 924 \text{ MeV}$$

$$n_0 = 0.17 \text{ fm}^{-3}$$

H

$$\mu_H = 350 - 400 \text{ MeV},$$

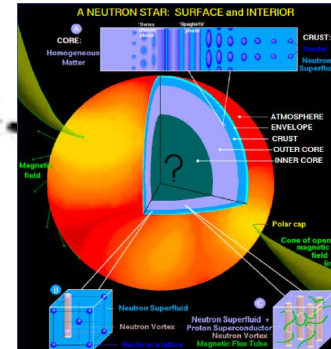
$$T_H = 150 - 160 \text{ MeV}$$

Their meeting point

Triple point

H – remnant for finite N_c

E



- large N_c QCD phase diagram:

- three regions, i.e.:

- confined

- deconfined

- quarkionic phase

- separated by

1st order phase transition

Large N_c limit of QCD

- quarks loops are suppressed by $1/N_c$ relative to gluon contribution
- $\Rightarrow$ cold dense matter in the $N_c = \infty$ world for $\mu_B \gg m_N$ - quarkyonic matter

Quark-Hadron continuity:

F

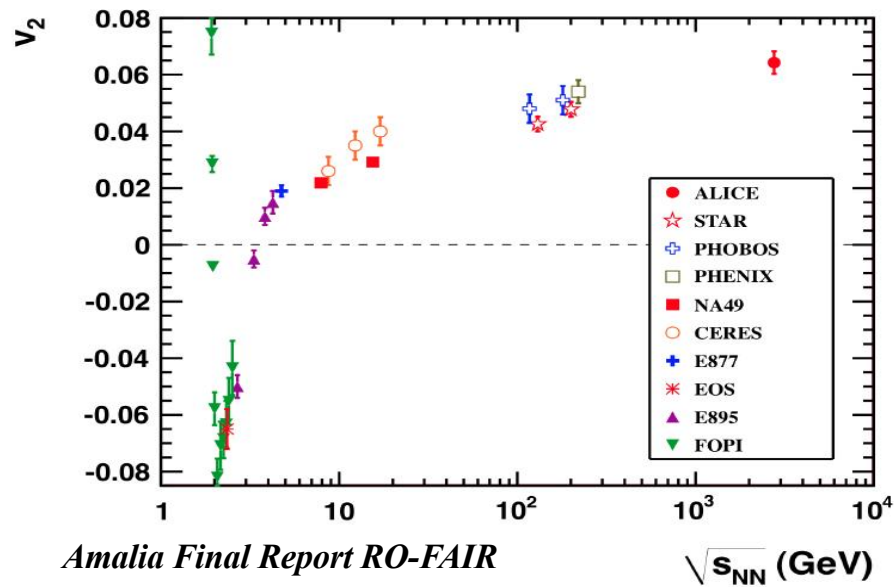
Superfluid nuclear matter

Superconducting quark matter

μ_B

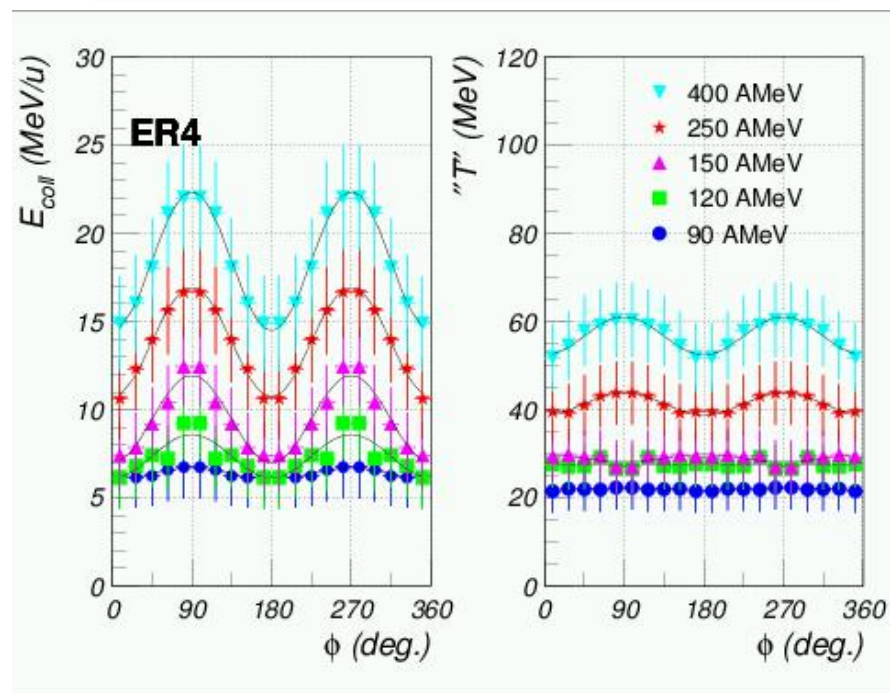
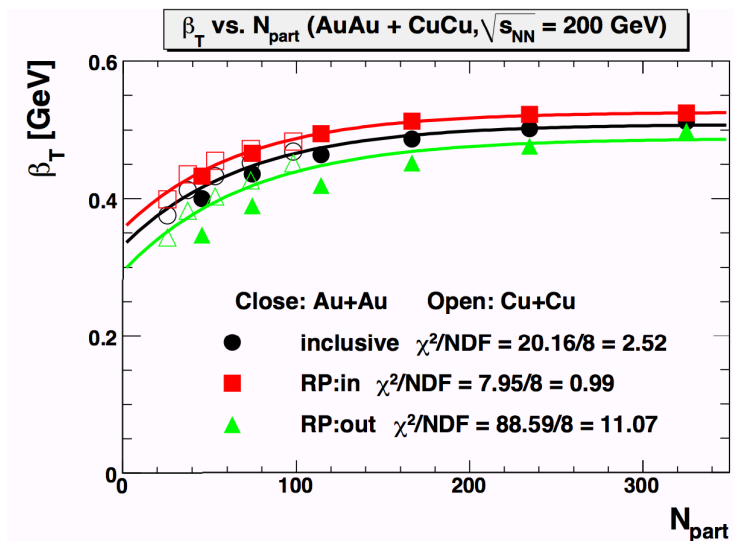
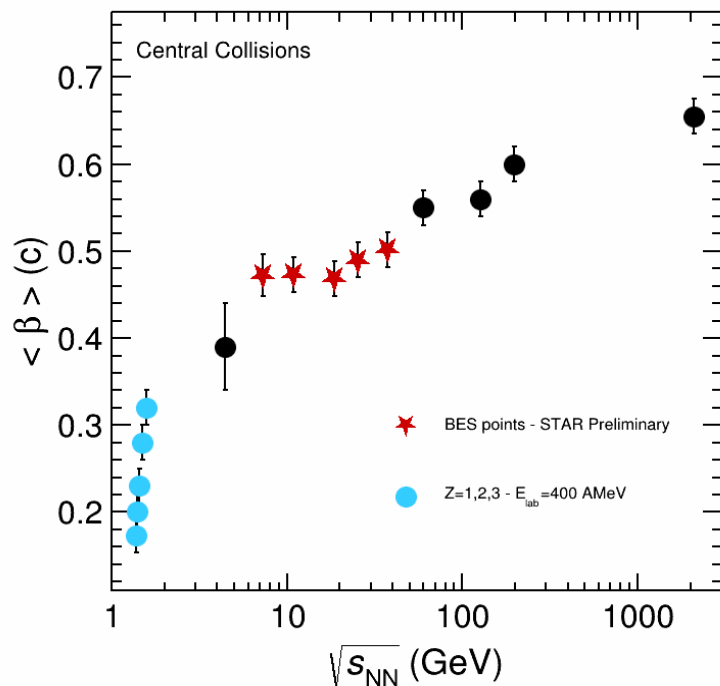
G

Physics topics prepared for data analysis @ CBM

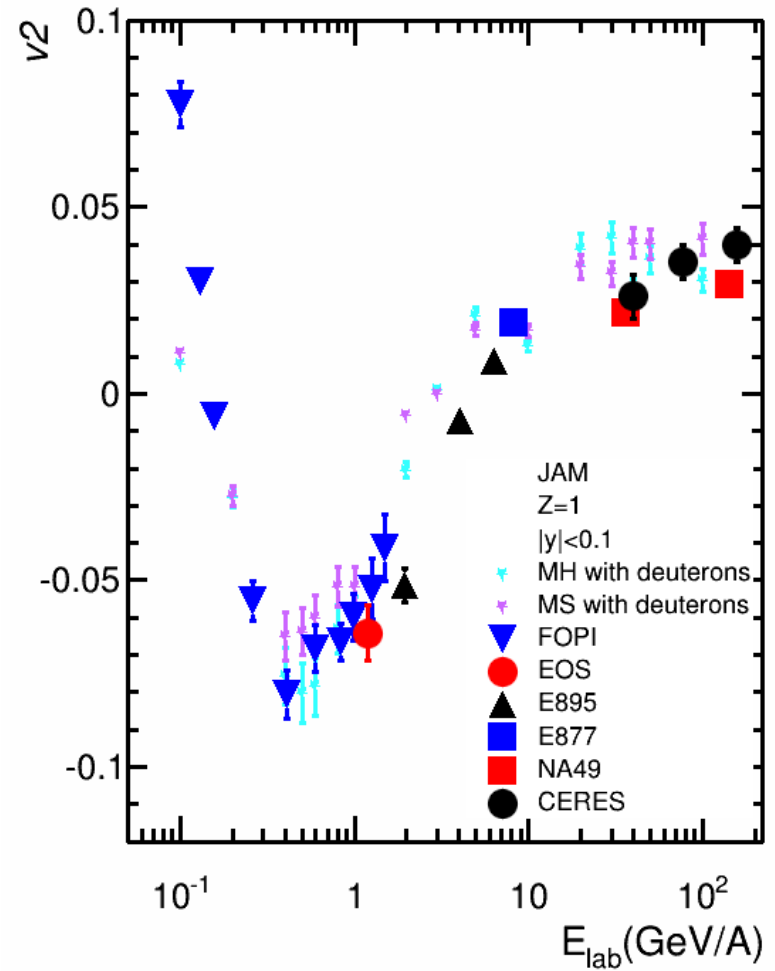
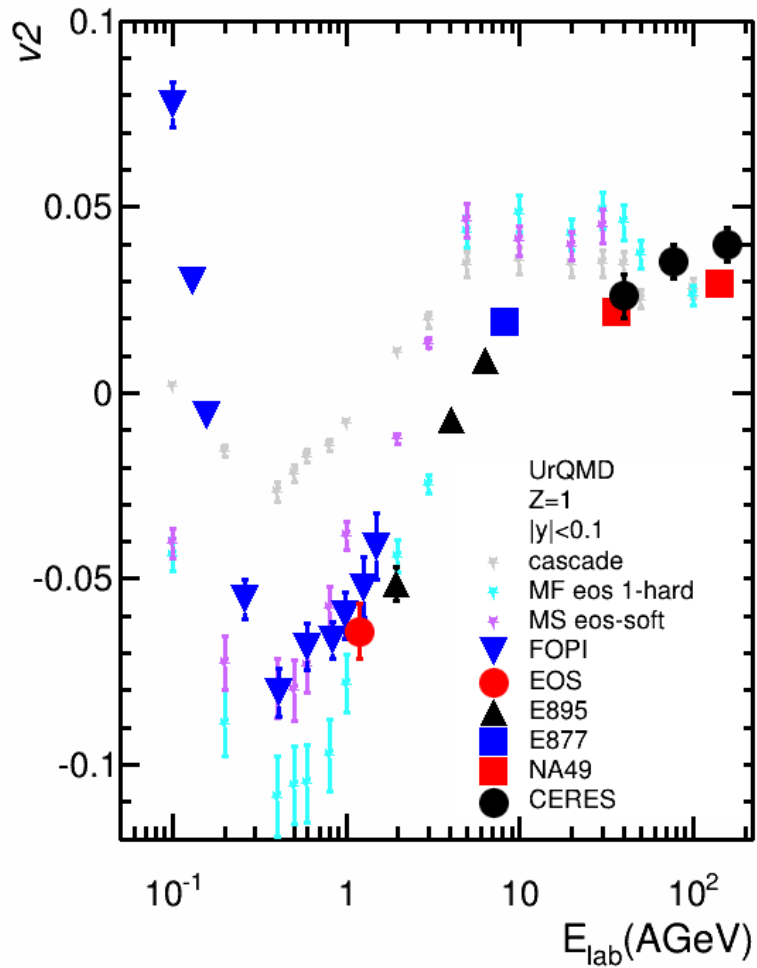


Amalia Final Report RO-FAIR

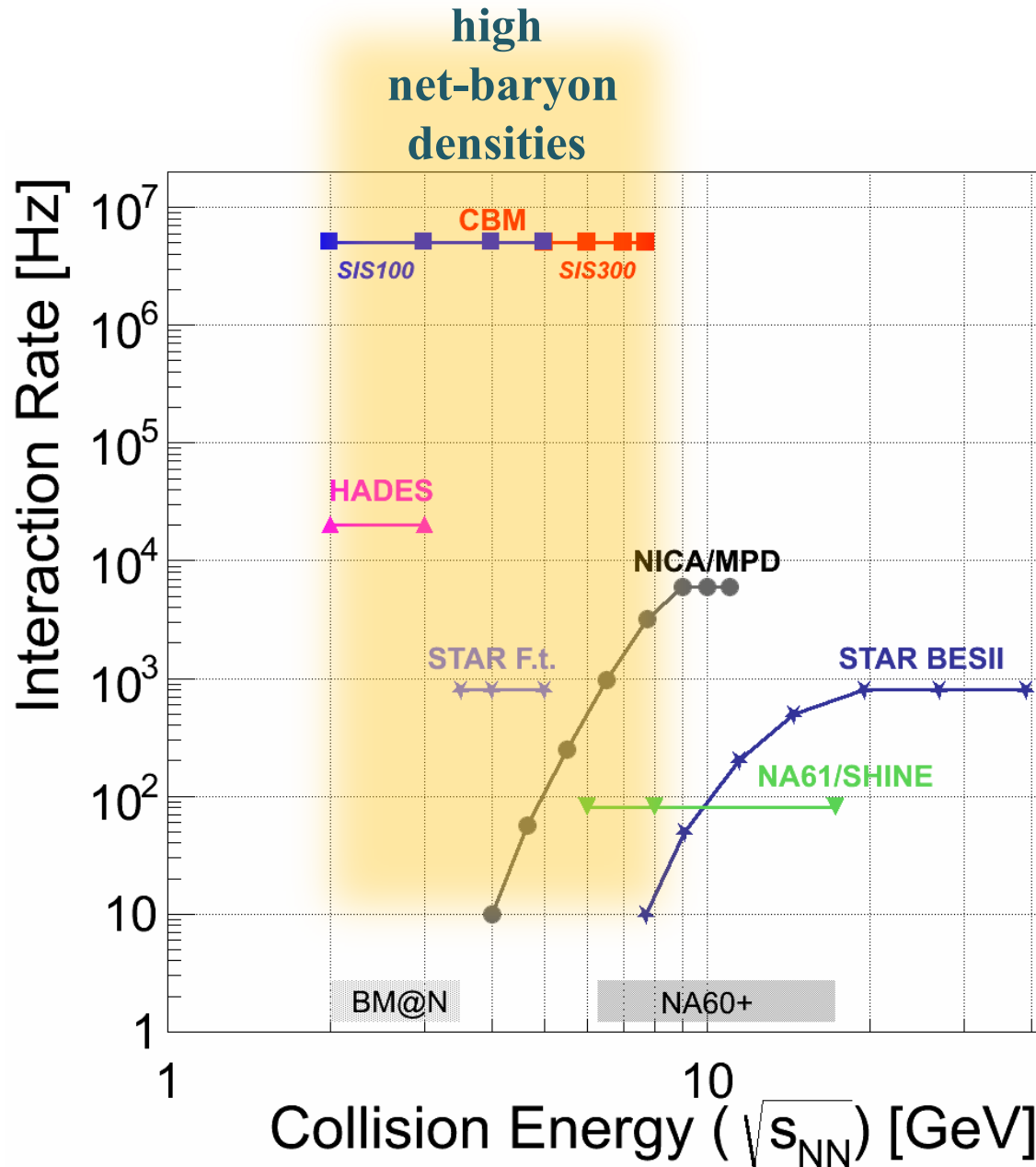
$\sqrt{s_{NN}}$ (GeV)



Physics topics prepared for data analysis @ CBM



Experiments exploring dense QCD matter



SIS-100 accelerator will deliver:

- heavy ions (Au) up to 11A GeV
 $\sqrt{s_{NN}} = 4.7$ GeV
- light ions (e.g. Ca) up to 14A GeV
 $\sqrt{s_{NN}} = 5.3$ GeV
- protons up to 29 GeV
 $\sqrt{s_{NN}} = 7.5$ GeV

Present status of FAIR civil construction



Excavation SIS100 tunnel

Concrete shell works for SIS100



Upgraded SIS18 completed ready for FAIR and FAIR phase 0



Excavation transfer building & CBM cave

construction timeline:

- civil construction completed in 2023
- installation of accelerators and experiments 2022 - 2024
- start of pilot beams in 2025

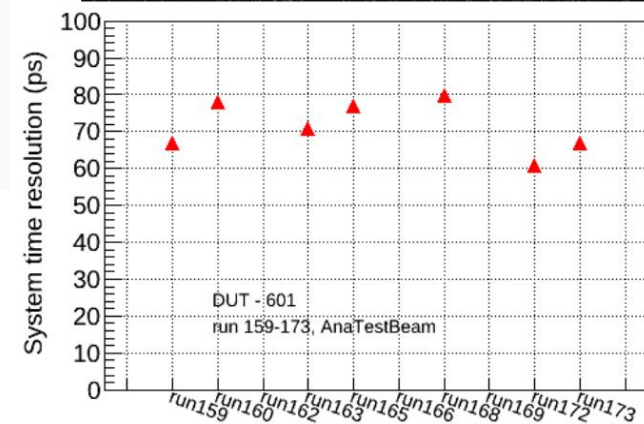
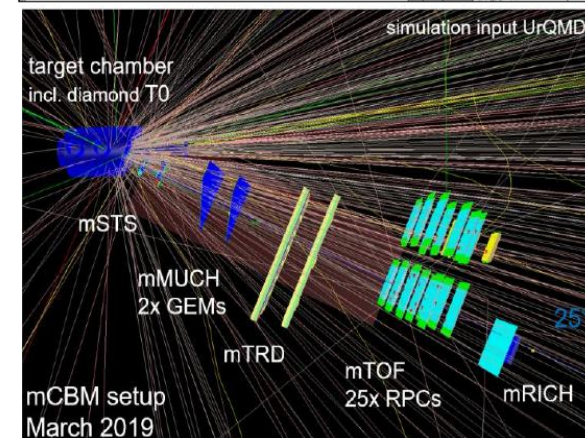
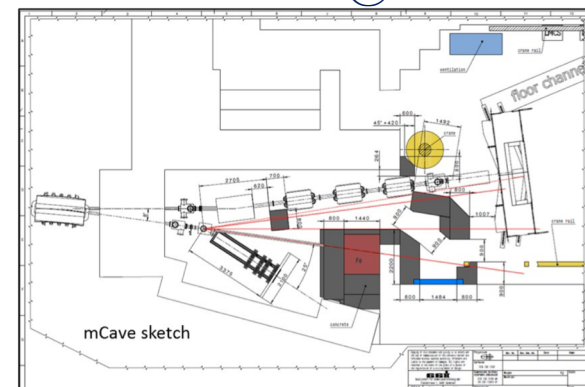
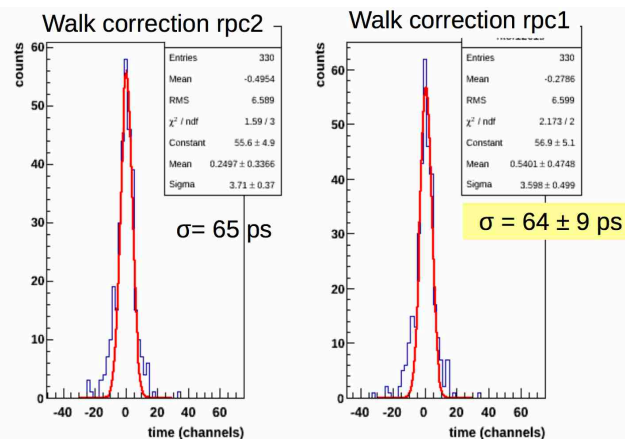
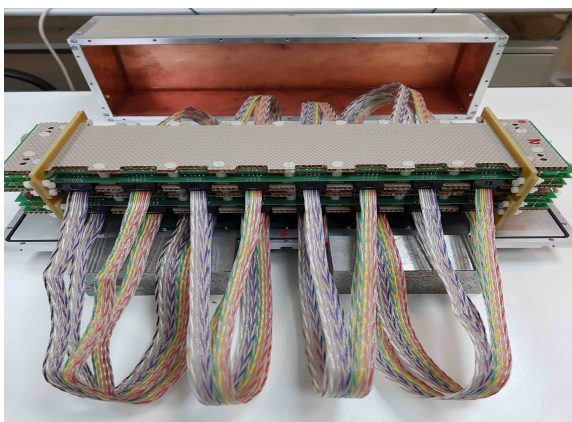
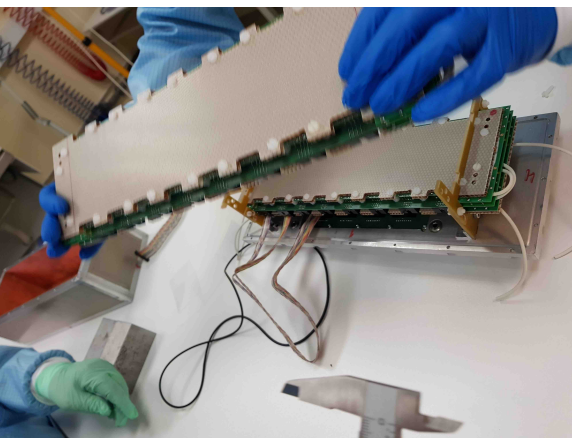
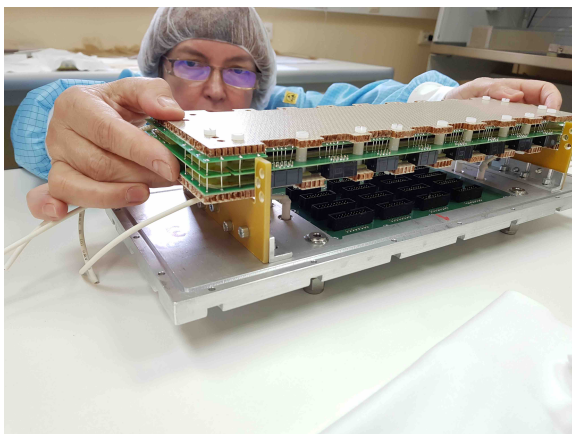
*R&D Activities
&
Steps towards construction & tests
of
CBM ToF & TRD subdetectors
for
CBM Experiment @ FAIR*

Assembling and tests of 2 new RPC prototypes

In mCBM

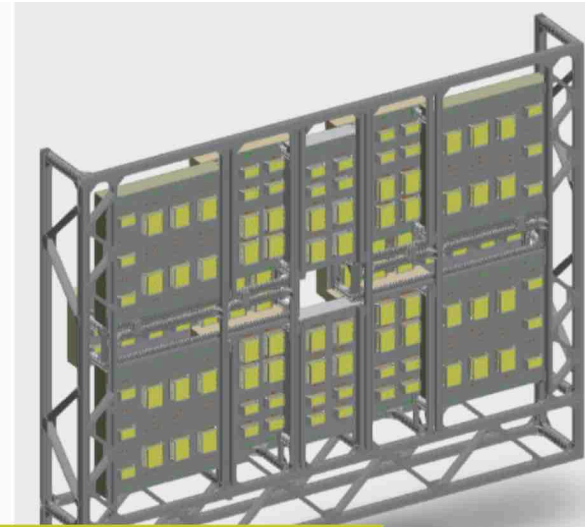
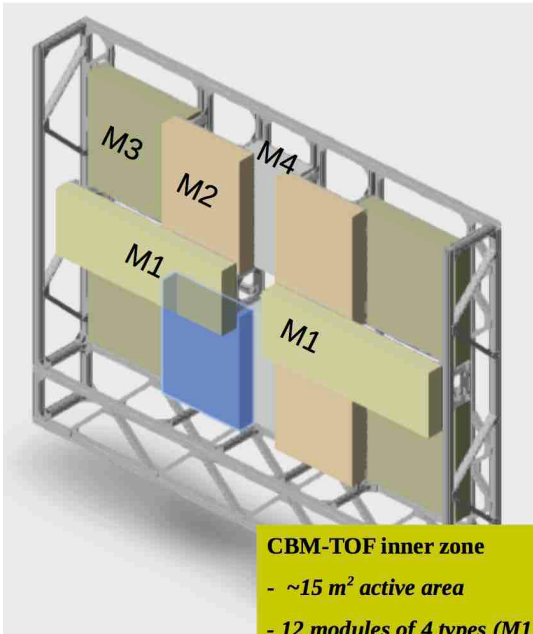
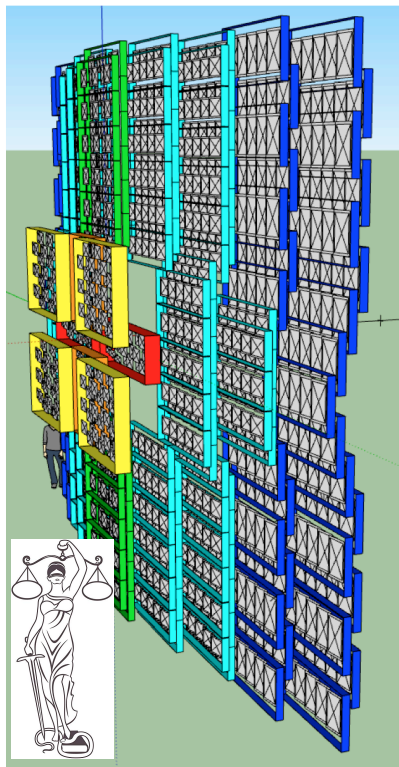
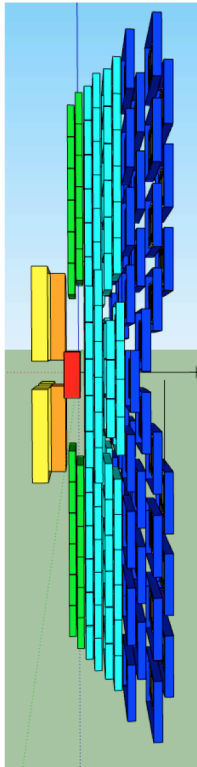
FAIR Phase0 @ SIS18

In house tests



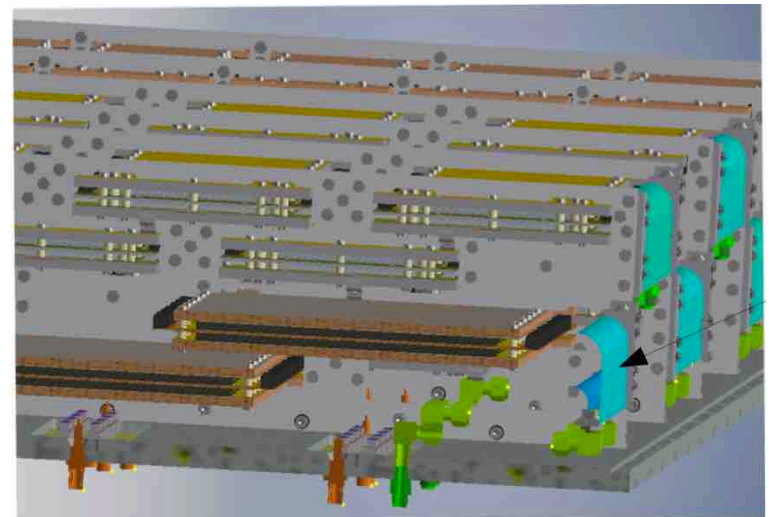
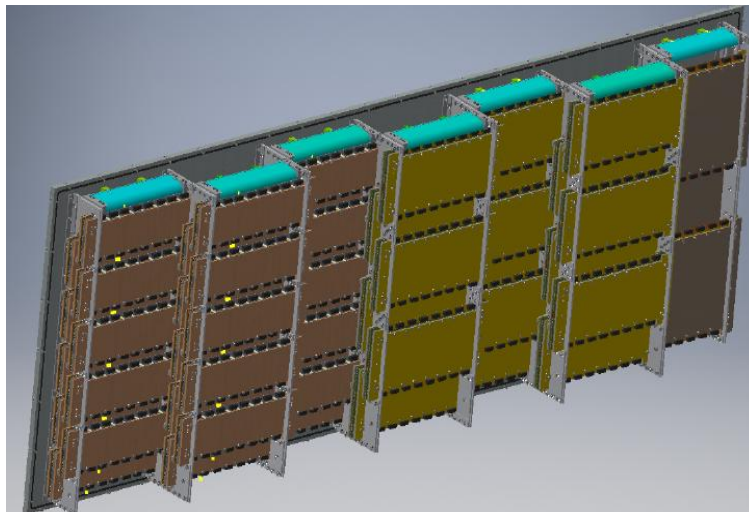
Close to be finalized CBM-ToF Inner zone design

M1
M2
M3
M4
M5
M6



CBM-TOF inner zone

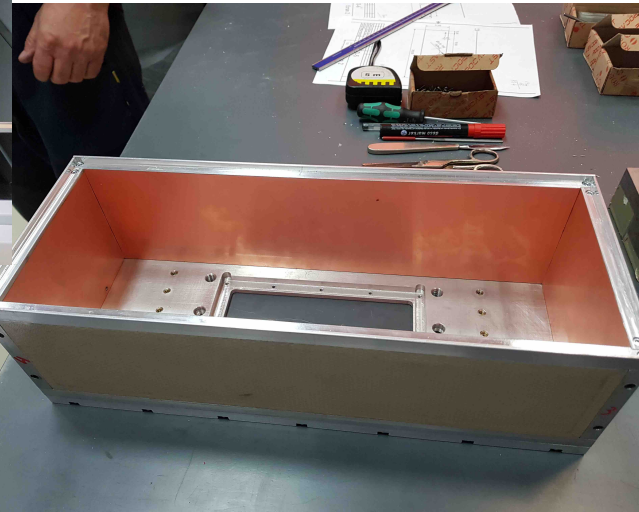
- ~15 m² active area
- 12 modules of 4 types (M1, M2, M3, M4)
- 470 MGMSRPC counters with 0.9 mm strip pitch, of 3 types (60 mm (1a), 100 mm (1b) and 200 mm (1c) strip length)
- 30 080 readout channels



In progress

➤ *4 new prototypes:*

- 2 - similar with 2018 ones but with 200 μm gap instead of 140 μm*
- 2 - the same architecture replacing low resistivity Chinese glass with “low resistivity” float glass*



➤ *Detailed aging tests @ IRASM in progress*

CBM-TRD

CBM TRD review, GSI, March 14th & 15th 2017

Reviewers:

Venelin Angelov (Heidelberg University)

Thomas Kirn (RWTH Aachen)

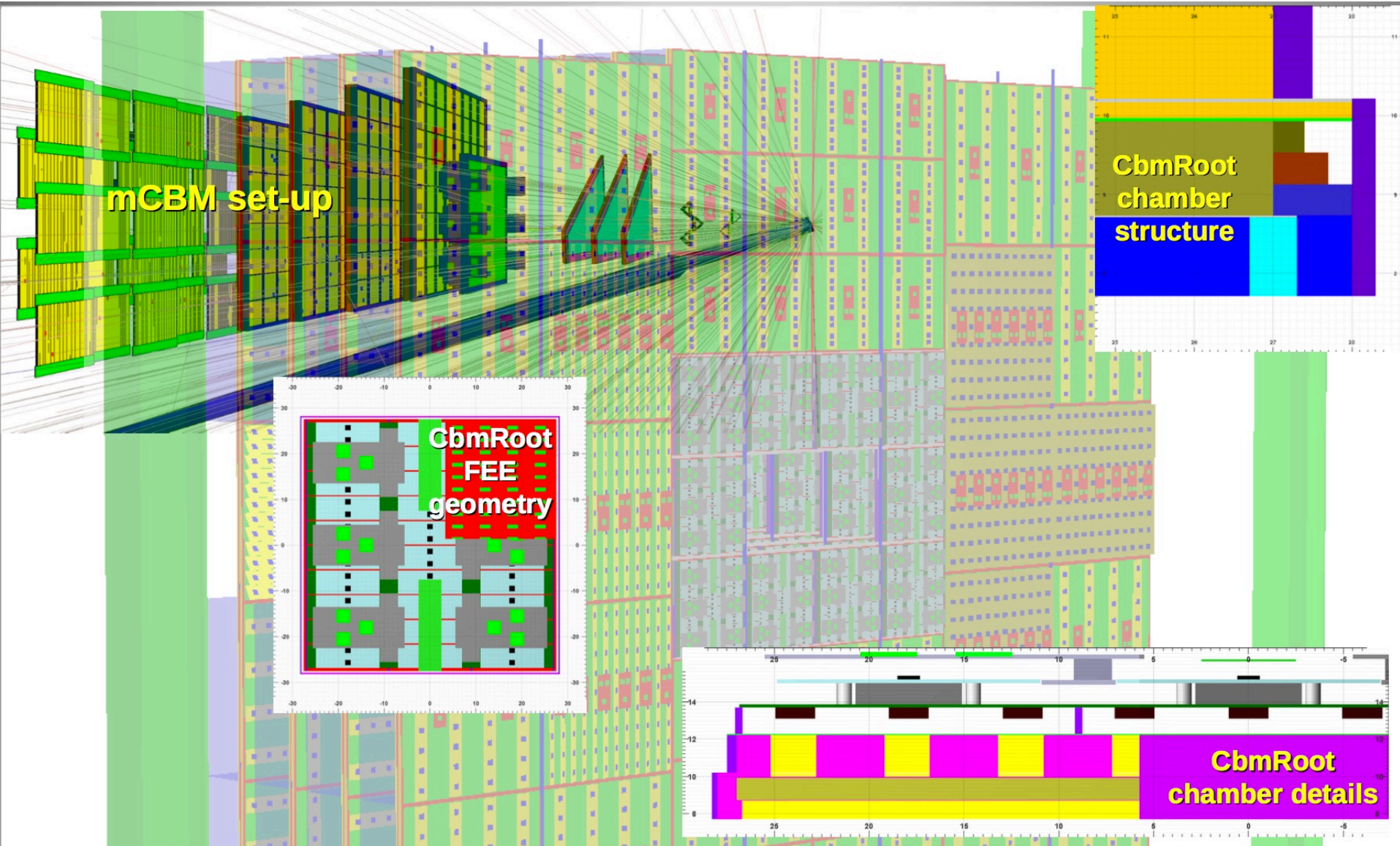
Christoph Rembser (CERN)

Werner Riegler (CERN)

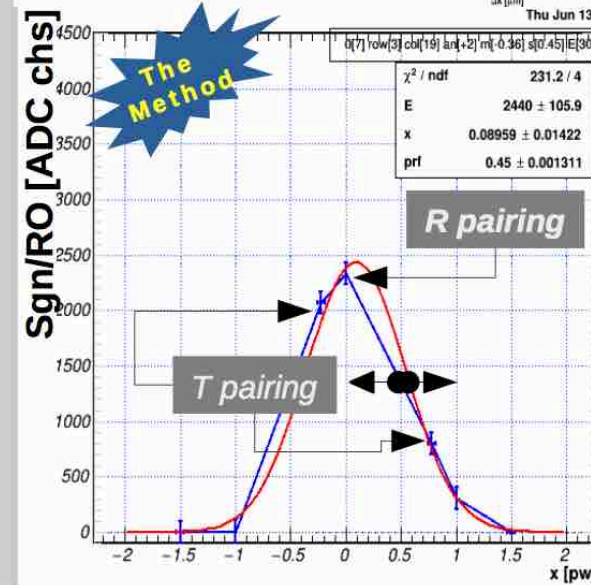
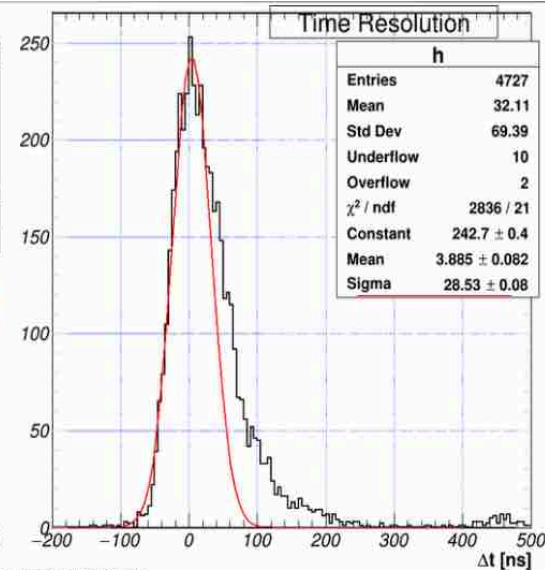
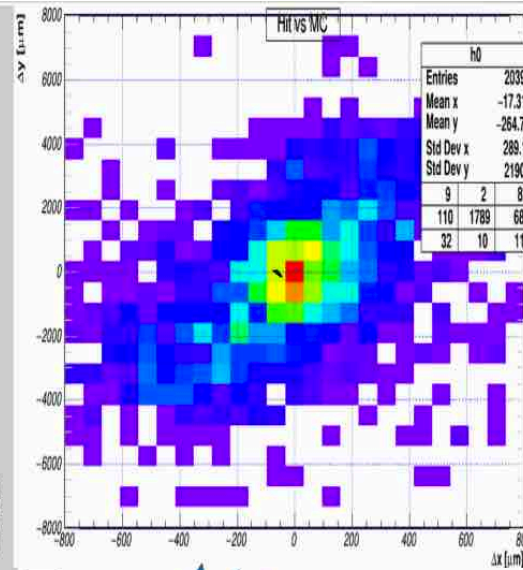
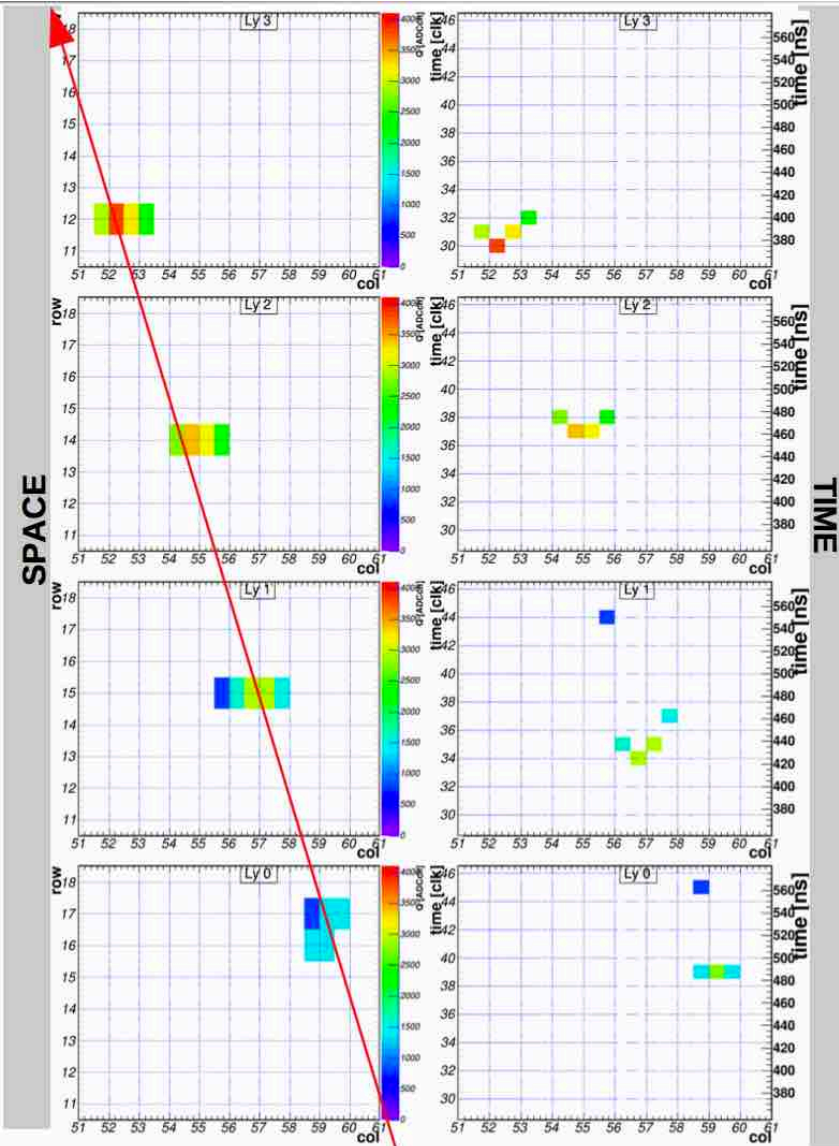
Enrico Scomparin (INFN Torino)

- ***In general, the tests for the ‘baseline chamber & electronics’ solution should come at least to the level of completeness and clarity that was presented for the ‘alternative chamber & electronics’ solutions.***
- ***The alternative chamber design is certainly very elegant and innovative, and the level of evaluation and tests is very impressive.***
- ***The performance of the alternative electronics is also demonstrated to work well.***

Buch-TRD geometry and chamber + FEE signal characteristics integration in CbmRoot



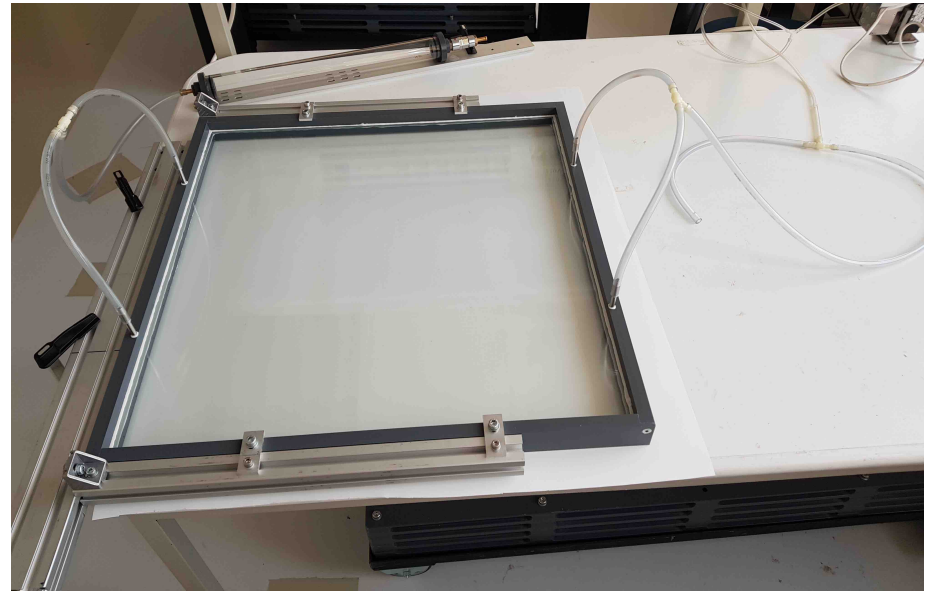
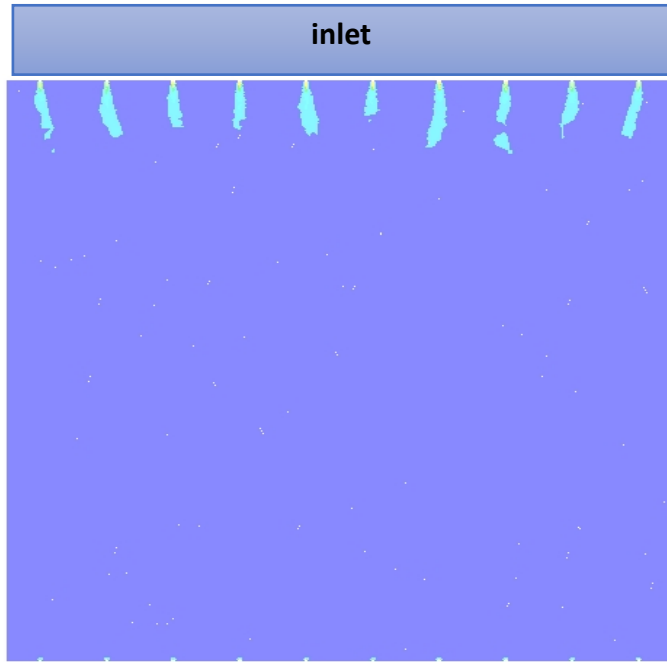
Hit reconstruction performance



- ✓ $\sigma_x = 114 \mu\text{m}$ single-row
 - ✓ $\sigma_y = 1.6 \text{ mm}$ single row
 - ✓ $\sigma_y = 0.9 \text{ mm}$ row cross
 - ✓ $\sigma_t = 30 \text{ ns}$
- wrt MC info !

Chamber design

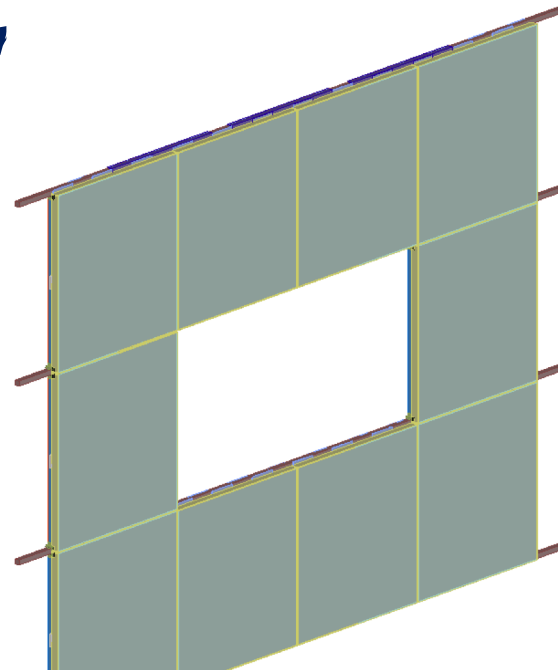
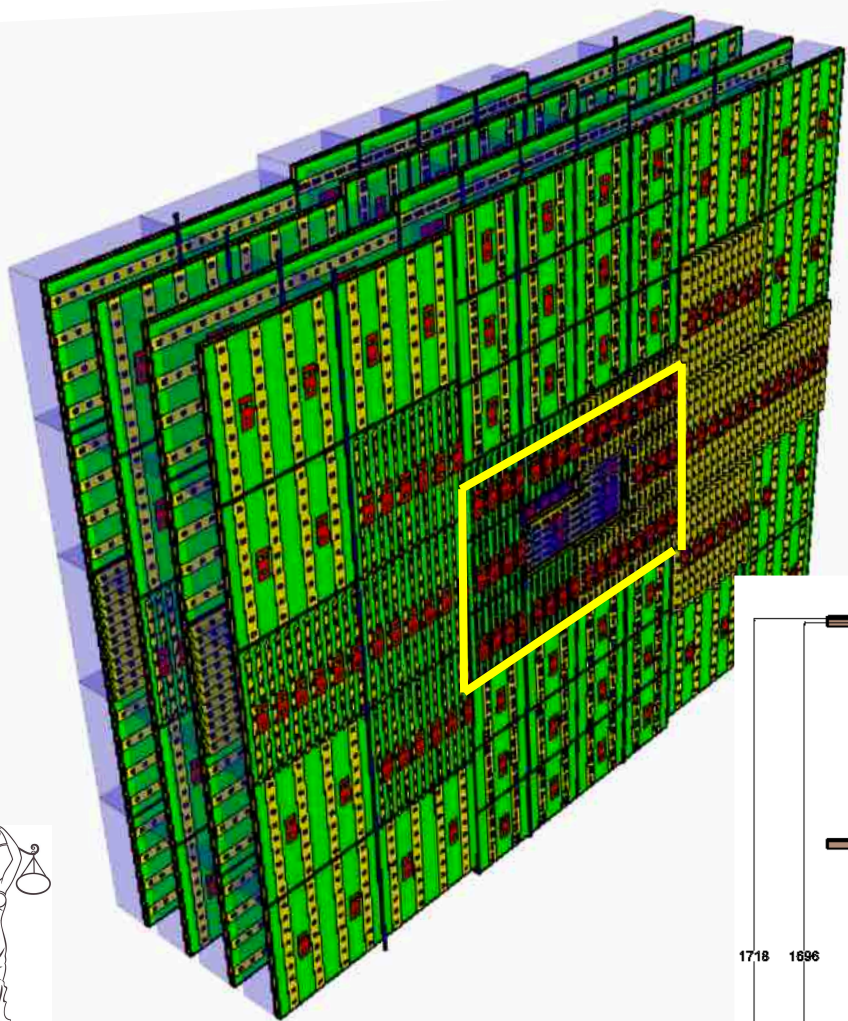
gas flow - ANSYS simulations



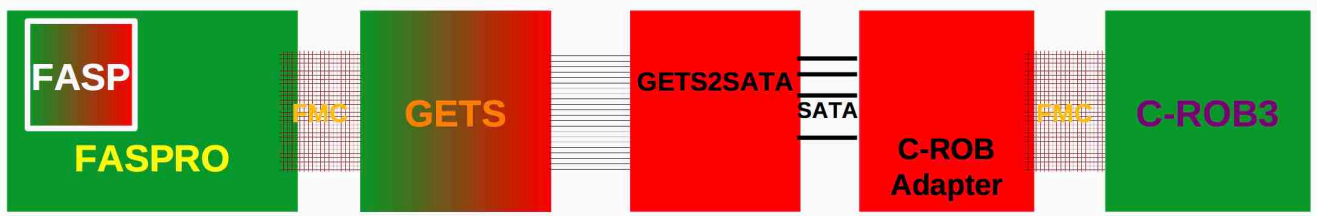
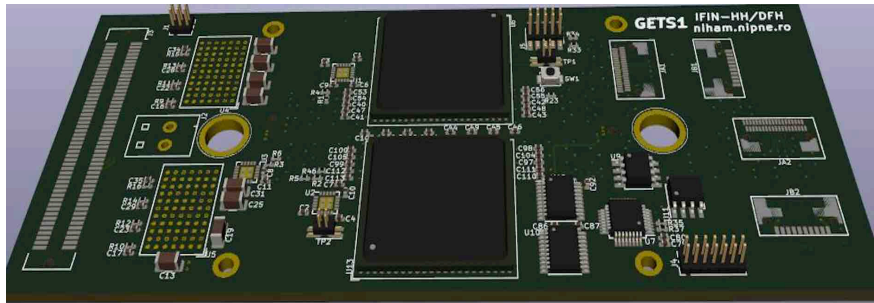
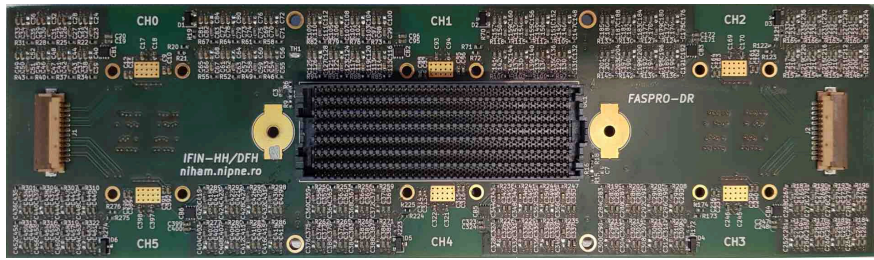
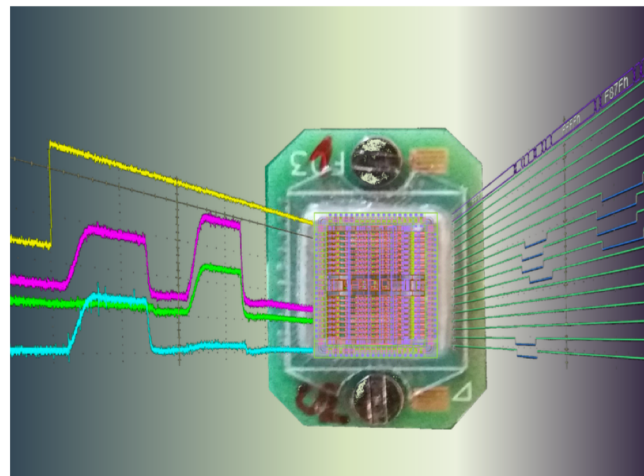
- **Both, experimental and simulated gas dynamics, show uniform flow distribution along the inlet**



CBM-TRD inner zone design a1



Hdw chain (PCBs) to connect FASP FEE to the C-ROB3 and their realization status



ready

in progress

missing

FASP : Production ready for up to 80 pcs (45 % of 1 module)
Bonding in progress

FASPRO : tested, fixed, 9 pcs available.

GETS : Design ready; components available (PolarFire)
Production ready (details solved)

GETS2SATA : Connector board
Convert I/O to 4 SATA cables
Design not started (1 month)

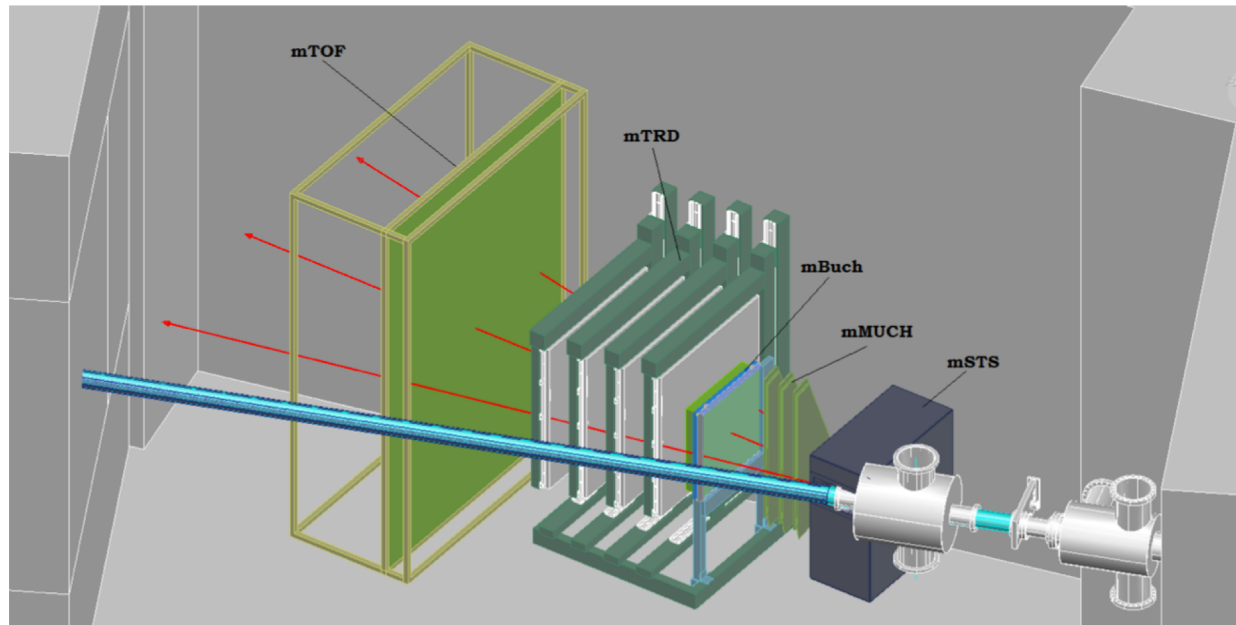
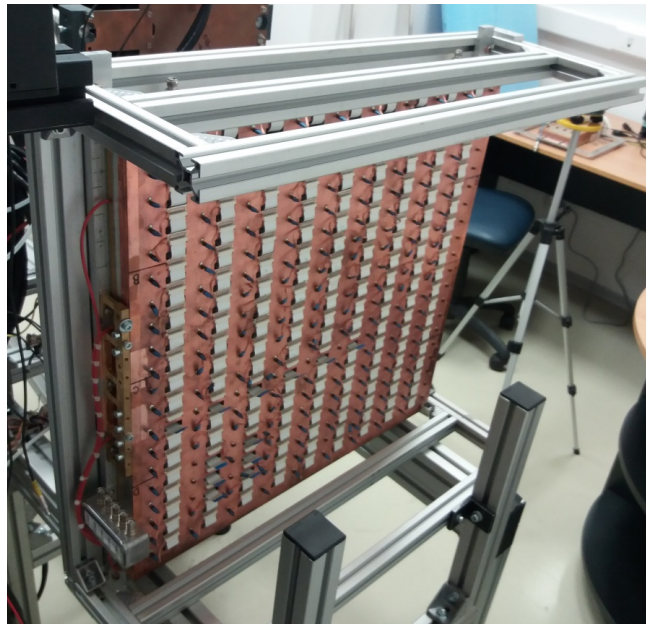
C-ROB Adapter : Maps 5x4 SATA input cables to FMC connector on C-ROB
Design not started (1 month)

C-ROB3 : 1 pcs available in Bucharest
We might need another one

In progress

➤ *Preparations for joining mCBM campaign in May 2020 using:*

- Real size HPD architecture TRD chamber*
- HPD FEE and Hdw data flow*



➤ *Detailed aging tests and radiation harness at IRASM - IFIN-HH*

➤ *Addendum of CBM-TRD TDR*

High visibility and competitiveness within CBM Collaboration

***CBM-TRD Retreat Meeting
27-29 March, 2019***



***The 33rd CBM collaboration meeting, GSI-Darmstadt
1-5 April, 2019***



5 presentations, A. Bercuci, M.Petris, L.Radulescu et al.

***The 34rd CBM collaboration meeting, Bose Institute, Kolkata
29 Sept. - 3 Oct., 2019***

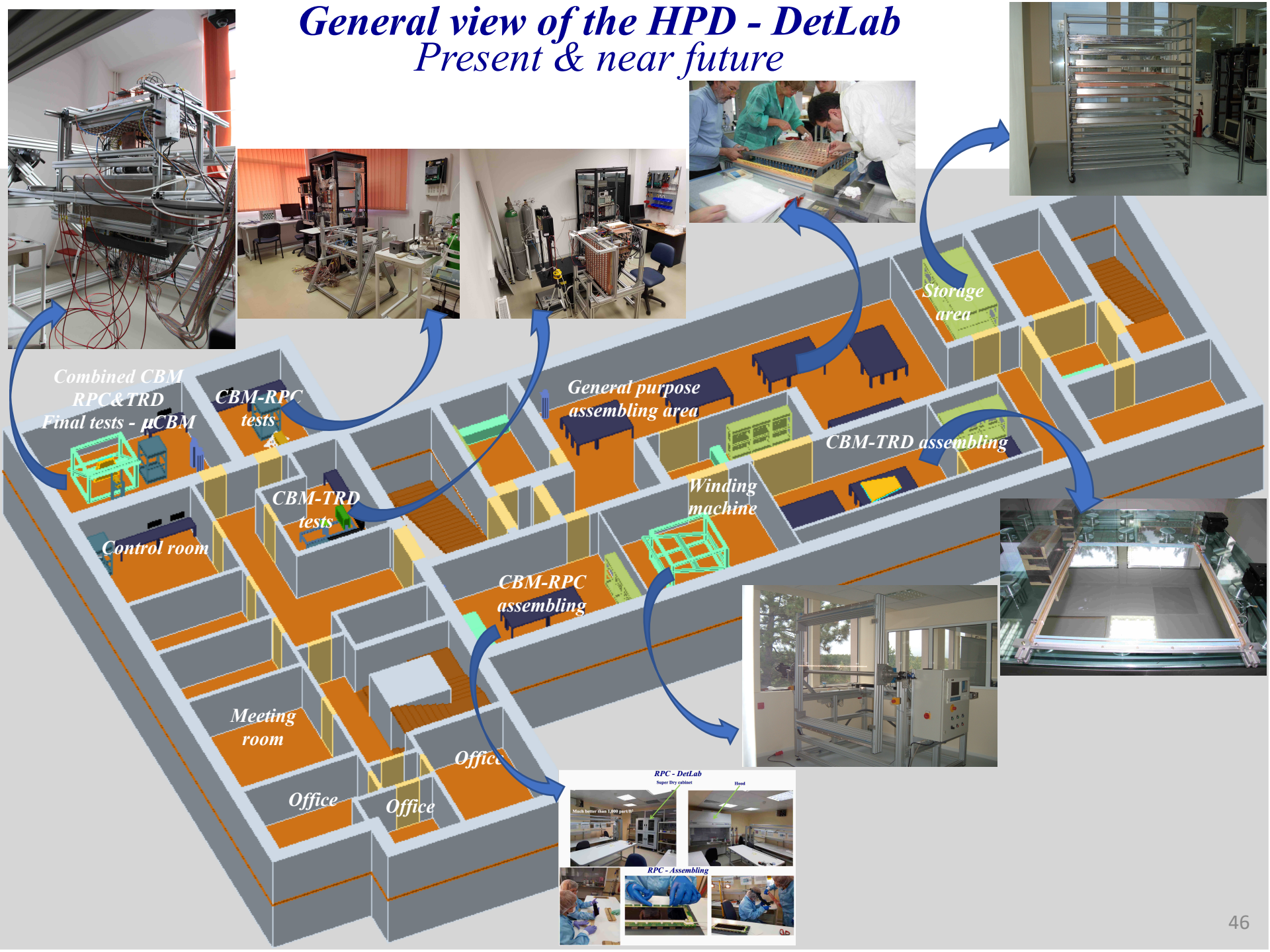


***4 presentations,
A. Bercuci,
M. Petris,
L. Radulescu
et al.***



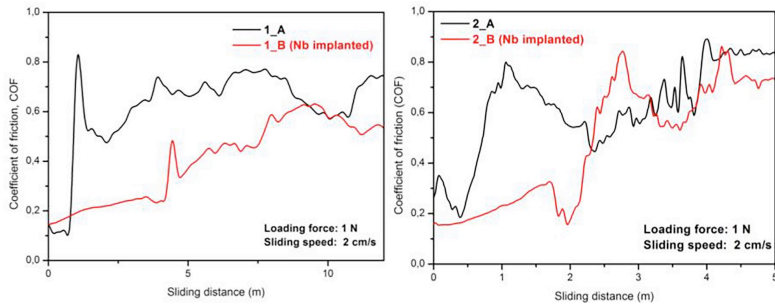
6 presentations, A. Bercuci, M.Petris, M. Petrovici, L.Radulescu et al.

General view of the HPD - DetLab Present & near future



*Applied Research
&
Technological Transfer*

Vacuum Thin Film Deposition System by magnetron sputtering for deposition of the metallic and nonmetallic thin films with lubricant, photo-catalytic, anticorrosion, wear-resistant, etc. properties.

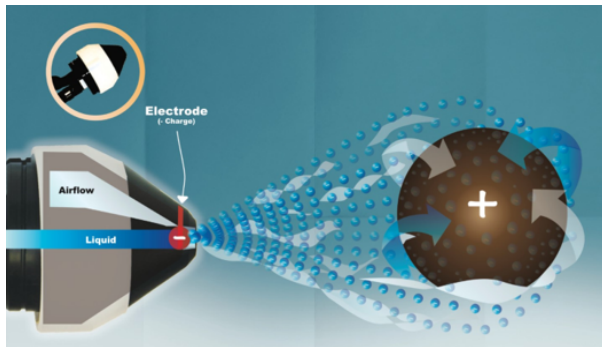


Variation of coefficient of friction with sliding distance for WC & WS₂ (1:2/3 injected power)

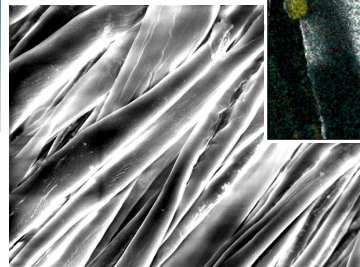
Variation of coefficient of friction with sliding distance for WC & WS₂ (1: 1/3 injected power)



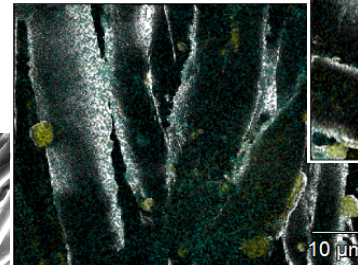
SEM images of colloidal dispersions of nanopowders deposited on textile surfaces by electrostatic spraying



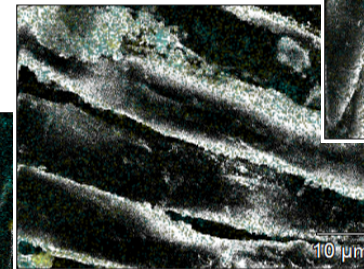
Electrostatic spraying of nano/ micro - powder colloidal dispersions



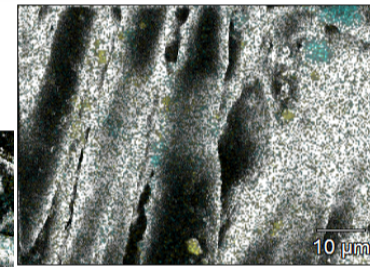
Untreated cotton



TiO₂:N+SiO₂ (1:1)



TiO₂:N+SiO₂ (1:2)



TiO₂:N+SiO₂ (1:1,5)

Improvement of tribological surface properties by vacuum thin film deposition and ion implantation
 - Nuclear Inst. and Methods in Physics Research B 450, 357-360 (2019)
 - J. Phys.: Condens. Matter 31 (2019), 375201

*Publications, Invited lectures,
Conferences, Patents, Meetings*

<i>Papers in ISI journals</i>	<i>- 41</i>
<i>Invited talks</i>	<i>- 3</i>
<i>Oral presentations at International Conf. and Workshops</i>	<i>- 4</i>
<i>Presentations at the Collaborations meetings</i>	<i>- 32</i>
<i>Internal Notes</i>	<i>- 1</i>
<i>Presentations at National Events</i>	<i>- 9</i>
<i>Patents - applied nr. A/00738/13.11.2019</i>	<i>- 1</i>
<i>HPD Seminars</i>	<i>- 11</i>

Training & teaching

Master thesis - 2

PhD students - 2

Master students - 3

Training & teaching

Would you like to contribute to understand the secrets of the Universe?

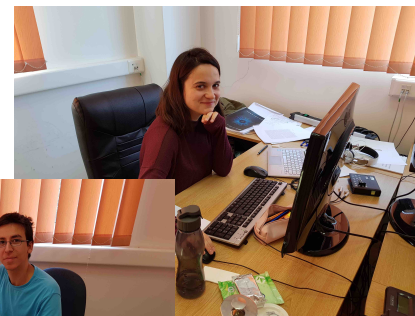
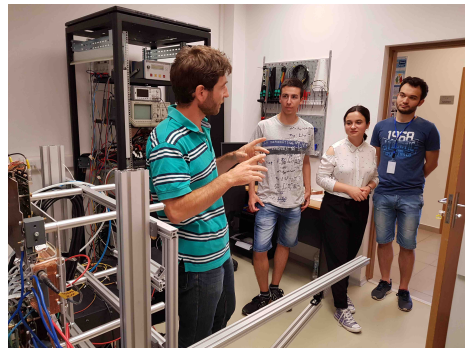
High Energy Physics
Nuclear Astrophysics
Particle Detection Systems
Front-End Electronics & IT

Summer Student Program 2019

Dedicated to advanced undergraduate level (3rd to 5th year of study, i.e. last year of Bachelor or during Master studies)

Organized by: Hadron Physics Department
Horia Hulubei National Institute of Physics and Nuclear Engineering

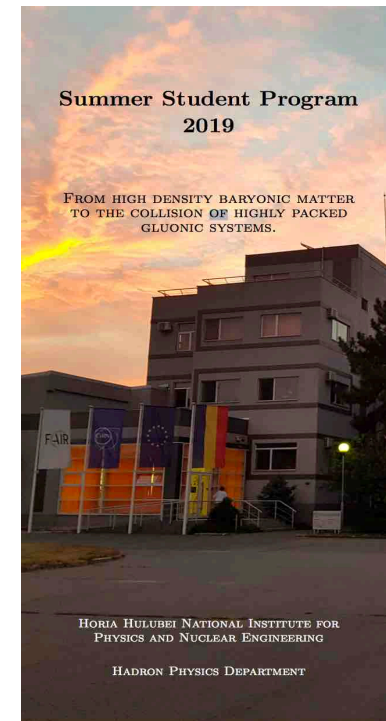
Duration: July 15 - September 15 / Deadline for application: March 31, 2019
Contact: 0040-21-4066215, nsr@niham.nipne.ro
For further information visit the Training / Summer Student Program at <http://niham.nipne.ro>

Summer Student Program 2019

FROM HIGH DENSITY BARYONIC MATTER TO THE COLLISION OF HIGHLY PACKED GLUONIC SYSTEMS.

HORIA HULUBEI NATIONAL INSTITUTE FOR PHYSICS AND NUCLEAR ENGINEERING
HADRON PHYSICS DEPARTMENT



Outreach

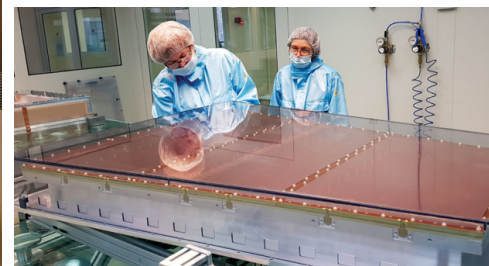
*International group of Post Docs
PhD and Master students*

http://niham.nipne.ro/HPD-Courier_electronic-version.pdf

*Winners of
International Competitions in Physics*



*CERN Courier January 24, 2019
ALICE revitalised*



HPD COURIER
NUMBER 1 | JANUARY 2019

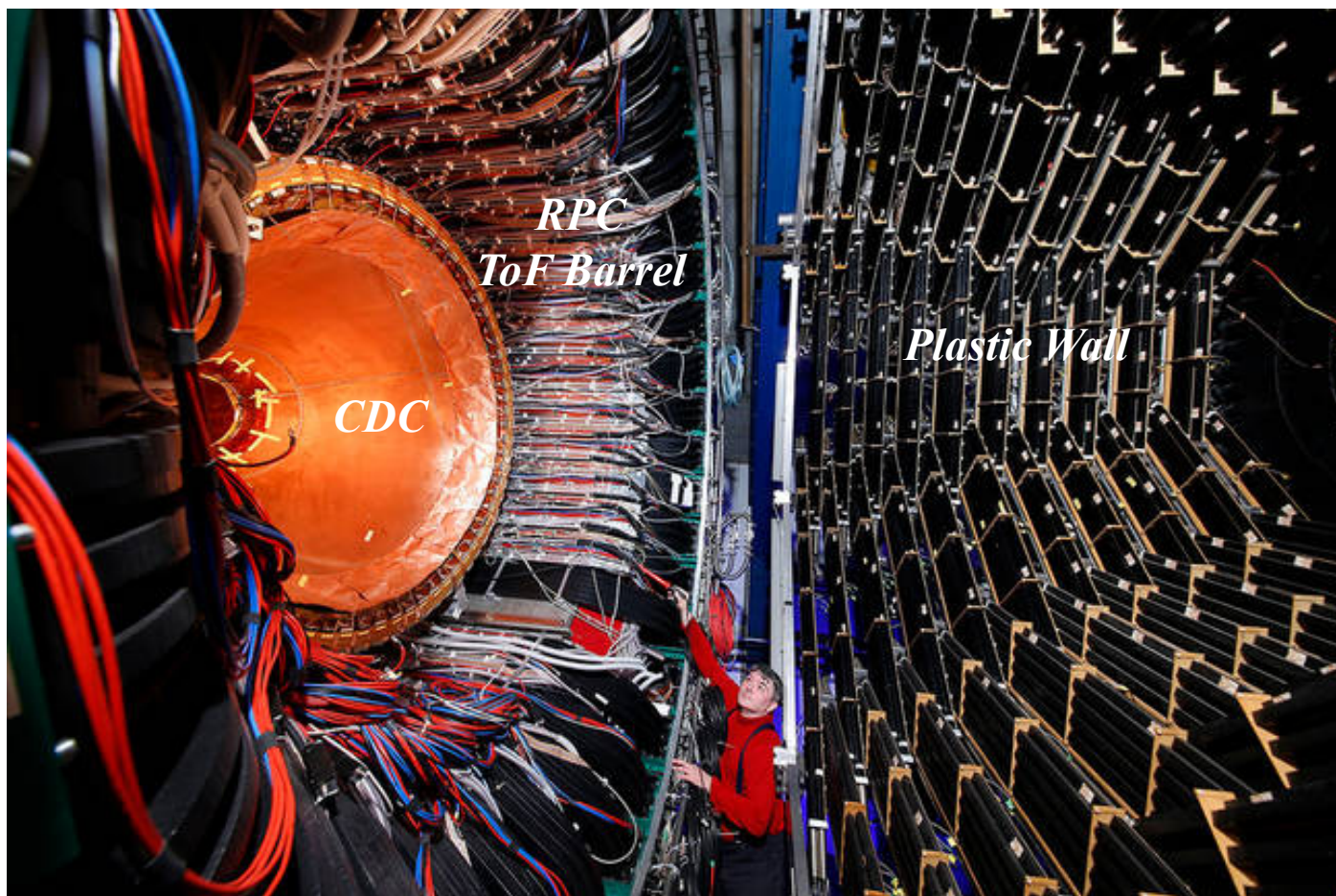
ASSEMBLED & TESTED
130 TRD MWPs (24%)
20 TPC CHOKs (50%)
based on CMOS technology

DESIGNED
3rd version of FASP
(Fast Aging Signal Processor)
fully operational



Outreach

FOPI Photo selected on the occasion of GSI 50th Anniversary



Some of our essential contributions

Social events



The main actors behind the achievements summarized above





*Merry Christmas
and
a happy, healthy and successful
New Year
for you and your family !*

