

PHENOMenial workshop @ CERN

10th October 2022

PHENOMenial meetings

where did we start, where are we going?

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When all started...

The first PHENOMenal meeting was held the 20th October 2020:



Introduction

Purpose of meetings:

interaction among ALICE and MC community on **operative projects**

Key points:

meetings will be **informal** and there will **ample room for discussion**



The (many) meetings

2020/2021

- 20th Oct 2020: <https://indico.cern.ch/event/965150/>
- Estimation of theory errors: Herwig 7 and PYTHIA Ropes
- 15th Dec 2020: <https://indico.cern.ch/event/983111/>
- Estimation of theory errors: PYTHIA Ropes and QCD-CR
- 26th Jan 2021: <https://indico.cern.ch/event/998104/>
- Nuclei hadronisation: deuterons with PYTHIA
 - Fragmentation and clusterisation in the very forward region
- 23rd Feb 2021: <https://indico.cern.ch/event/1007143/>
- Double parton scatterings: PYTHIA 8 and ALICE in Run3
 - Nuclei hadronisation: deuterons with PYTHIA
- 22nd Apr 2021: <https://indico.cern.ch/event/1028933/>
- Estimation of theory error of PYTHIA QCD-CR in baryon and meson yields
- 25th May 2021: <https://indico.cern.ch/event/1040956/>
- Short and long range correlations with a high-pT trigger particle: EPOS LHC and Pythia 8 with shoving follow up
- 7th September 2021: <https://indico.cern.ch/event/1071215/>
- Interplay between core and corona components in high-energy nuclear collisions: experimental introduction and overview of updated DCC12 model
- 23rd November 2021: <https://indico.cern.ch/event/1096174/>
- Understanding strangeness enhancement with PYTHIA

2022

- 1st February 2022: <https://indico.cern.ch/event/1120695/>
- Hanbury-Brown-Twiss interferometry and collectivity across systems
- 16th March 2022: <https://indico.cern.ch/event/1135173/>
- Jet quenching in small systems
- 28th June 2022: <https://indico.cern.ch/event/1173973/>
- High-pT physics in p-Pb collisions
- 30th August 2022: <https://indico.cern.ch/event/1179605/>
- Proton yields and rescattering
- 11th October 2022: <https://indico.cern.ch/event/1208504/>
- MPIs and double heavy-hadron production



Assessment of uncertainties

- Predictive power of *given model* for *given observable* is unclear.
- Project goal: Add theoretical error bars on this plot

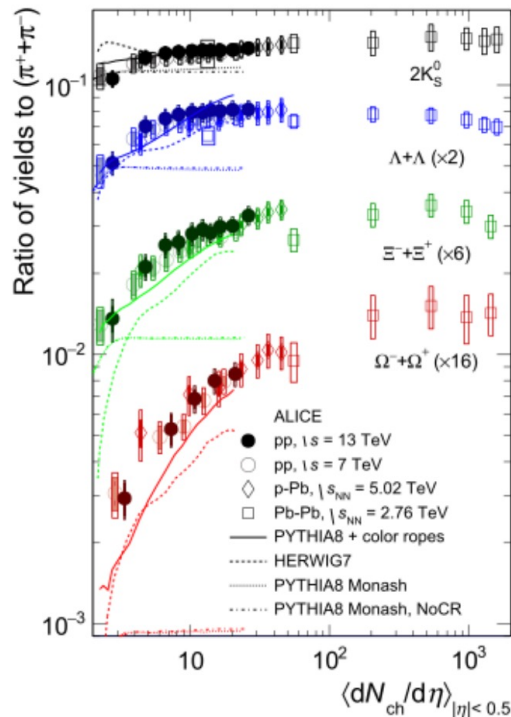


Move from qualitative to quantitative comparisons.



Time to exclude some models!

[link 1](#)



Discussion items [link 2](#)

- Identifying common baseline parameters to vary
- Sideband measurement which should be enveloped
- Automated way (RIVET)
- Use spread between flavours of models to assess overall uncertainty

➤ some choices were taken on actual prescriptions for the uncertainties of our papers

[link 3](#)

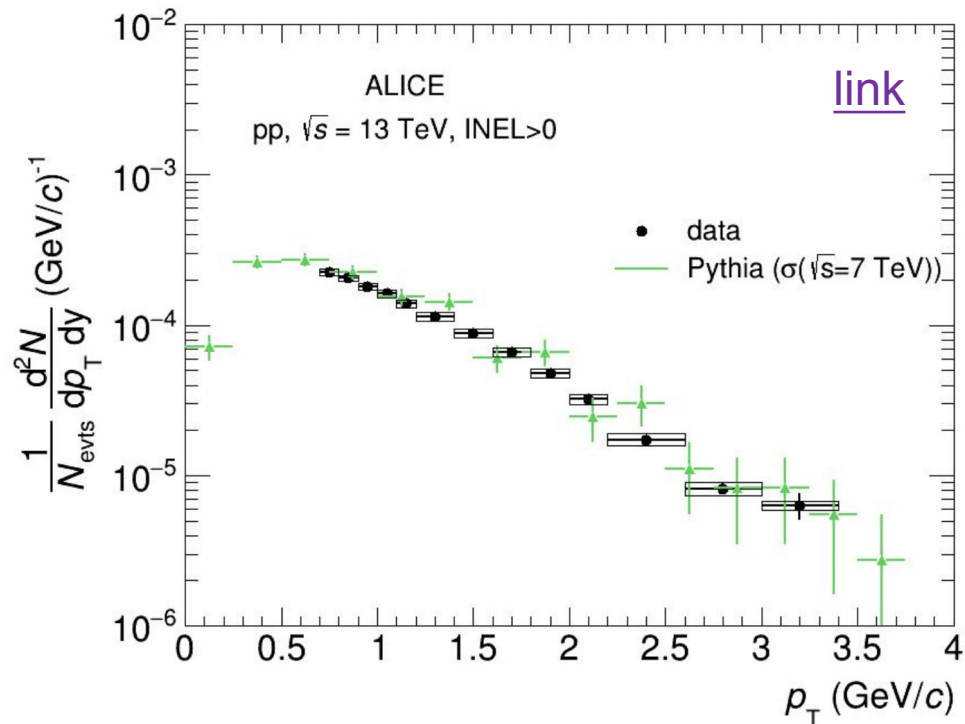


Nuclei

Nuclei

Pythia production mechanism for deuterons [link](#):
differential cross-sections for 8 different $2 \rightarrow n$ processes

- $pn \rightarrow \gamma D$
- $pn \rightarrow \pi^0 D$
- $pn \rightarrow \pi^- \pi^+ D$
- $pn \rightarrow \pi^0 \pi^0 D$
- $pp \rightarrow \pi^+ D$
- $nn \rightarrow \pi^- D$
- $pp \rightarrow \pi^+ \pi^0 D$
- $nn \rightarrow \pi^- \pi^0 D$





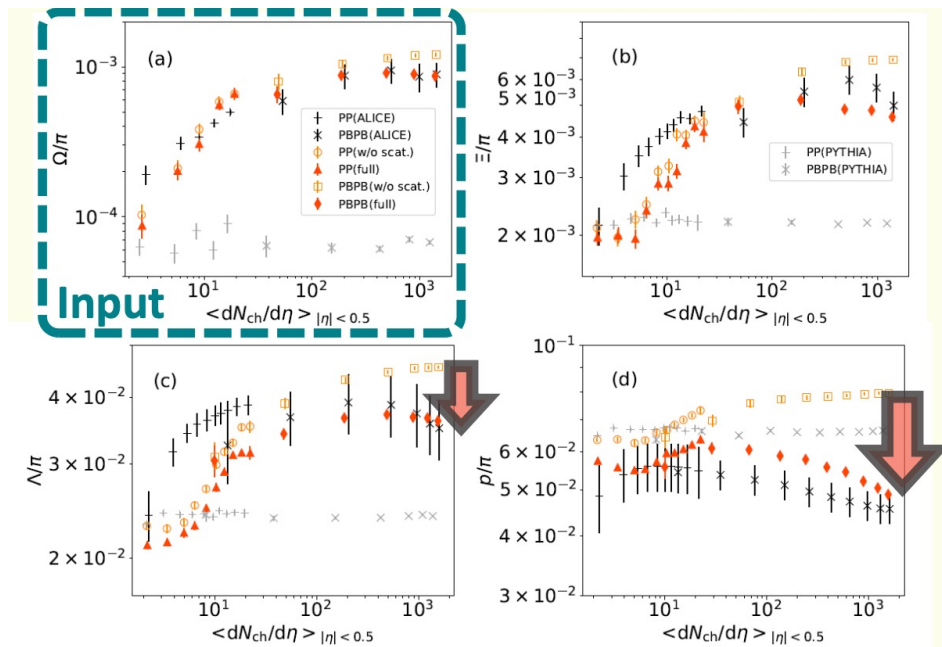
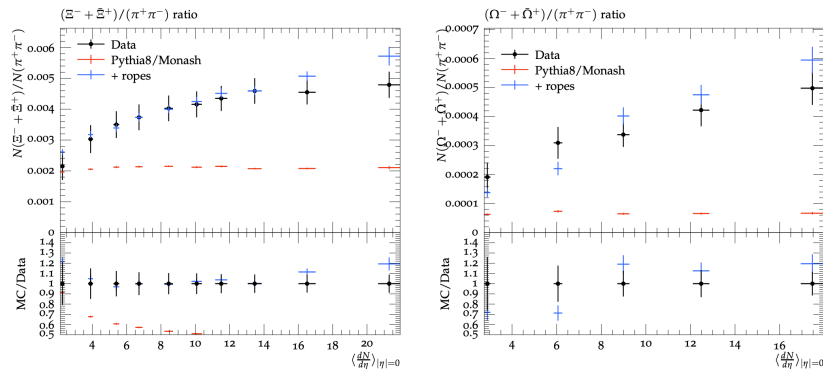
Strangeness

DCCI2
[link](#)

DCCI2 and different Pythia mechanisms discussed

- good improvement in description of strangeness enhancement

Minbias results: ALICE p-p $\sqrt{s} = 7$ TeV



[Pythia link](#)

10/11/22

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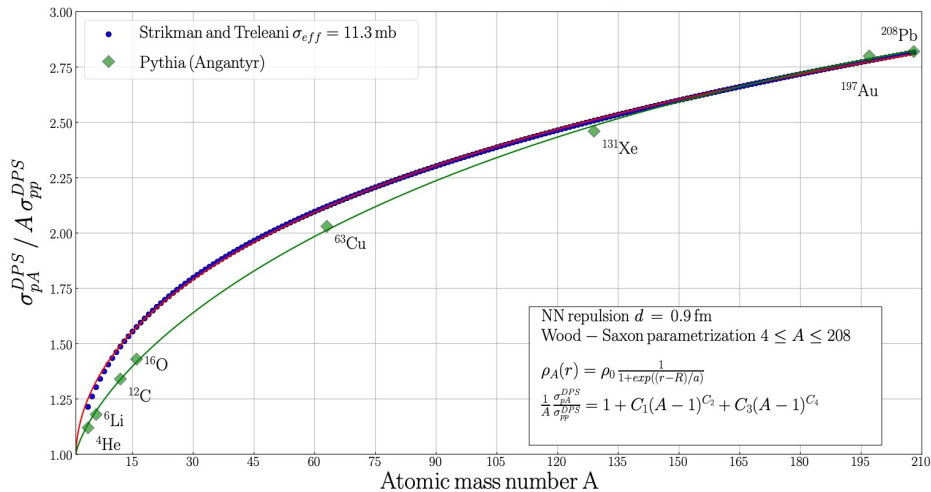


Double-parton scatterings

Implications of DPS in pA wrt pp

[link](#)

Enhancement of the DPS cross section in pA collisions



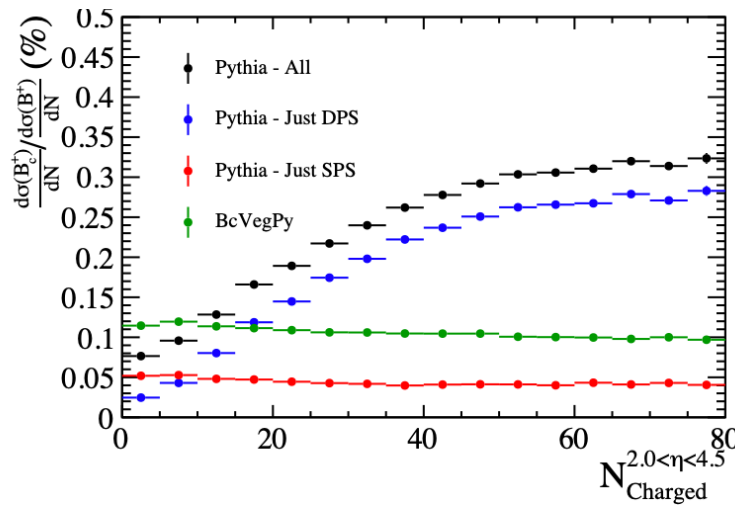
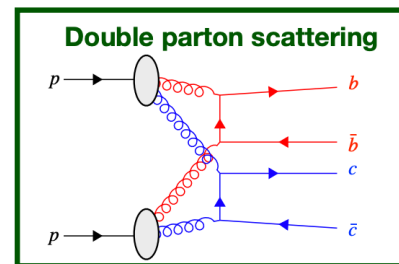
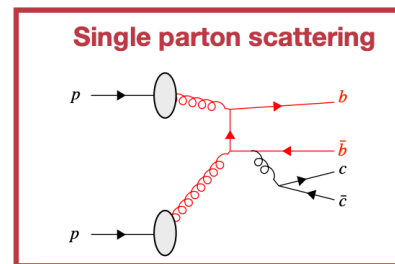
Outlook for future measurements

10/11/22

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Heavy quarks: from SPS or DPS?

[link](#)

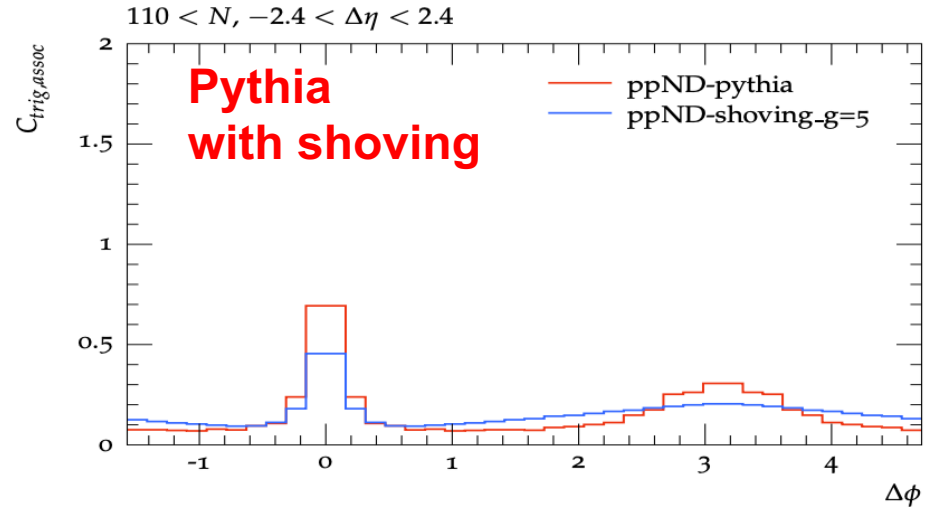
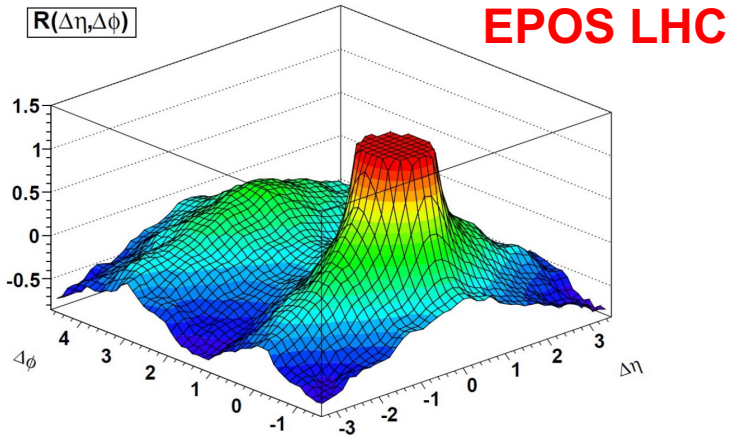




Correlations

Key issue in small systems: the ridge \rightarrow good improvements in the description [link](#)

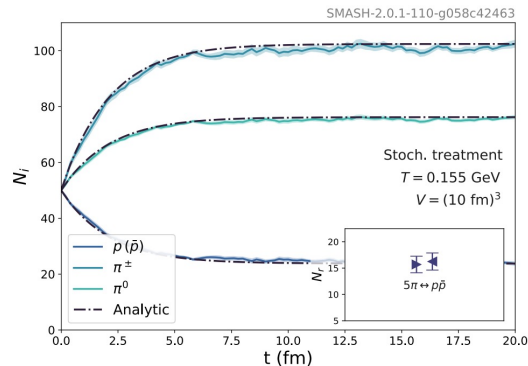
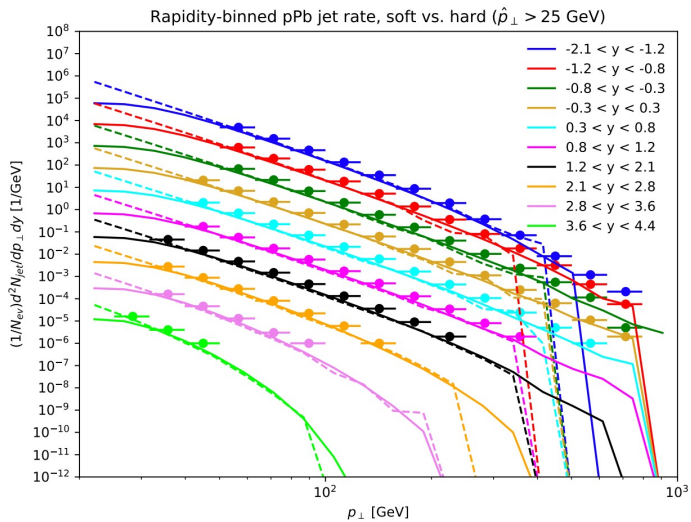
\rightarrow Using real hydro, our calculation provides a ridge structure in pp@LHC using particles with $1 < p_t < 3\text{GeV}/c$, for high multiplicity events





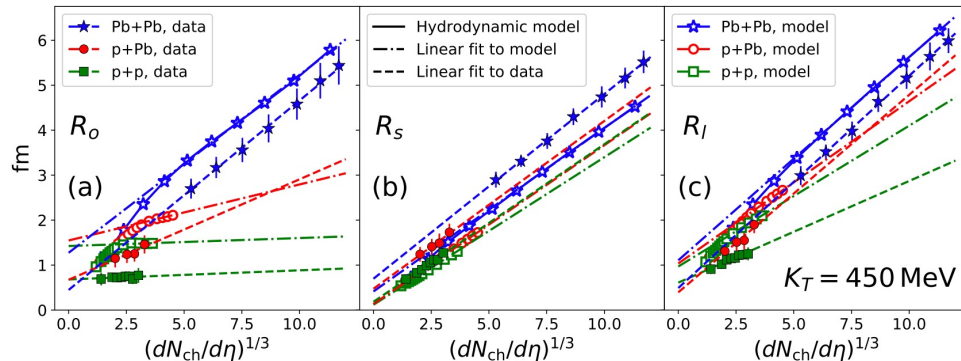
Many other interesting discussions...

Hard QCD in Angantyr
[link](#)



proton annihilation
[link](#)

HBT [link](#)





Outlook of the workshop – today

THURSDAY, 10 NOVEMBER



14:00 → 14:15 **Introduction**

🕒 15m ✎

Speakers: Christian Bierlich (Lund University (SE)), Valentina Zaccolo (Universita e INFN Trieste (IT))

14:15 → 15:35 **Topical session: Light flavours I** → pheno part

✎

Conveners: Marius Uthelm, Valentina Zaccolo (Universita e INFN Trieste (IT))

14:15 **Interplay between core and corona from small to large systems - DCC12 model**

🕒 20m ✎

Speaker: Yuuka Kanakubo

14:35 **Strange particle production with Pythia**

🕒 20m ✎

Speaker: Leif Lönnblad (Lund University (SE))

14:55 **Hadronic transport approach for heavy ion collisions - SMASH**

🕒 20m ✎

Speaker: Oscar Garcia-Montero

15:15 **Discussion**

🕒 20m ✎

15:35 → 16:00

Coffee break

🕒 25m

📍 Cafeteria building 6, first floor

→ upstairs
to the left



Outlook of the workshop – today

16:00 → 17:00

Topical session: Light flavours II → exp part

Conveners: Christian Bierlich (Lund University (SE)), Peter Christiansen (Lund University (SE))



16:00

Strangeness production from small to large systems

Speaker: Livio Bianchi (Universita e INFN Torino (IT))

🕒 20m



16:20

Light-nuclei production at LHC

Speaker: Ramona Lea (Universita di Brescia (IT))

🕒 20m



16:40

Discussion

🕒 20m



17:00 → 18:00

Topical session: Heavy flavours



Conveners: Marius Uthmeim, Valentina Zaccolo (Universita e INFN Trieste (IT))



17:00

Double-parton scattering with Pythia

Speaker: Oleh Fedkevych (INFN - National Institute for Nuclear Physics)

🕒 20m



17:20

Charm production in small and large systems

Speaker: Mattia Faggin (Universita e INFN, Padova (IT))

🕒 20m



17:40

Discussion

🕒 20m



20:00 → 22:00

Social dinner

🕒 2h

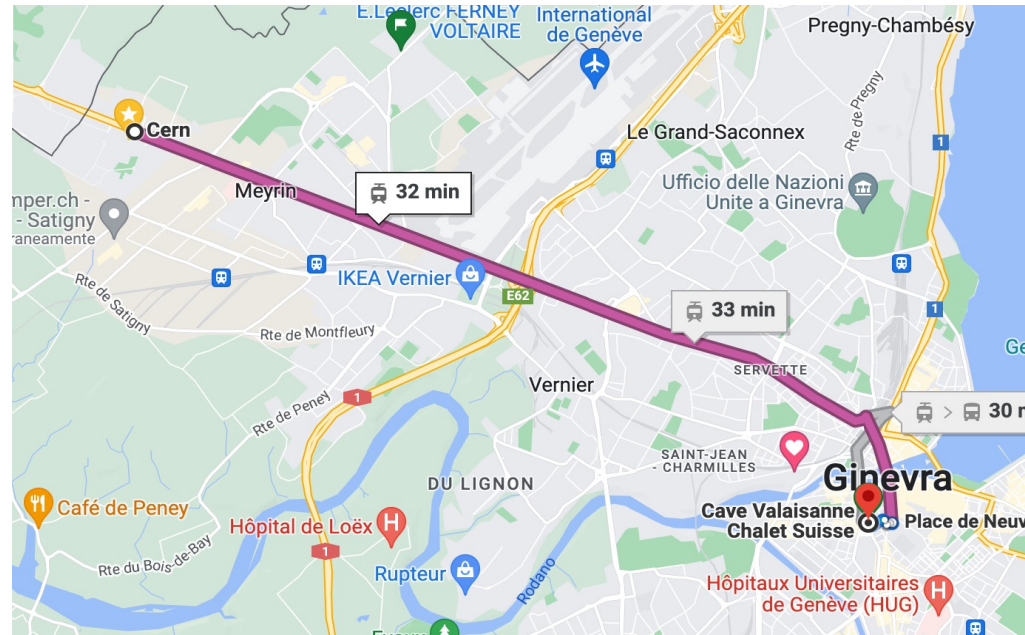


Outlook of the workshop – today

Social dinner tonight at 20

Cave Valaisanne Chalet Suisse <https://cavevalaisanne.ch/>

reachable by tram 18 + short walk





Outlook of the workshop – tomorrow

Focus
on the future!

FRIDAY, 11 NOVEMBER

09:00 → 10:00 **Topical session: Future prospects I** **New pheno developments**

Conveners: Valentina Zaccolo (Universita e INFN Trieste (IT)), Yuuka Kanakubo

09:00 **EPOS4: A MC tool for high-energy scatterings** 20m
Speaker: Klaus WERNER

09:20 **Physics and usage of PYTHIA 8.3** 20m
Speaker: Christian Bierlich (Lund University (SE))

09:40 **Discussion** 20m

10:00 → 10:30 **Coffee break** 30m Cafeteria building 6, first floor

10:30 → 11:30 **Topical session: Future prospects II** **New exp developments towards ALICE 3**

Conveners: Alice Ohlson (Lund University (SE)), Christian Bierlich (Lund University (SE))

10:30 **Light-flavour measurements in Run3 and 4 with ALICE** 20m
Speaker: Nicolo Jacazio (Universita e INFN, Bologna (IT))

10:50 **Heavy-flavour measurements with ALICE in Run3, 4 and beyond** 20m
Speaker: David Dobrigkeit Chinellato (University of Campinas UNICAMP (BR))

11:10 **Discussion** 20m

11:30 → 12:00 **Discussion: Q&A - Ask MC authors anything** 6/R-012 - conference room

12:00 → 12:10 **Closing remarks** 10m



Please get in touch

We would really appreciate if you could let us know if you have ideas for topics for next year and...

if you are interested in the series of meetings
just subscribe to the mailing list:

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