

# 12<sup>th</sup> International Conference on Hard and Electromagnetic Probes of High-Energy Nuclear Collisions

## ALICE highlights

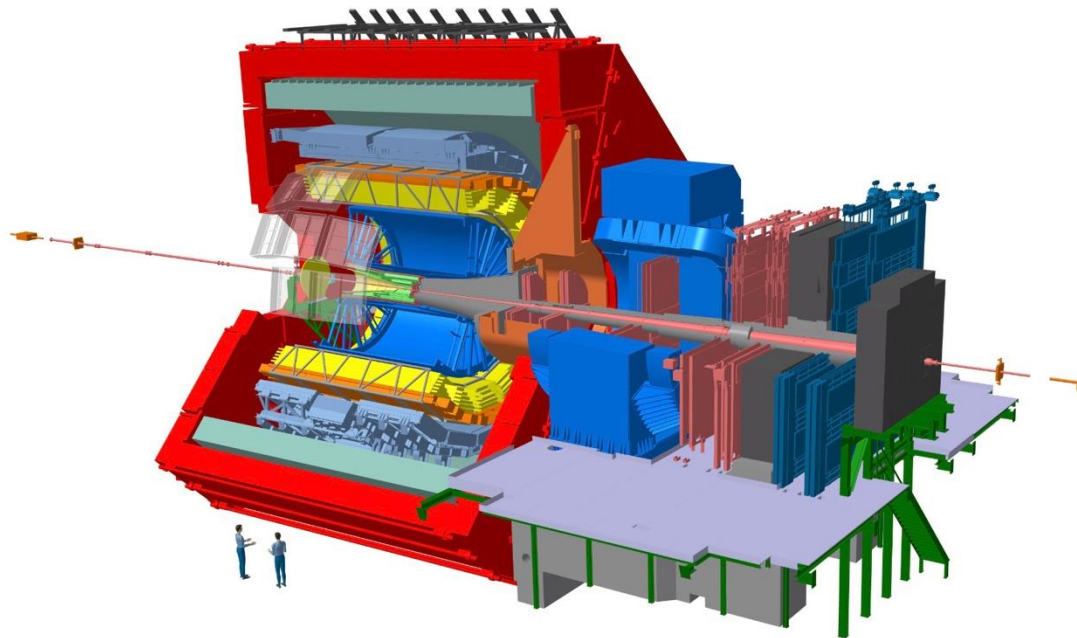
Xiaozhi Bai (USTC)

for the ALICE Collaboration

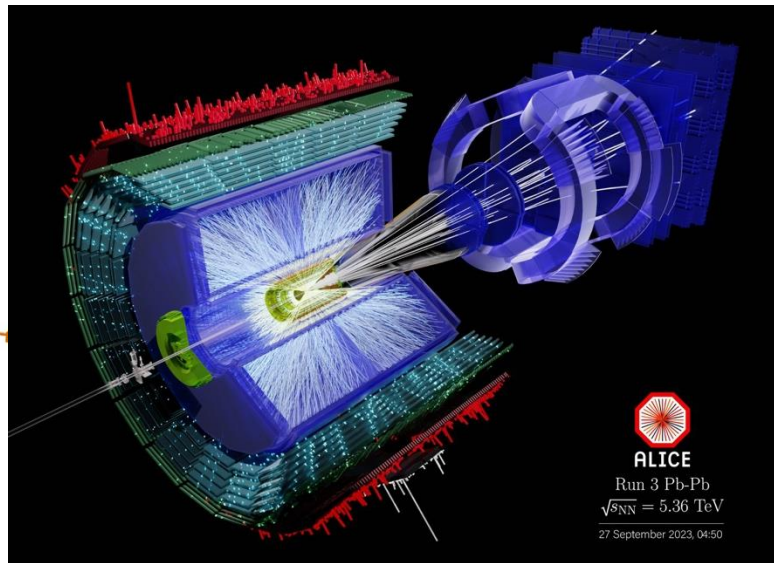
Nagasaki, Japan, 22<sup>nd</sup> - 27<sup>th</sup>, Sep. 2024



# ALICE in Run 3 (Ongoing)

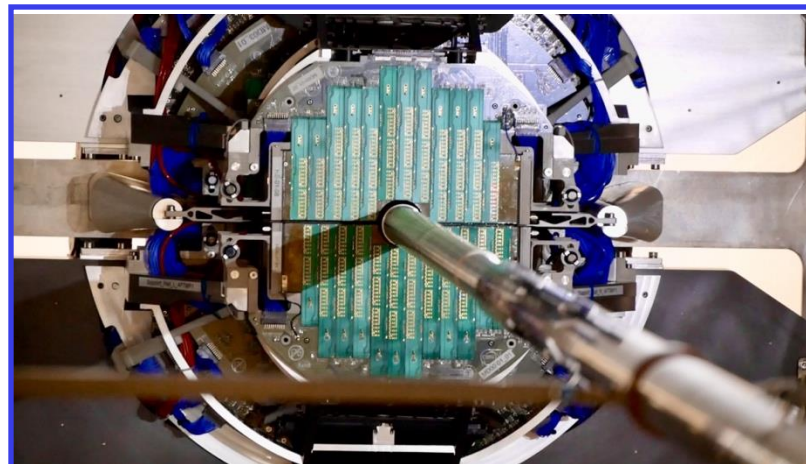


Major upgrades installed in 2019- 2021



LHC LS2	LHC RUN 3	LHC LS3	LHC RUN 4	LHC LS4	LHC RUN 5 and RUN 6
2019-2021	2022-2025	2026-2028	2029-2032	2033-2034	2035-2041

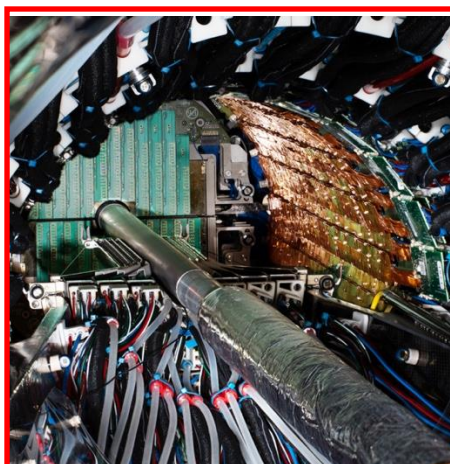
# ALICE in Run 3 (MFT and ITS2)



## New Muon Forward Tracker

[MFT CDS LINK](#)

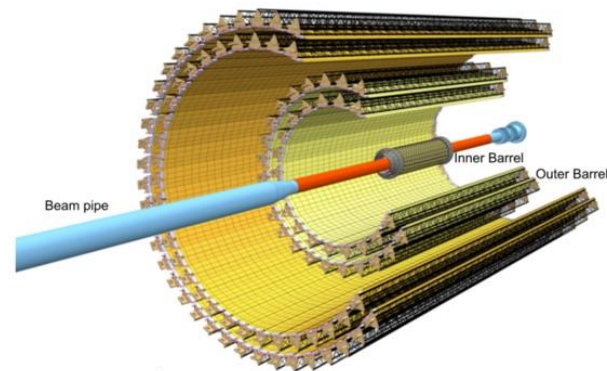
- Monolithic Active Pixel Sensor technology
- Spatial resolution: 5  $\mu\text{m}$
- Pixel size: 27  $\mu\text{m}$  x 29  $\mu\text{m}$
- Integration time: 5  $\mu\text{s}$



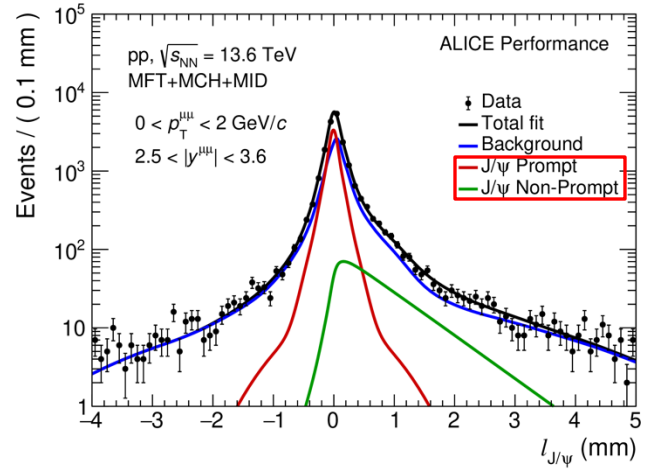
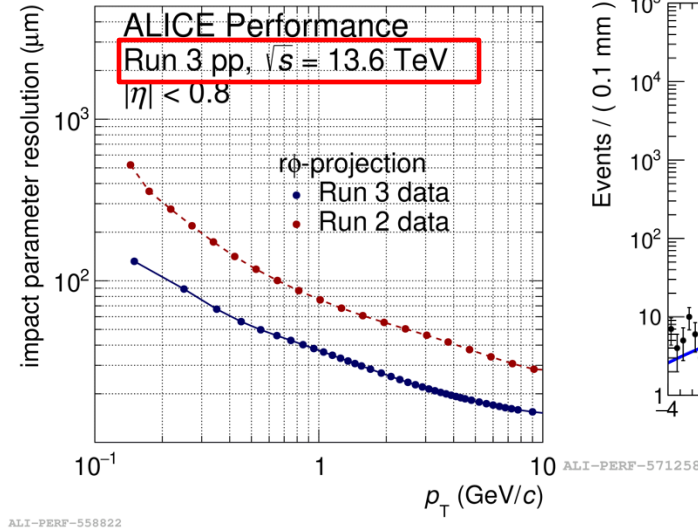
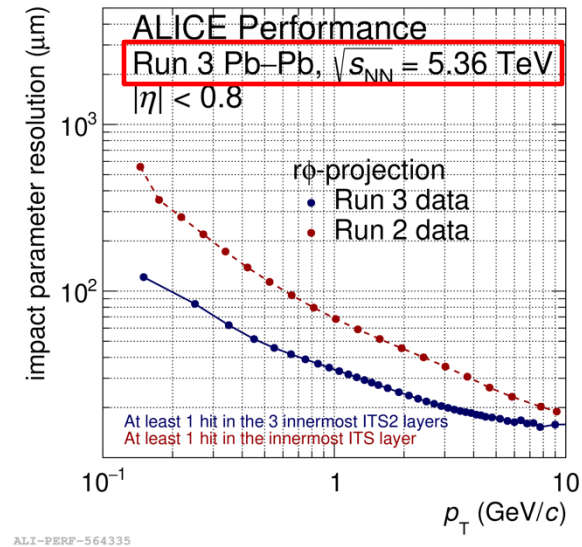
## Upgraded Inner Tracking System

[TDR ITS2 LINK](#)

- 3 layers in inner barrel (IB), 4 in outer barrel (OB)
- Get closer to IP: from 39 mm to 23 mm
- Reduced material budget: from 1.14%  $X_0$  to 0.36%  $X_0$  per layer
- Reduced pixel size: from 50 x 425  $\mu\text{m}^2$  to 29 x 27  $\mu\text{m}^2$



# Performance of the ITS2 and MFT in Run 3



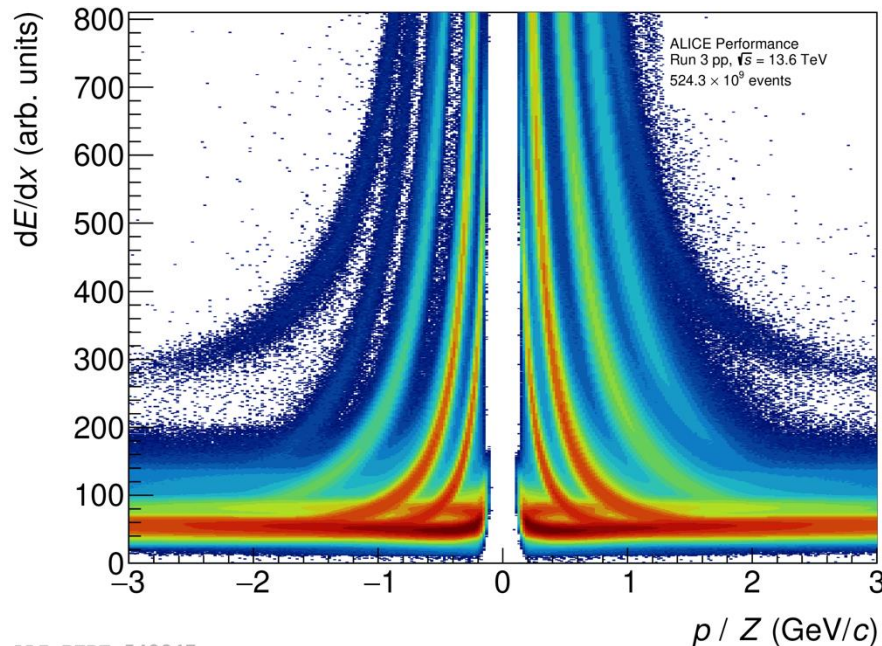
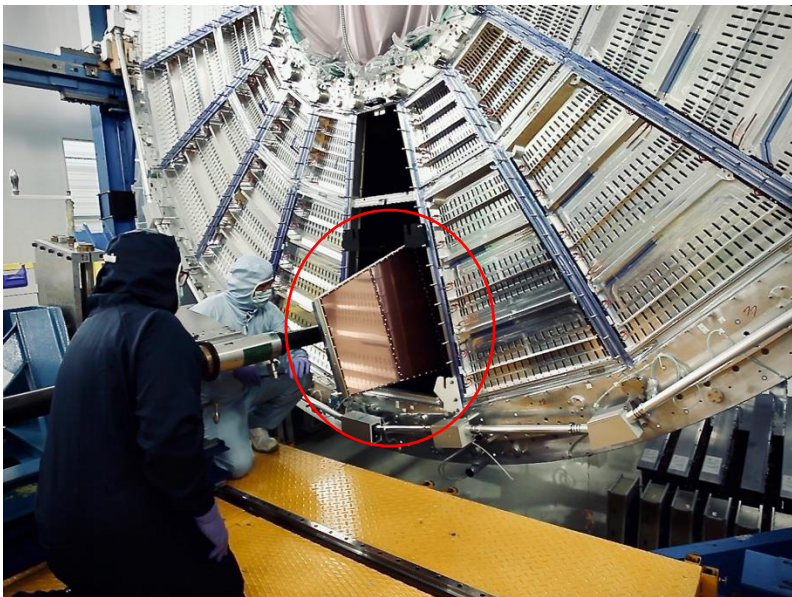
## Improved pointing resolution at midrapidity

already now by **factors of 2 and 6** in the transverse plane and beam-line direction, respectively

## Secondary vertex reconstruction enabled at forward rapidity

separation of **J/ψ** contributions from beauty-hadron decays

# ALICE in Run 3 (TPC)



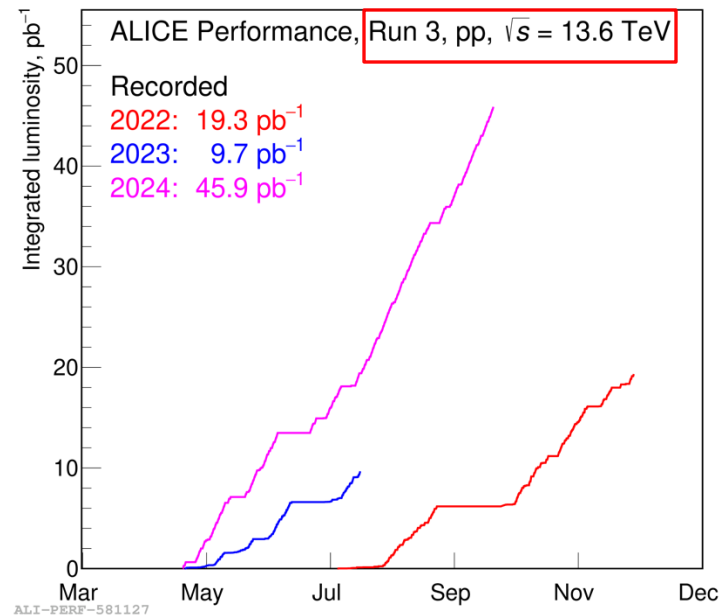
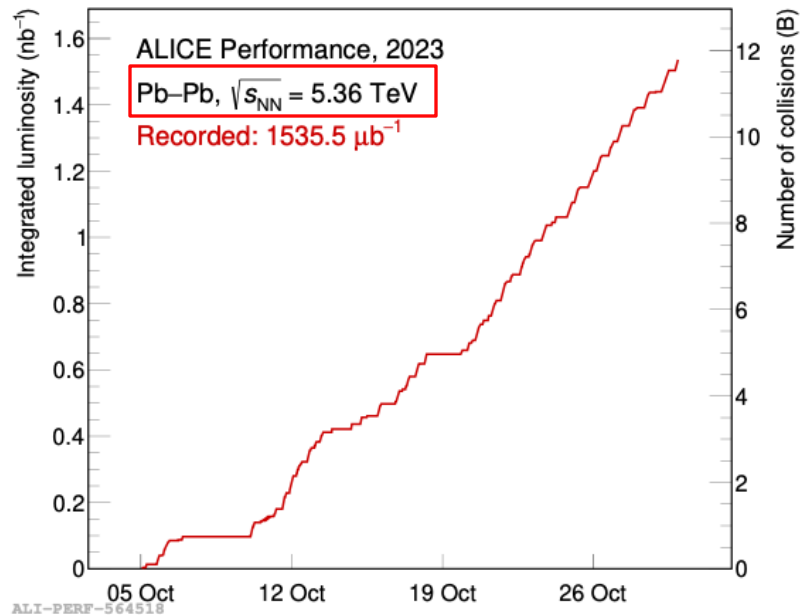
ALI-PERF-542847

Upgraded Time Projection Chamber -> **GEM, continuous readout**

[TPC UPGRADE CDS LINK](#)

- pp data taking at 500 kHz
- Pb-Pb data taking at 50 kHz

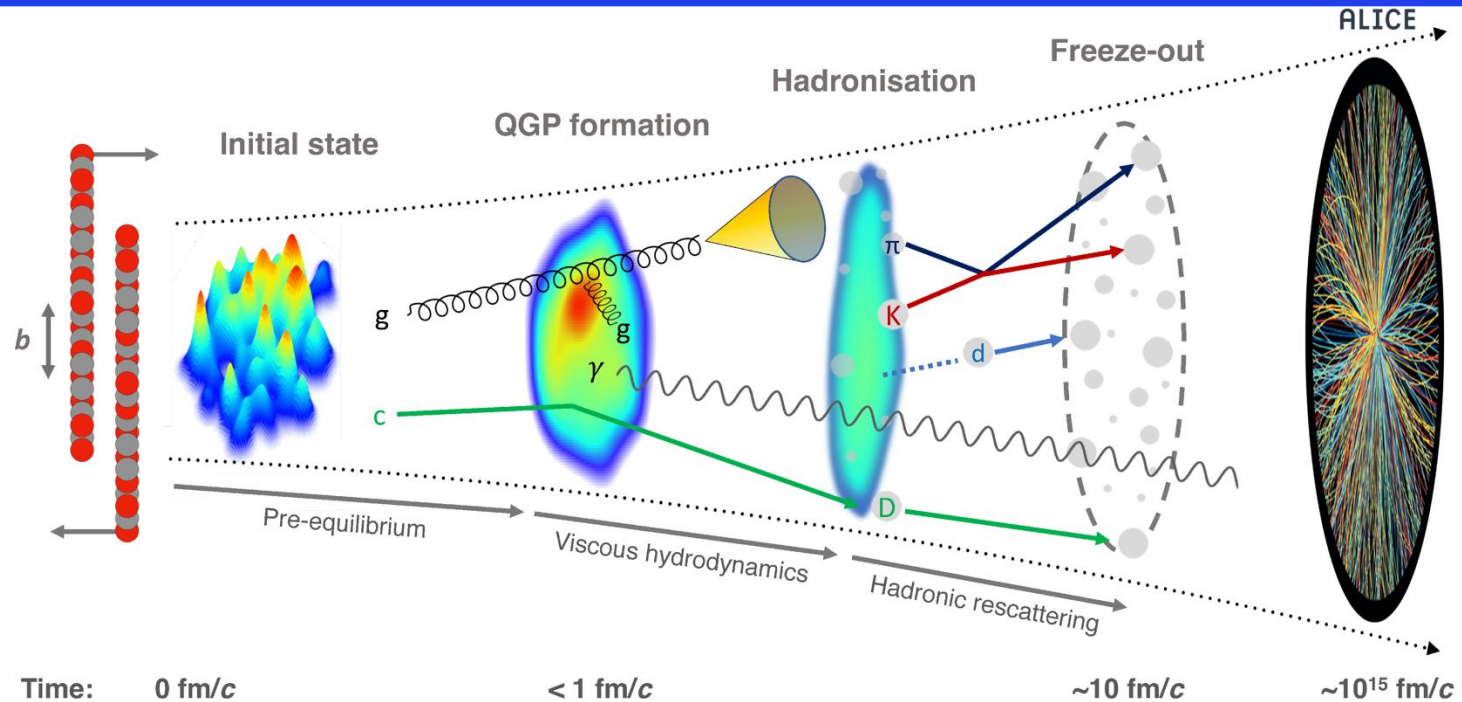
# Run 3 data taking



- Pb-Pb data taking at **50 kHz**
- Collected approx. 12 B minimum bias events

- pp data taking at **500 kHz**
- $75 \text{ pb}^{-1}$  minimum bias events are currently recorded

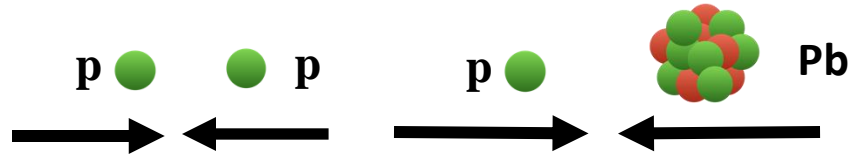
# Evolution of the heavy-ion collisions



ALI-PUB-528781

Heavy flavor, quarkonium and jets, are excellent **hard probes** to study the **initial state**, **QGP properties** and **hadronisation mechanisms in heavy-ion collisions**

ALICE, Eur. Phys. J. C 84 (2024) 813

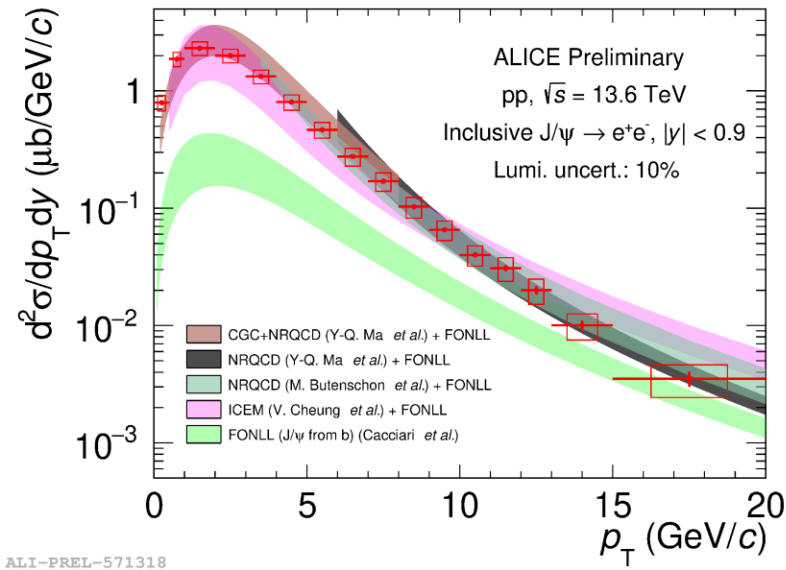
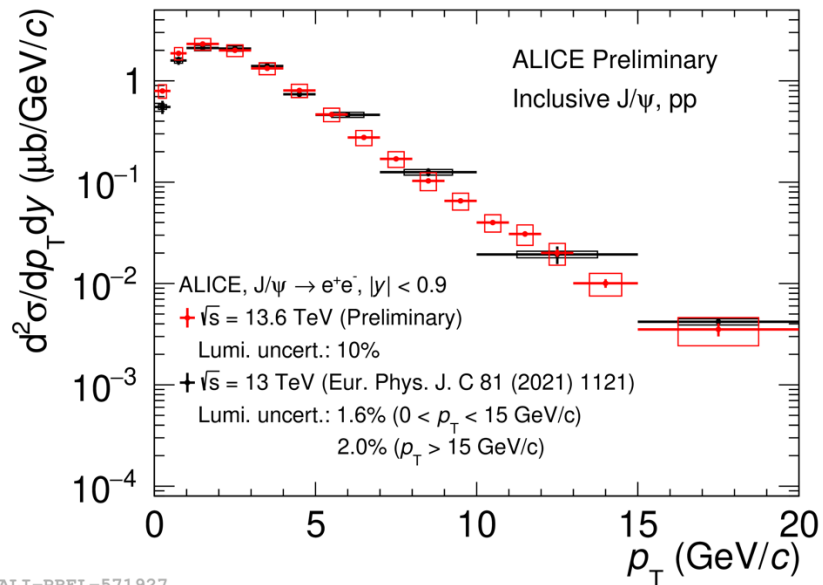


## Highlights from pp and p-Pb collisions



# Charmonia in pp collisions at $\sqrt{s} = 13.6$ TeV

Run 3 Preliminary

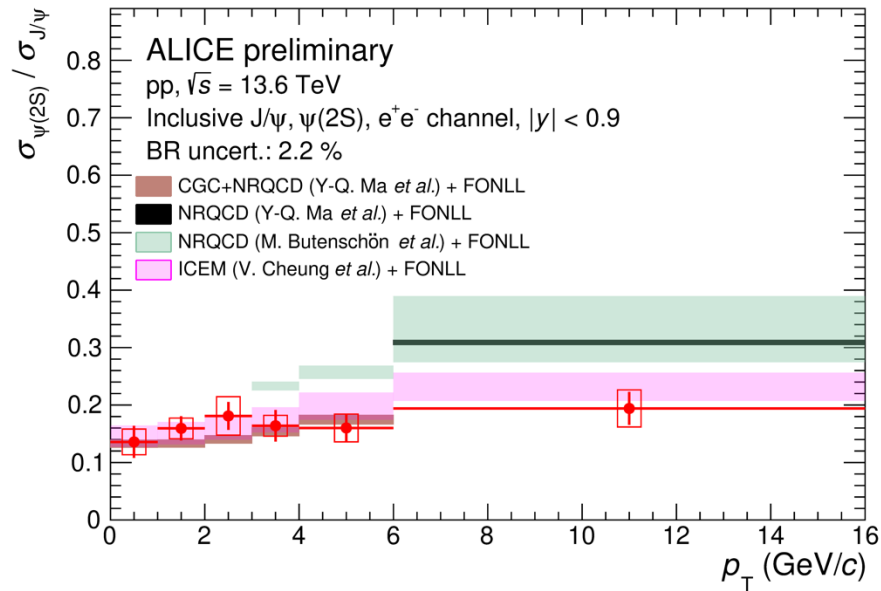
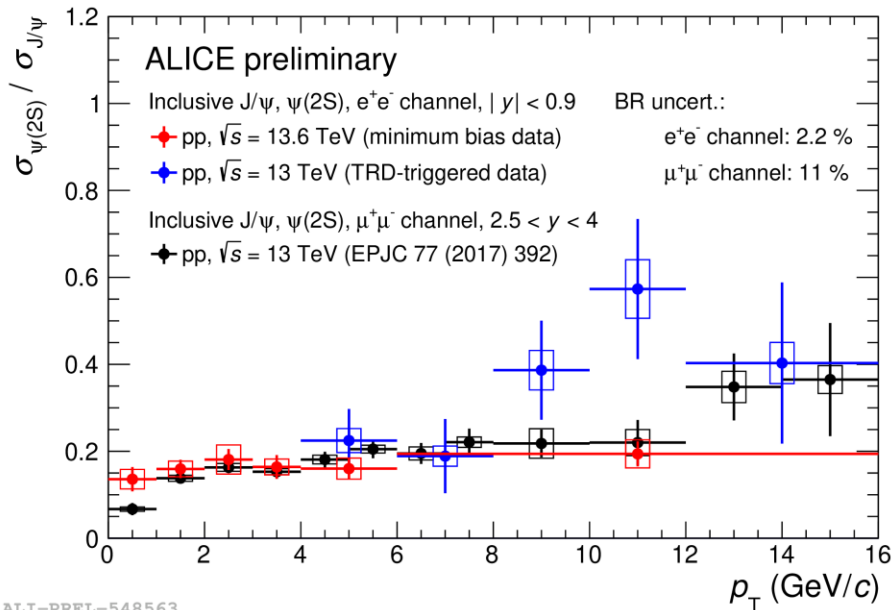


- The new  $J/\psi$  cross section is consistent with the Run 2 results
- The data are described by ICEM and NRQCD based models coupled with FONLL to account for the non-prompt  $J/\psi$  contribution

Yiping Wang 24/09 09:00

# $\psi(2S)$ in pp collisions at $\sqrt{s} = 13.6$ TeV

Run 3 Preliminary

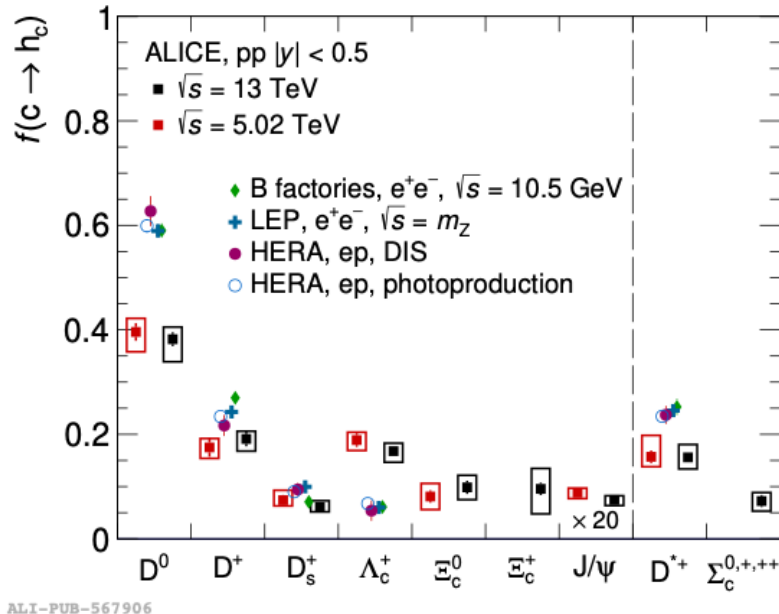
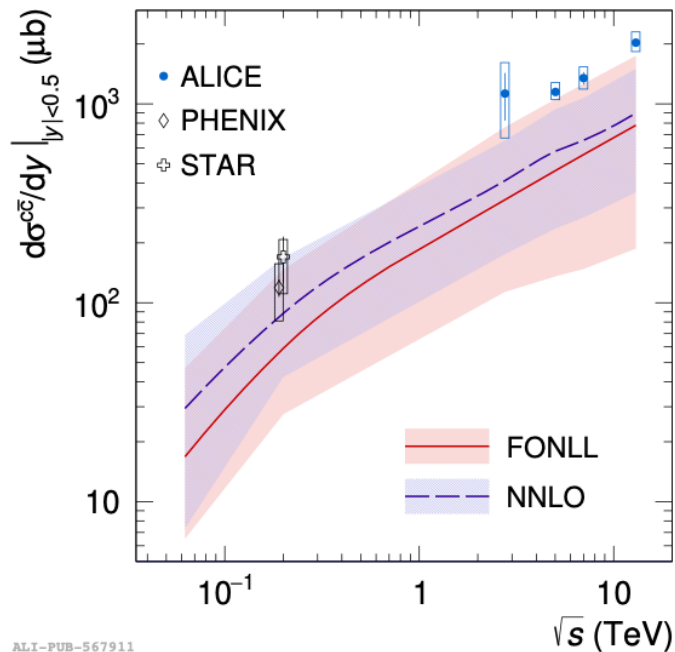


- Run 3 with the significantly increased statistics allow to reconstruct  $\psi(2S)$  via dielectron decays
- The CGC + NRQCD and ICEM can describe the data at low  $p_T$

Yiping Wang 24/09 09:00

# Charm production and fragmentation fractions

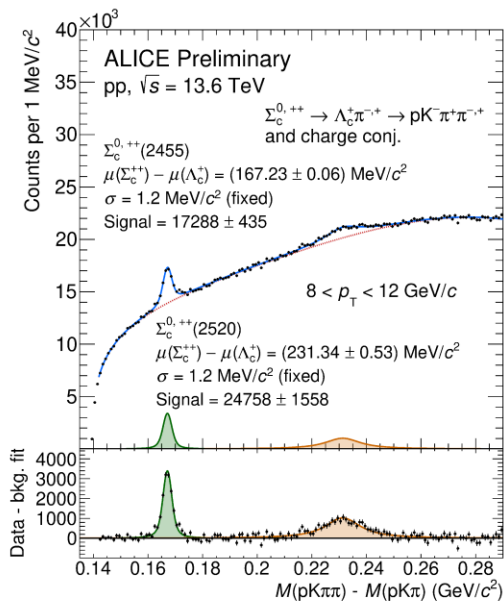
ALICE, JHEP 12 (2023) 086



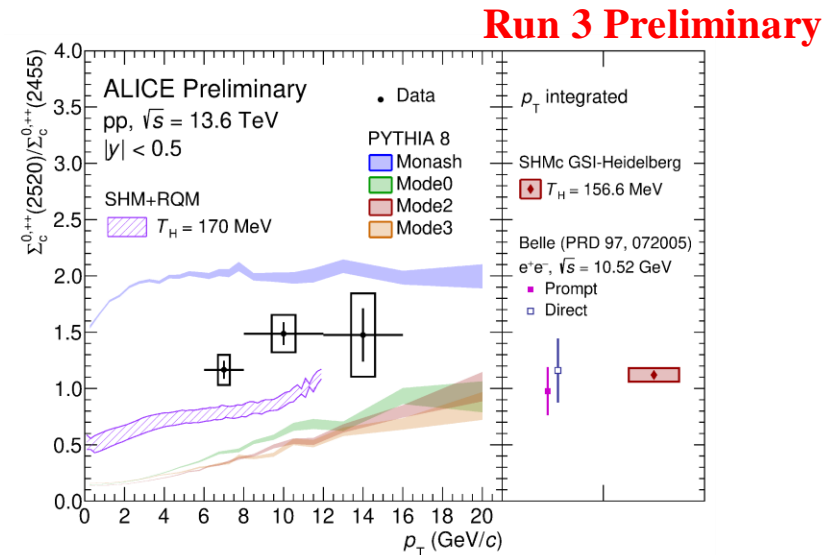
- Total charm production cross section: values on the upper limits of the FONLL prediction at midrapidity
- **Charm fragmentation fractions are different** w.r.t ee and ep collisions
- **Baryon production is not fully understood**

Federica Zanone [23/09 17:50](#)

# $\Sigma_c^{0,++}$ in pp collisions at $\sqrt{s} = 13.6$ TeV



ALI-PREL-571534



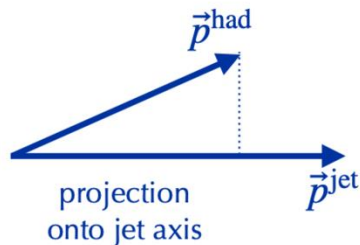
ALI-PREL-574270

- First measurement of the production of  $\Sigma_c^{0,++}(2520)$  relative to  $\Sigma_c^{0,++}(2455)$  in pp collisions at  $\sqrt{s} = 13.6$  TeV
- No evidence of difference w.r.t. e<sup>+</sup>e<sup>-</sup> collisions considering current uncertainties
- PYTHIA 8 Monash (default tune) overestimates the ratio, PYTHIA 8 with additional color reconnection topologies underestimates the ratio

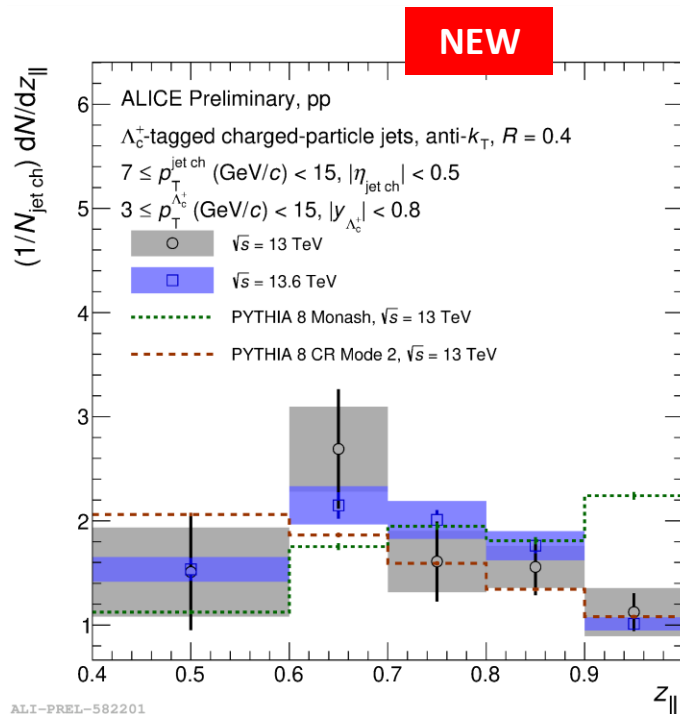
Federica Zanone 23/09 17:50

# Probe the charm baryon fragmentation function

Run 3 Preliminary



$$z_{\parallel} = \frac{\vec{p}_{\text{jet}} \cdot \vec{p}_{\text{had}}}{\vec{p}_{\text{jet}} \cdot \vec{p}_{\text{jet}}}$$

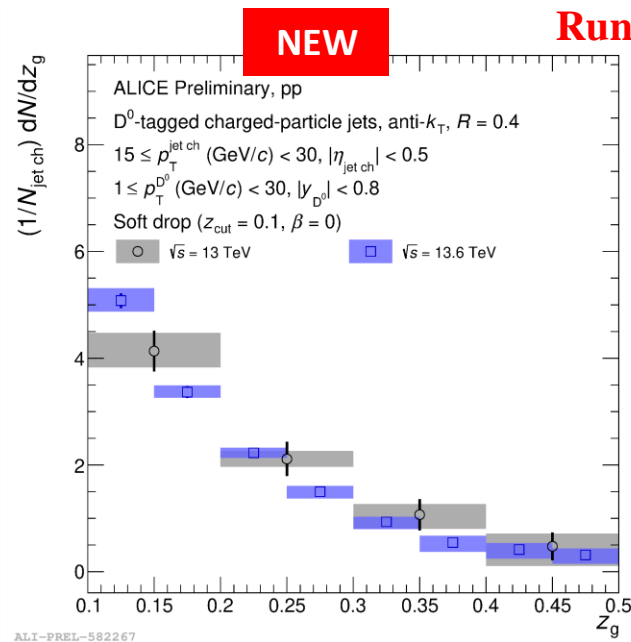
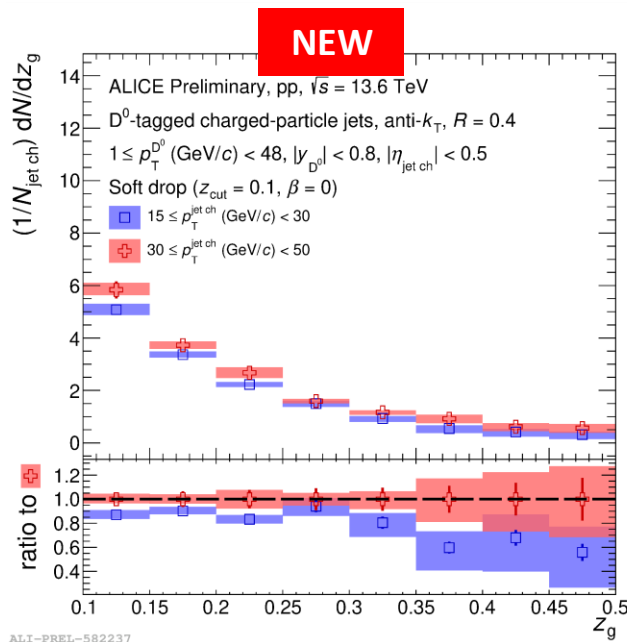


- $\Lambda_C$  probing the non-universality of charm baryon hadronisation
- The precision of the new results from Run 3 improved significantly

Jochen Klein 25/09 12:10

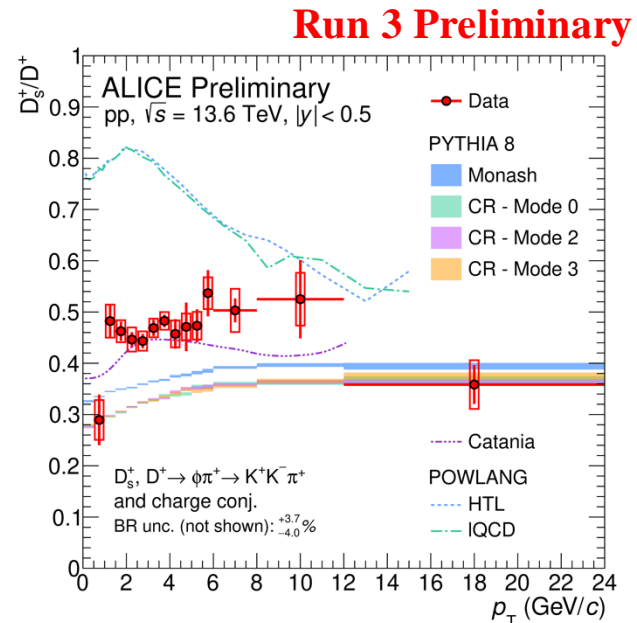
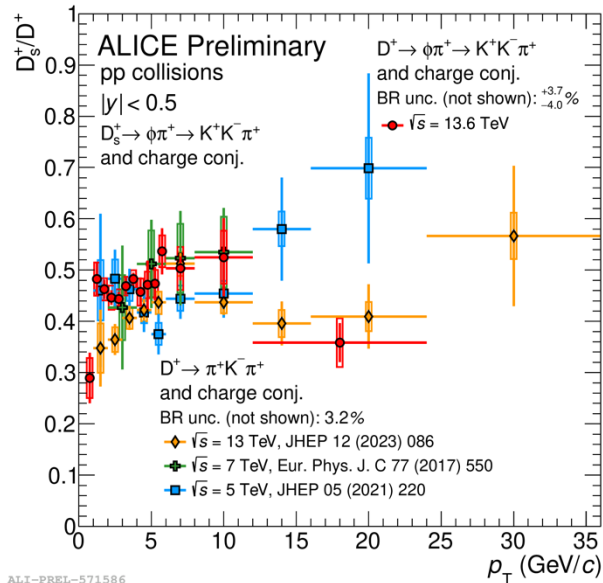
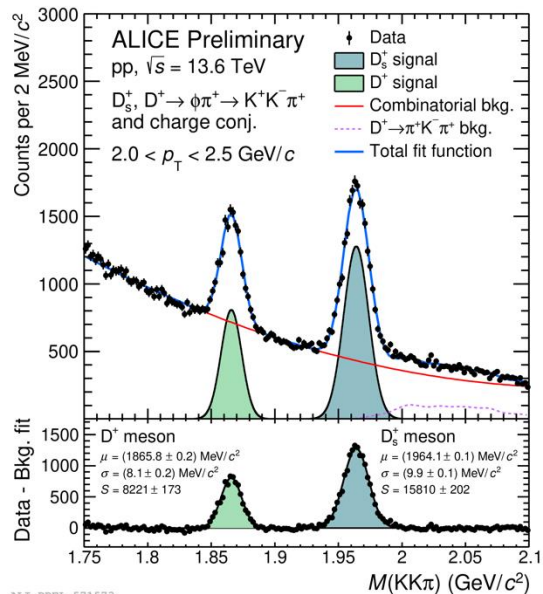
# Probing the charm splitting function

$$z_g = \frac{p_{T,g}}{p_{T,c} + p_{T,g}}$$



- The momentum fraction of the first splitting in groomed charm jets converges to the charm splitting function ( $c \rightarrow cg$ ).
- Run 3 allows us to make differential measurements in jet  $p_T$
- In inclusive jets  $Z_g$  has no dependence on jet  $p_T$ , but in heavy-flavour jets mass effect decreases with increasing  $p_T$ ?

# Prompt $D_s^+$ and $D^+$ in pp collisions at $\sqrt{s} = 13.6$ TeV

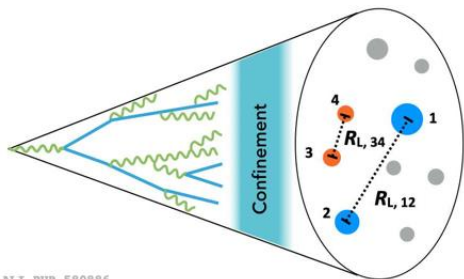


- First measurement of prompt  $D_s^+$  and  $D^+$  ratio in pp collisions at  $\sqrt{s} = 13.6$  TeV, finer granularity, down to  $p_T = 0$
- Provide a better **baseline for Pb-Pb measurements**, tools to investigate the **strangeness enhancement in charm sector**
- Catania (coalescence) gives best description, while POWLANG (local color recombination) and PYTHIA (string fragmentation) can not describe the data

Fabio Catalano 24/09 09:20

New publication

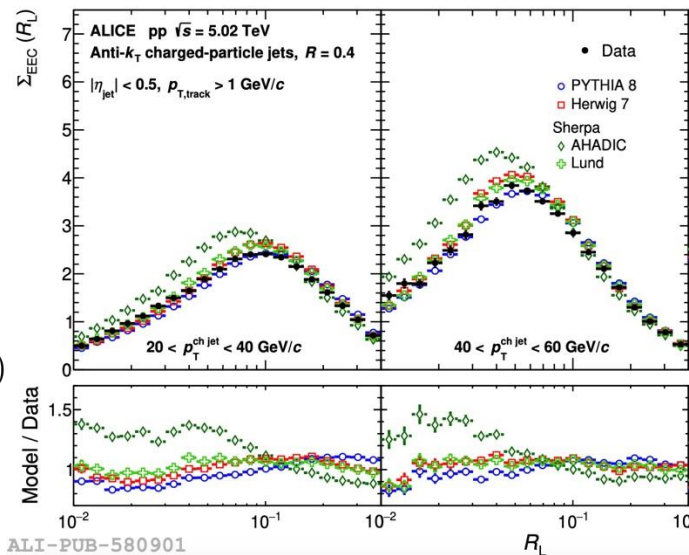
arXiv:2409.12687



ALI-PUB-580886

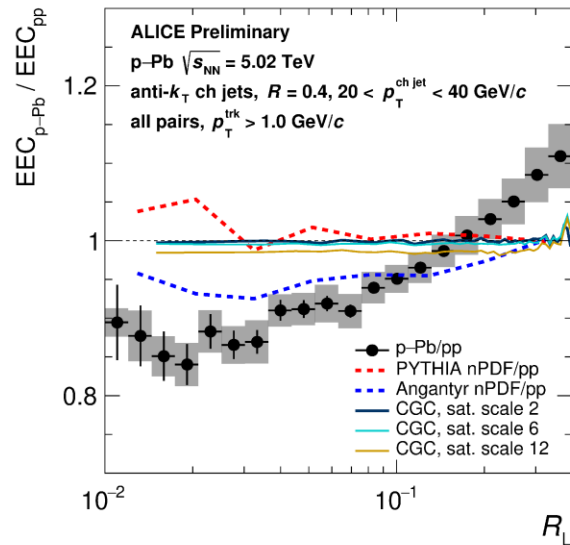
$$\frac{d\sigma_{EEC}}{dR_L} = \sum_{i,j} \int d\sigma(R'_L) \frac{p_{T,i} p_{T,j}}{p'_{T,jet}} \delta(R'_L - R_{L,ij})$$

$$R_L = \sqrt{\Delta\phi_{ij}^2 + \Delta\eta_{ij}^2}$$



ALI-PUB-580901

ALI-PREL-579734



➤ A novel jet substructure observable describing the energy flow inside jets, can be calculated from first principles in QCD in the perturbative limit

➤ Separation of the perturbative and non-perturbative regimes

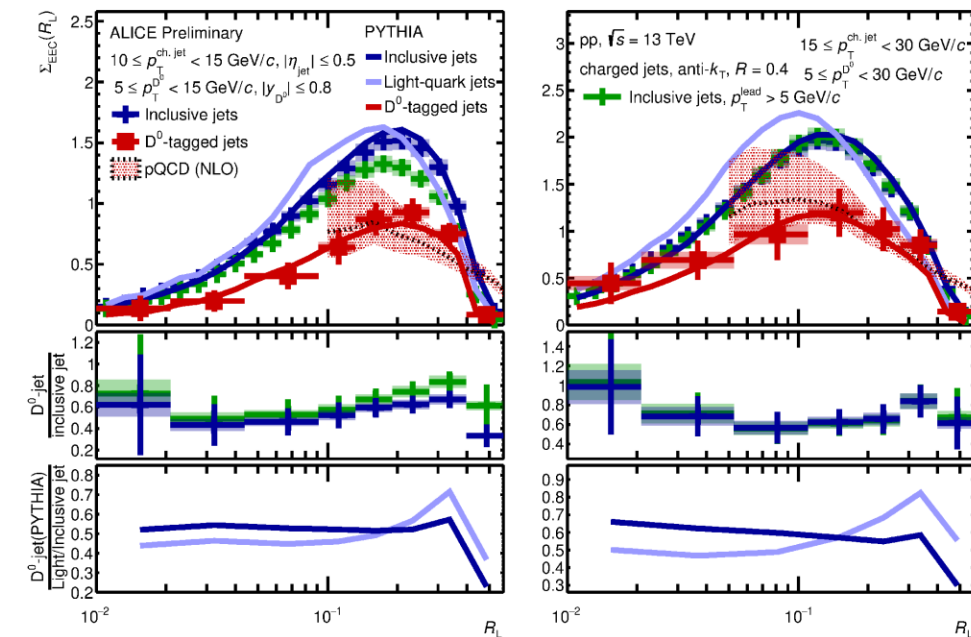
Ananya Rai 24/09 12:10

➤ Modification of the energy-energy correlator (EEC) seen in p-Pb collisions, but not explained by purely initial-state effects



# Mass dependence of the energy-energy correlators

New Preliminary

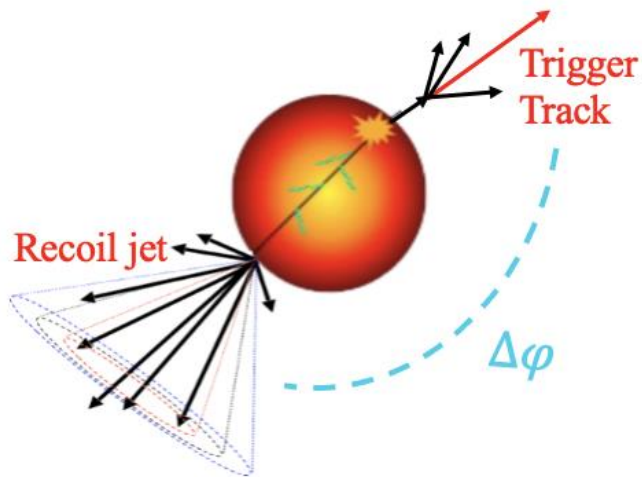


ALI-PREL-579241

- First heavy flavor energy-energy correlator measurement
- Flavour effect is seen as a decrease in the EEC amplitude, peak position is not significantly shifted compared to inclusive jets

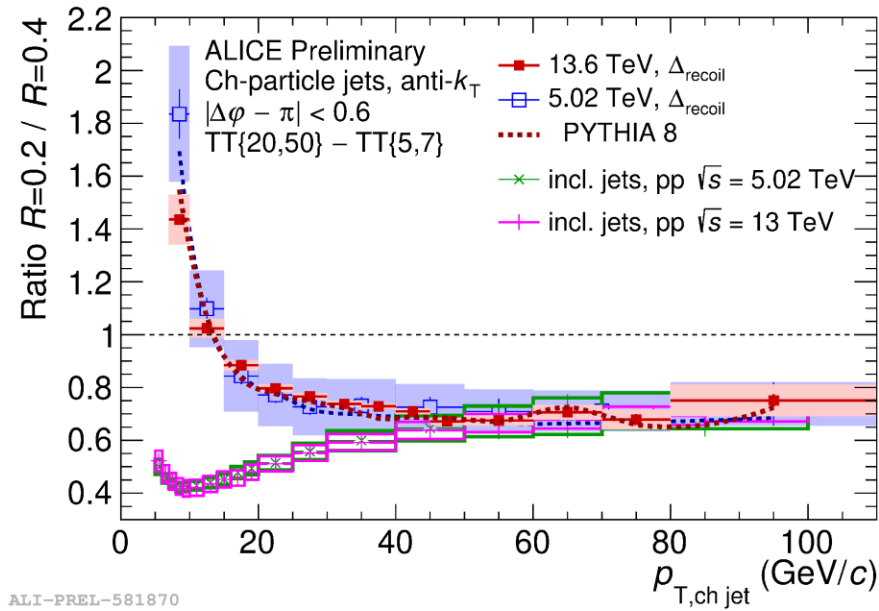
Anjali Nambrath 24/09 09:00

# Jet measurements in Run 3



**NEW**

Run 3 Preliminary



➤ The jet measurements in Run 3 by ALICE

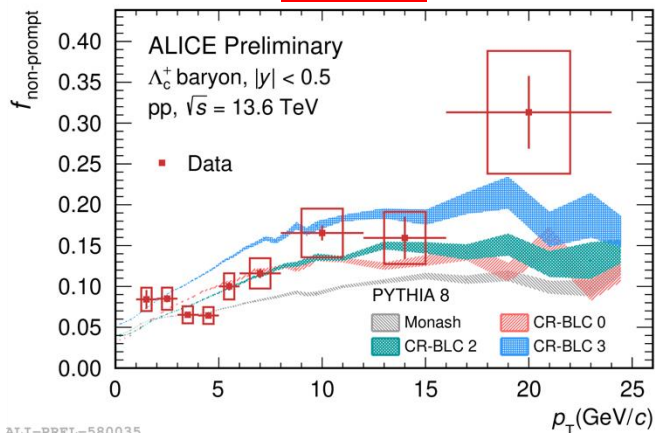
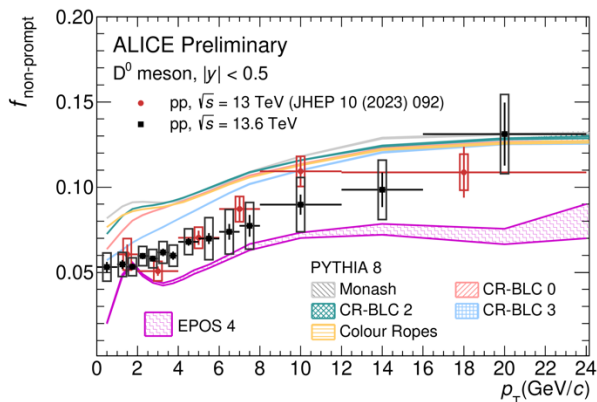
Daniel Matthew Jones 24/09 14:40

➤ The **statistical precision of the jet measurements is improved significantly in the Run 3**

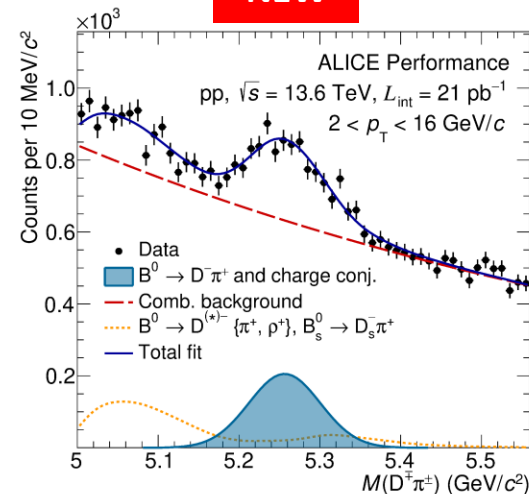
# Open beauty production in Run 3

Run 3 Preliminary

NEW

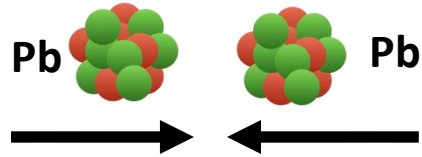


NEW



- Non-prompt D<sup>0</sup> fraction measured in Run 3: improved precision compared to Run 2 results and extended down to  $p_T = 0$
- Non-prompt  $\Lambda_c^+$  measured  $p_T$  down to 1 GeV/c
- **First direct observation of B<sup>0</sup> meson in ALICE**, measured down to  $p_T = 2$  GeV/c
  - Better constraint of the open beauty production

Andrea Tavira Garcia 23/09 14:40

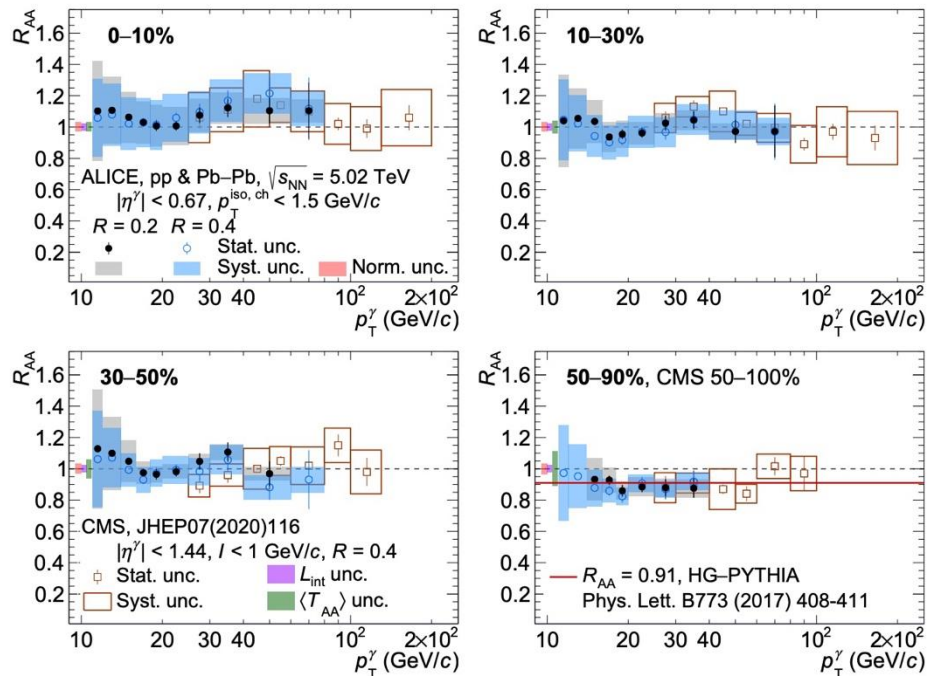


# Highlights from Pb–Pb collisions

# Isolated photon nuclear modification factor $R_{AA}$

New publication

arXiv:2409.12641

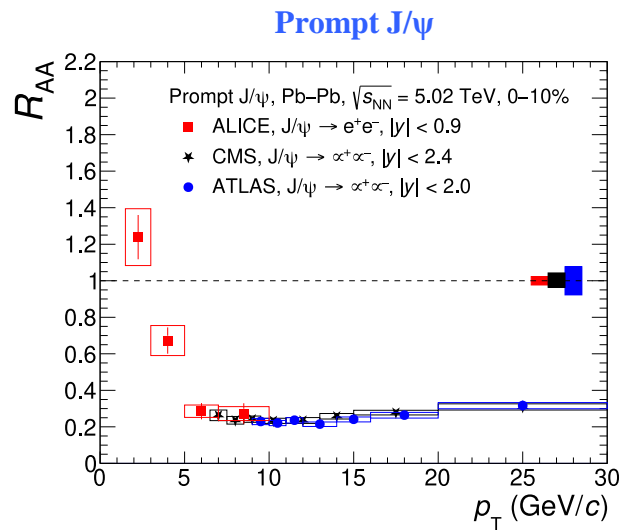
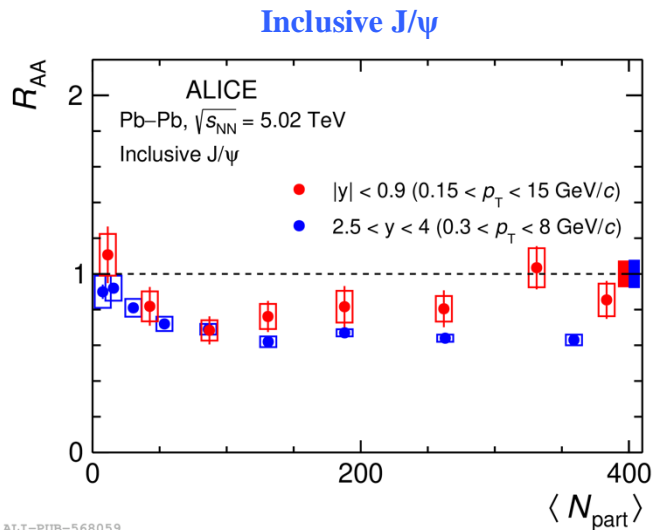


Gustavo Conesa Balbastre [25/09 09:00](#)

- $R_{AA}$  consistent with unity within the uncertainties for both  $R = 0.2$  and  $0.4$ , no radiation from QGP at these  $p_T$
- Peripheral collision in agreement with PYTHIA prediction including bias on centrality estimation

# J/ψ (re-)generation Pb–Pb collisions

ALICE, PLB 849 (2024) 138451, JHEP 02 (2024) 066



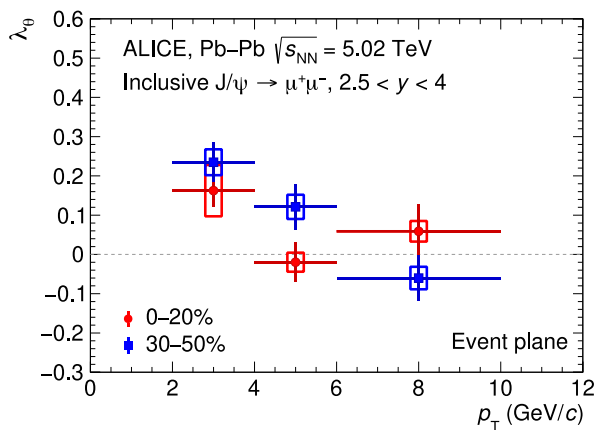
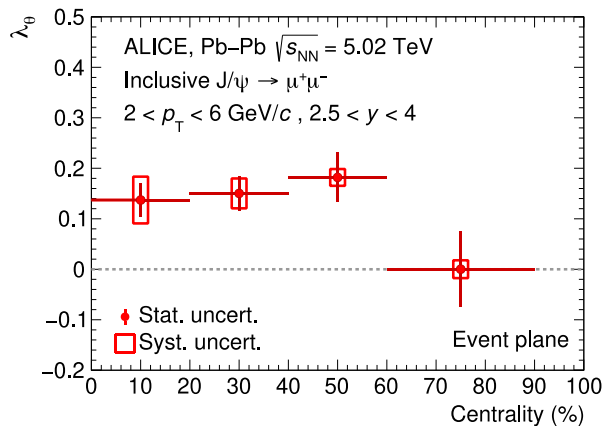
➤ Evidence for J/ψ (re-)generation in central collisions, with a larger contribution at low  $p_T$ , and at midrapidity

➤  $R_{AA}$  extended down to  $p_T = 1.5$  GeV/c and compatible within uncertainties with ATLAS and CMS measurements in the common  $p_T$  range

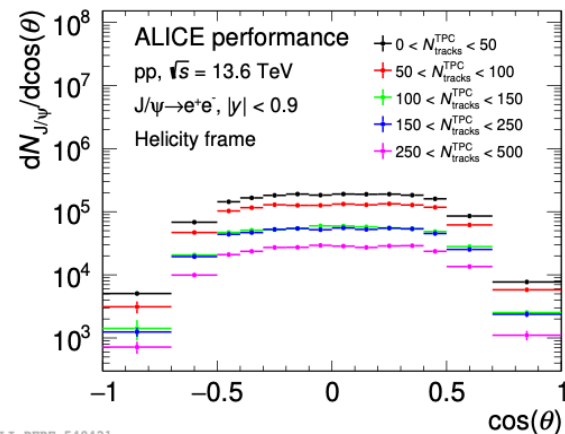
Yuan Zhang 24/09 10:00

# Charmonium Polarization

ALICE, PRL 131 (2023) 4, 042303

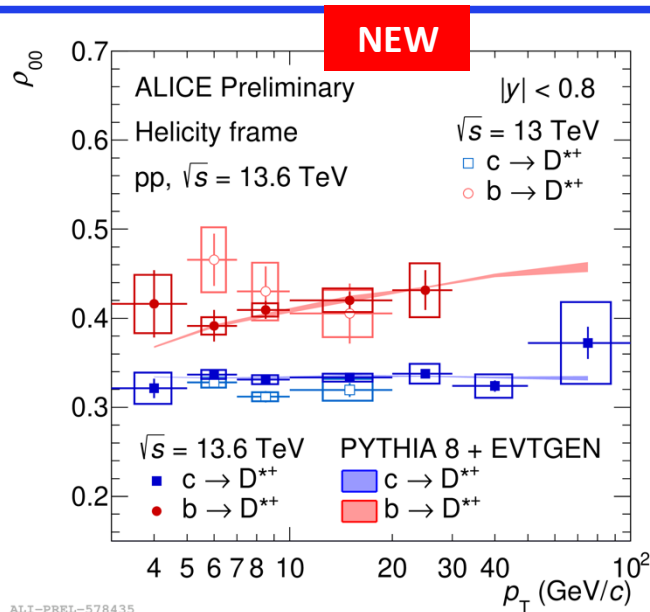
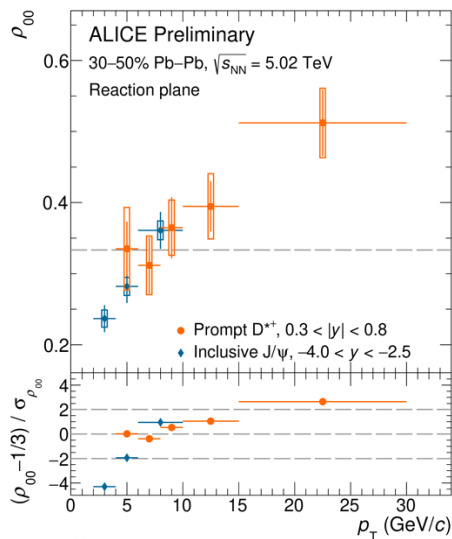


## New performance



- First measurement of quarkonium polarization **w.r.t the event plane**
- Significant polarization ( $\sim 3.9\sigma$ ) observed in semicentral collisions
- Polarization measurements are ongoing at midrapidity with Run 3 data

# D\*<sup>+</sup> spin alignment in pp and Pb-Pb collision



Run 3 Preliminary

➤ In Pb-Pb collisions:

- Spin density matrix  $\rho_{00} > 1/3$  for D\*<sup>+</sup> at high  $p_T \Rightarrow$  quark fragmentation scenario

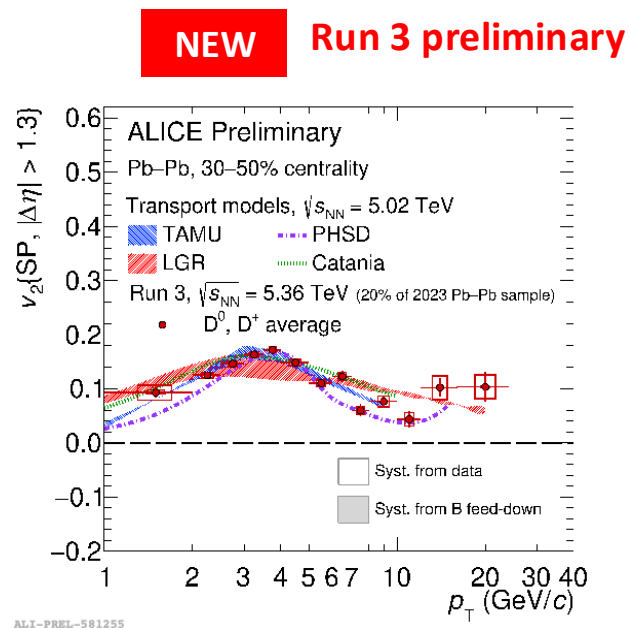
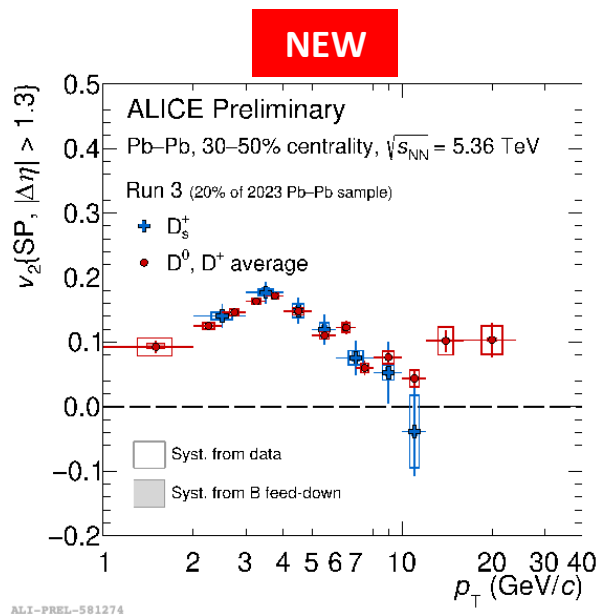
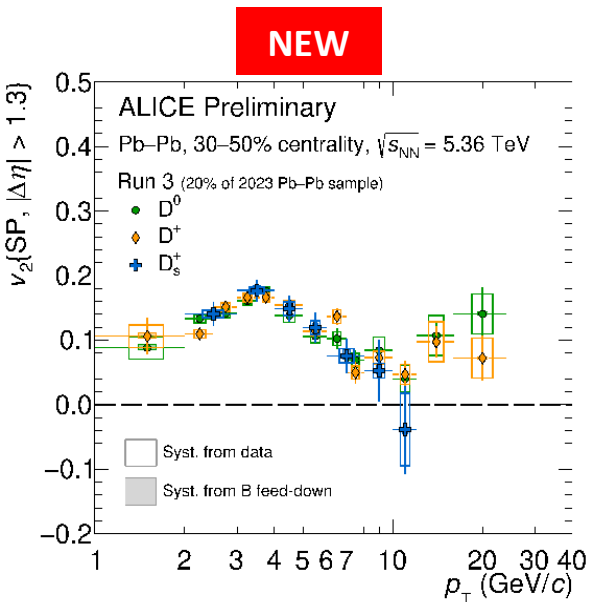
➤ In pp collisions:

- $\rho_{00} = 1/3$  for prompt D\*<sup>+</sup>,  $\rho_{00}$  larger than  $1/3$  for non-prompt D\*<sup>+</sup>, due to the helicity conservation in weak decays
- New measurement in pp collisions provides an important baseline for Pb-Pb collisions

Mingze Li 24/09 11:50



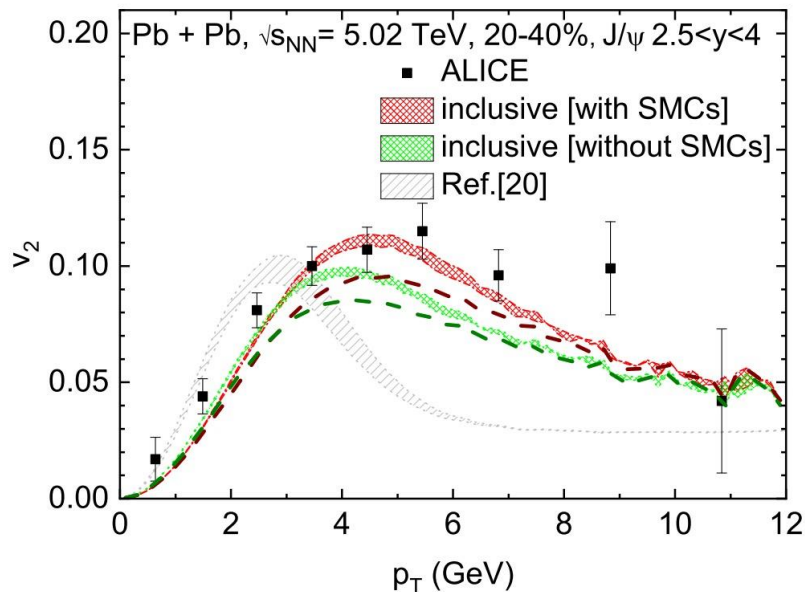
# Strange and non-strange D-mesons elliptic flow



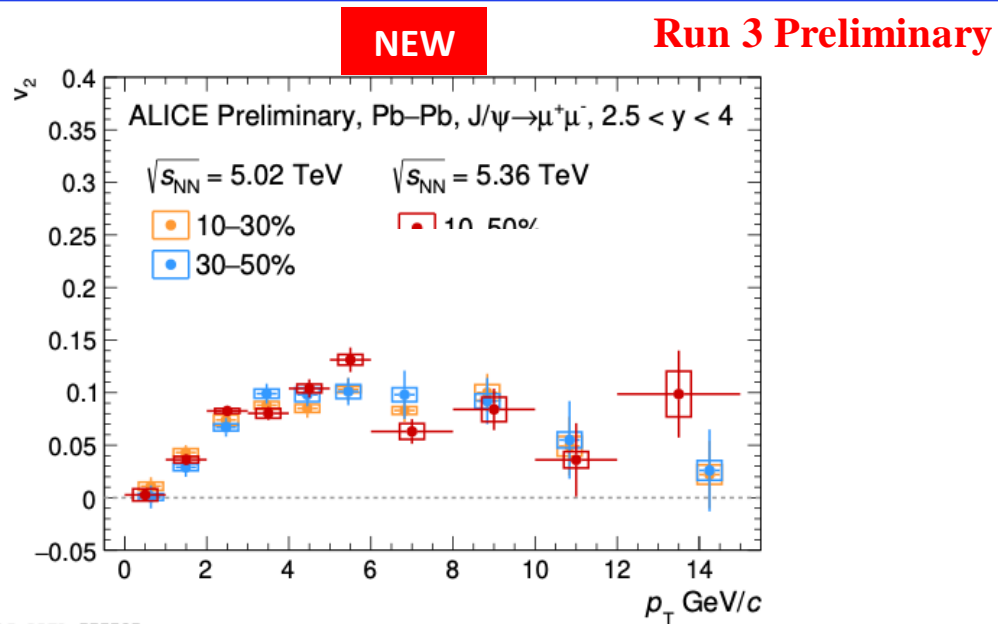
- Prompt D-meson  $v_2$  measured using Run 3 Pb-Pb data sample
  - No significant difference between strange and non-strange D mesons
  - Strange D-meson elliptic flow reproduced by the transport models
- About x4 larger statistics more than Run 2 one, x5 more statistics will come soon

Biao Zhang 23/09 16:50

# Charmonium elliptic flow in Run 3



M. He, et al., PRL.128, 162301 (2022)

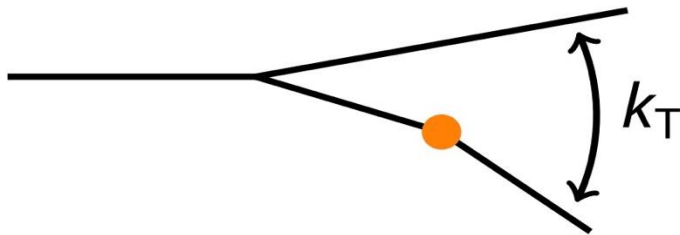


Yiping Wang 24/09 09:00

Poster by Chi Zhang 24/09

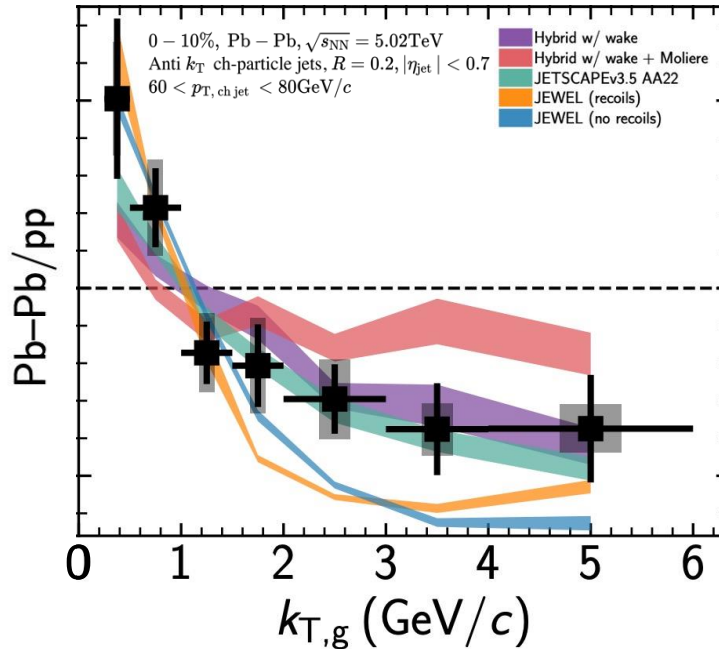
- The new result is consistent with Run 2, with statistical precision improved at low  $p_T$  at forward rapidity
- A significant  $J/\psi$   $v_2$  is observed at forward rapidity, consistent with the charm quark thermalization

# Searching for the quasi-particle in QGP



$$k_T = p_{T, \text{subleading}} \sin \Delta R$$

$$\Delta R = \sqrt{\Delta y^2 + \Delta \varphi^2}$$



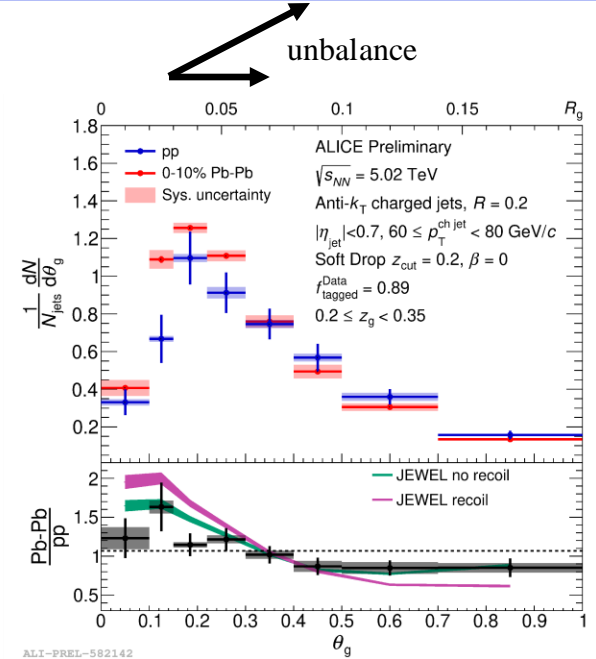
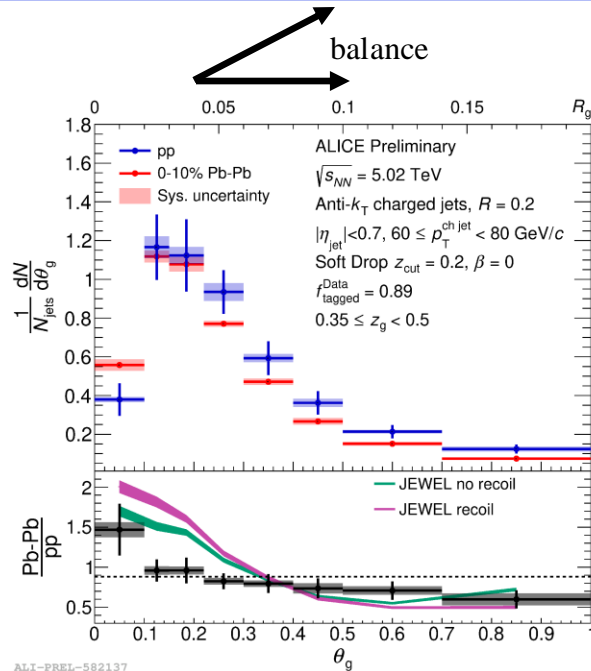
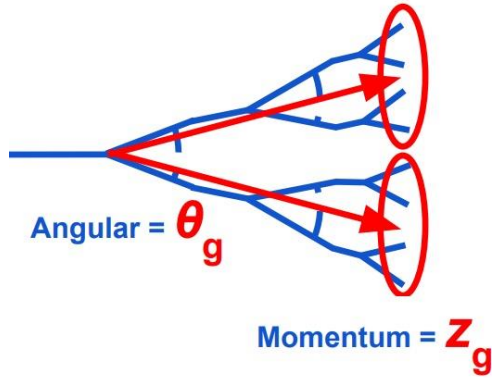
New publication

arXiv:2409.12837

Bas Hofman 23/09 14:40

- First measurement of the hardest relative transverse jet splitting
- **Need well-controlled models baseline** from theory to investigate Moliere effects to search quasi-particle in QGP
- Provide new constrain on the microscopic structure and dynamics of the quark–gluon plasma

# Quenching with correlated jet substructure



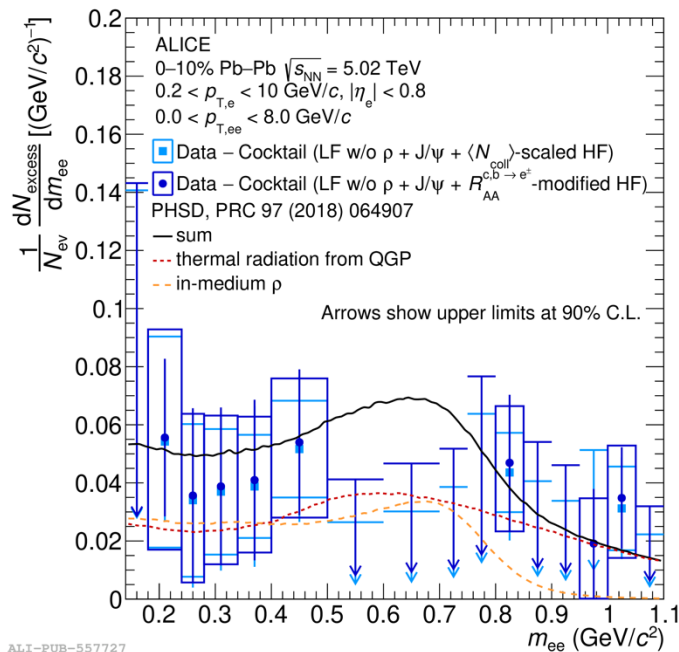
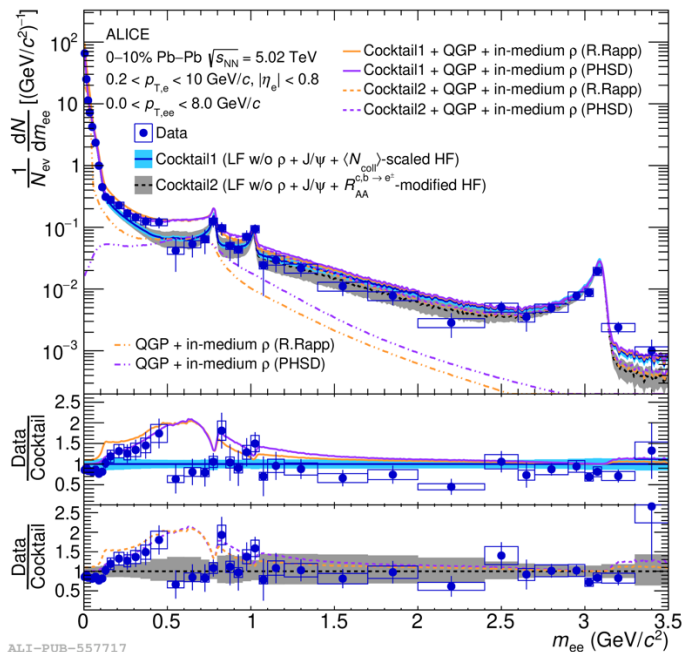
- Multidimensional measurement to disentangle jet survival bias from medium modifications
- Allow disentangling modifications to the **substructure of jets from energy loss effects** arising from migration of the jet momentum

Bas Hofman 23/09 14:40

# Dielectron production in Pb–Pb collisions

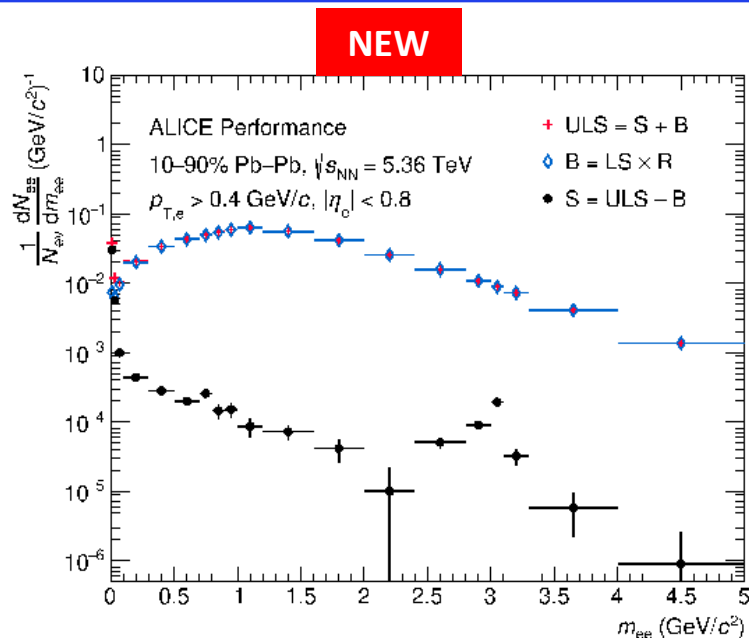
arXiv:2308.16704

Jerome Jung 24/09 12:10

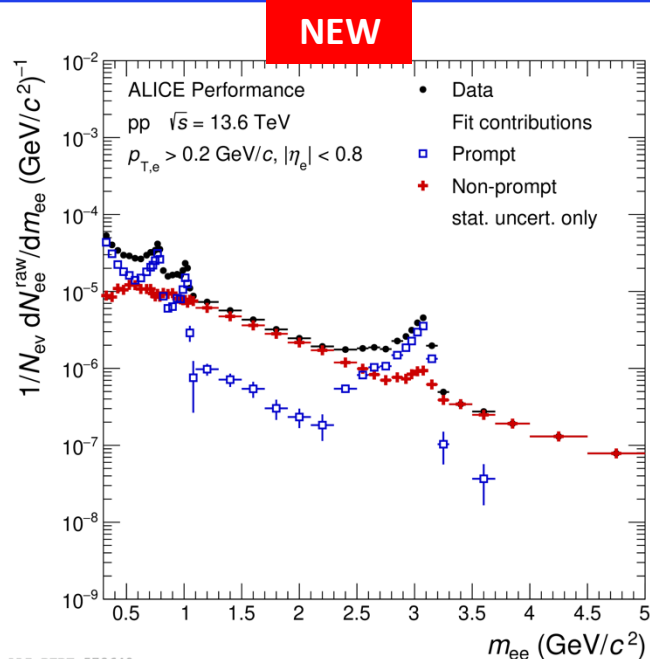


- Dielectron yield is consistent with hadronic cocktail within uncertainty, the excess in the low-mass region is 1.3σ
- More statistics and better control of HF background are needed to quantify the excess: full statistics from Run 3

# Di-electron performance in Run 3



ALI-PERF-578775



ALI-PERF-579640

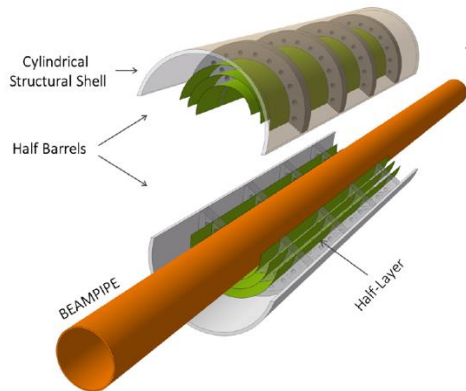
- More statistics and better-pointing resolution thanks to MFT and ITS upgraded in Run 3
- Improved DCA enable the separation of prompt (e.g. thermal) and non-prompt (HF background)

Poster by **Emma Charlotte Ege** [24/09](#)

Poster by **Florian Eisenhut** [24/09](#)

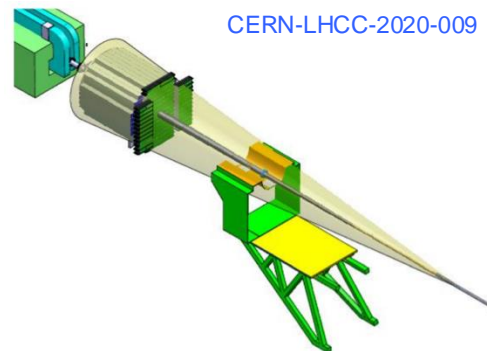
# Upgrading the ALICE detector (RUN 4)

## ITS3: TDR approved



[ITS3 CDS LINK](#)

## FoCal: TDR approved



CERN-LHCC-2020-009

- Replacing the ITS2 inner layers by "silicon-only"
- Inner-most radius 19 mm, x 2 improvement in pointing resolution
- **Improve the measurements of heavy flavor and dielectrons at midrapidity**

**Bong-Hwi Lim** [24/09 15:55](#)

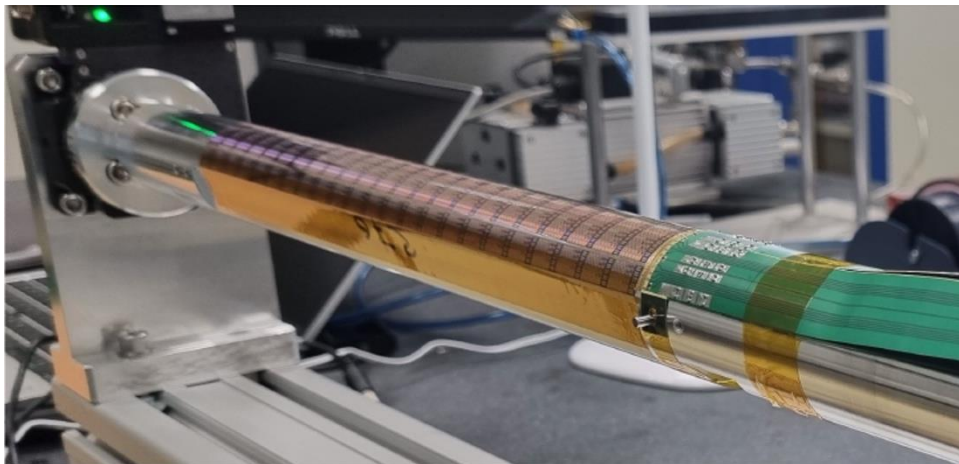
- FoCal-E calorimeter: High-granularity Si-W
- FoCal-H: Cu-scintillator
- Direct photons,  $\pi^0$ , jets at forward rapidity
- **Unexplored regions of small-x and low  $Q^2$  gluons**

**Jacek Tomasz Otwinowski** [24/09 16:15](#)

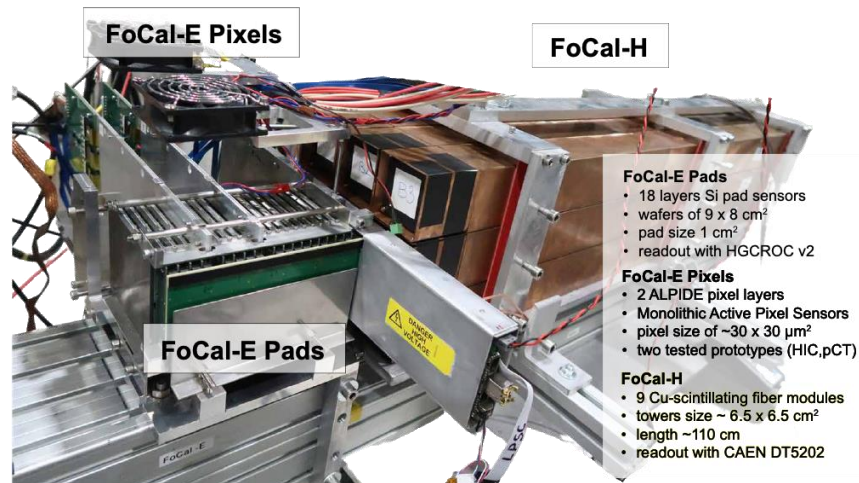
LHC LS2	LHC RUN 3	LHC LS3	LHC RUN 4	LHC LS4	LHC RUN 5 and RUN 6
2019-2021	2022-2025	2026-2028	2029-2032	2033-2034	2035-2041

# Upgrading the ALICE detector (RUN 4)

ITS3: Prototype



FoCal: Prototype



Prototypes constructed to test assembly methods and verify performance

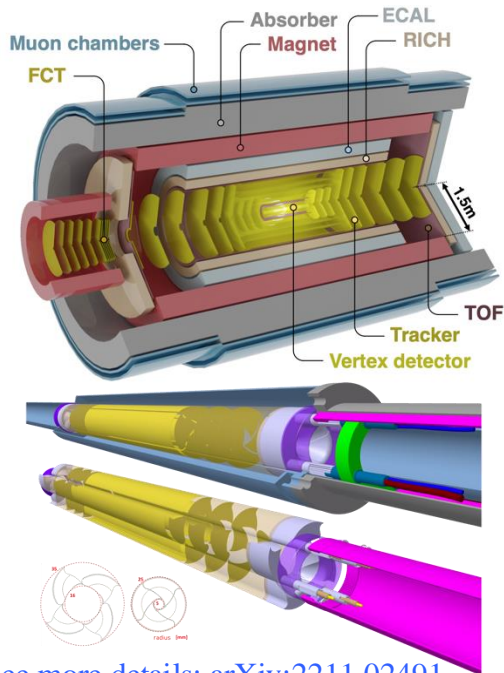
Bong-Hwi Lim [24/09 15:55](#)

Jacek Tomasz Otwinowski [24/09 16:15](#)

LHC LS2	LHC RUN 3	LHC LS3	LHC RUN 4	LHC LS4	LHC RUN 5 and RUN 6
2019-2021	2022-2025	2026-2028	2029-2032	2033-2034	2035-2041



# Upgrading the detector (**ALICE 3**)



See more details: [arXiv:2211.02491](https://arxiv.org/abs/2211.02491)

## Detector concept:

- Compact **all-silicon tracker** with high-resolution vertex detector
- **Particle Identification** over large acceptance, identification of muons, electrons, hadrons, photons
- Fast read-out and online processing

## Physics programs:

- High-precision **beauty** measurements
- **Multi-charm baryons, exotic hadrons, ultra-soft photons**
- **Time-dependence and flow of thermal radiation**
- $D-\bar{D}$  and  $D-D^*$   $\Delta\phi$  correlations

Cas Van Veen [24/09 15:35](#)

LHC LS2	LHC RUN 3	LHC LS3	LHC RUN 4	LHC LS4	LHC RUN 5 and RUN 6
2019-2021	2022-2025	2026-2028	2029-2032	2033-2034	2035-2041

# The ALICE contribution ( parallel session)

<ul style="list-style-type: none"> <li>• Jet fragmentation and substructure correlations in pp and Pb-Pb at <math>\sqrt{s_{NN}} = 5.02</math> TeV with ALICE, <a href="#">Bas Hofman 23/09 14:40</a></li> <li>• Energy-energy correlators of inclusive jets from small to large collision systems with the ALICE experiment, <a href="#">Anjali Nambrath 24/09 09:00</a></li> <li>• Probing jet hydrochemistry and charged-particle jet radial profile modifications in pp and Pb-Pb collisions with ALICE, <a href="#">Sierra Lisa Weyhmiller 24/09 11:10</a></li> <li>• Extracting the anomalous dimensions of energy-correlators in charged jets in pp collisions at 13 TeV with ALICE, <a href="#">Ananya Rai 24/09 12:10</a></li> <li>• Measurements of jet quenching using hadron-jet observables at ALICE <a href="#">Daniel Matthew Jones 24/09 14:40</a></li> <li>• New measurements of inclusive jet suppression and jet <math>v_2</math> in Pb-Pb collisions with ALICE <a href="#">Aimeric Landou 24/09 15:00</a></li> <li>• Measuring isolated prompt photon production in small and large collision systems with ALICE <a href="#">Gustavo Conesa Balbastre 25/09 09:00</a></li> </ul>	<b>JETs (7)</b>
<ul style="list-style-type: none"> <li>• Measurements of production of charm-hadron pairs in pp collisions with ALICE <a href="#">Pengzhong Lu 23/09 14:20</a></li> <li>• Studies of beauty-quark production, hadronisation and cold nuclear matter effects in pp and p-Pb collisions with ALICE <a href="#">Andrea Tavira Garcia 23/09 14:40</a></li> <li>• Characterisation of heavy-quark propagation and thermalisation in QGP with ALICE <a href="#">Biao Zhang 23/09 16:50</a></li> <li>• Investigating of charm-quark hadronisation into baryons and its collision-system dependence with ALICE <a href="#">Federica Zanone 23/09 17:50</a></li> <li>• The role of strangeness in heavy quark hadronisation from small to large collision systems with ALICE <a href="#">Fabio Catalano 24/09 09:20</a></li> <li>• Investigation of charm hadronisation and early magnetic field in ultrarelativistic heavy-ion collisions via <math>D^{*+}</math>-meson spin alignment with ALICE <a href="#">Mingze Li 24/09 11:50</a></li> <li>• Electroweak vector-boson production in hadronic collisions with ALICE <a href="#">Shingo Sakai 25/09 09:20</a></li> <li>• Differential measurements of in-jet fragmentation of charmed mesons and baryons in pp collisions with ALICE <a href="#">Jochen Klein 25/09 12:10</a></li> </ul>	<b>Heavy Flavor (8)</b>
<ul style="list-style-type: none"> <li>• Charm and beauty production at forward rapidity with ALICE <a href="#">Michele Pennisi 23/09 15:20</a></li> <li>• Quarkonia production in proton-proton and Pb-Pb collisions with ALICE <a href="#">Yiping Wang 24/09 09:00</a></li> <li>• Prompt/Non-prompt <math>J/\psi</math> production in proton-proton and Pb-Pb collisions with ALICE <a href="#">Yuan Zhang 24/09 10:00</a></li> <li>• Quarkonium polarization in hadronic collisions with ALICE <a href="#">Zhenjun Xiong 24/09 11:30</a></li> <li>• <math>J/\psi</math> photoproduction and polarization in peripheral Pb-Pb collisions with ALICE <a href="#">Ionut Cristian Arsene 24/09 12:10</a></li> </ul>	<b>Quarkonia (5)</b>
<ul style="list-style-type: none"> <li>• Exploring jet quenching effects via di-hadron correlations in 13 TeV proton-proton collisions with ALICE <a href="#">Maxim Virta 23/09 15:00</a></li> <li>• Studying the interaction between charm and light-flavor mesons with ALICE <a href="#">Emma Chizzali 25/09 11:50</a></li> <li>• Exploring light flavor hadronization in hard and soft events with event shape classifiers in small collision systems at the LHC with ALICE <a href="#">Feng Fan 23/09 15:20</a></li> <li>• Probing light nuclei production mechanism by measuring nuclei production in and out of jets with ALICE at the LHC <a href="#">Chiara Pinto 25/09 10:50</a></li> <li>• Direct photon production and correlations at low pT in Pb-Pb collisions with ALICE <a href="#">Dmitri Peresunko 24/09 10:50</a></li> <li>• Direct photon measurement in small systems and thermal radiation from QGP with ALICE <a href="#">Jerome Jung 24/09 12:10</a></li> <li>• Probing the nucleus and nucleons with vector mesons in ultra-peripheral collisions in ALICE <a href="#">Minjung Kim 25/09 09:40</a></li> <li>• A new class of ultra-peripheral collisions in ALICE: inelastic photonuclear interactions and open charm photoproduction <a href="#">Sigurd Nese 25/09 10:00</a></li> <li>• ALICE 3 physics programme and detector R&amp;D <a href="#">Cas Van Veen 24/09 15:35</a></li> <li>• Design and expected performance of the ALICE ITS3 tracker upgrade <a href="#">Bong-Hwi Lim 24/09 15:55</a></li> <li>• ALICE Forward Calorimeter upgrade (FoCal): physics program and expected performance <a href="#">Jacek Tomasz Otwinowski 24/09 16:15</a></li> </ul>	<b>Soft Probes Detector Upgrades (11)</b>

# The ALICE contribution ( poster session)

- Probing the shower properties of charm quarks using energy-energy correlators with ALICE [Preeti Dhankher](#)
- Testing the flavour dependence of QCD parton showers using heavy-flavour jet substructure with ALICE [Vit Kucera](#)
- Energy-energy correlators in p-Pb collisions at 5 TeV with the ALICE experiment [Anjali Ila Nambrath](#)
- Monte Carlo studies of energy-energy correlators for D0-tagged jets in in pp collisions [Beatrice Eva Liang-Gilman](#)
- Measurement of the transverse momentum( $\langle T \rangle$ ) distributions of charged-particle jet fragments in pp collisions at  $\sqrt{s} = 5.02$  TeV with ALICE [Jaehyeok Ryu](#)
- b-jet measurement using heavy flavour tagging with secondary vertex method in pp collisions at 13.6 TeV with ALICE [Hanseok Park](#)
- Energy-energy correlators of jets in pp and PbPb collisions with the ALICE experiment [Wenqing Fan](#)
- Charged beauty-tagged jet measurement with impact parameter method in proton-proton collisions in Run3 [Hyungjun Lee](#)
- First Measurements of Charged-Particle Jet Production in pp Collisions at  $\sqrt{s} = 13.6$  TeV with ALICE [Joonsuk Bae](#)
- Jet spectra evolution as a function of center of mass energy in pp collisions with ALICE [Archita Rani Dash](#)
- Study of background effects for jet analyses with Run 3 data in ALICE [Wenhui Feng](#)
- Probing medium response by measuring proton to pion ratio and charged particles radial profile with jet in PbPb and pp collisions at 5.02 TeV with ALICE [Taketo Yokoo](#)

**JETs  
(12)**

- b-jet tagging in pp collision using graph neural network for the ALICE experiment [Changhwan Choi](#)
- First D0-tagged jet axes difference measurement in pp collisions at  $\sqrt{s} = 5.02$  TeV with ALICE [Emma Rose Yeats](#)
- First study for azimuthal correlations of electron-muon pairs from heavy flavor decays in proton-proton collisions with ALICE [Shunsuke Kurita](#)
- Measurement of multiplicity dependent  $\chi_{c0}$  via semileptonic decay in collisions of pp at 13 TeV with ALICE [Chong Kim](#)
- Production of electrons from open beauty-hadron decays in pp collisions at 13 TeV with ALICE [Jonghan Park](#)

**Heavy Flavor  
(5)**

- Quarkonia collectivity in proton-proton and Pb-Pb collisions with ALICE [Chi Zhang](#)
- Dimuon measurement in low and intermediate mass region in  $\sqrt{s} = 13.6$  TeV pp collisions at ALICE [Motomi Oya](#)
- Charmonium production at midrapidity using TRD-triggered data measured in ALICE [Jin Joo Seo](#)
- Measurements of inclusive  $J/\psi$  and  $\psi(2S)$  production at midrapidity in pp collisions at  $\sqrt{s} = 13.6$  TeV with ALICE [Yuan Zhang](#)

**Quarkonia  
(4)**

- Correlation of strangeness production with charged hadrons in proton-proton collisions [Kai Cui](#)
- Event-by-event mean transverse momentum fluctuations in pp collisions at  $\sqrt{s} = 13$  TeV using ALICE detector [Bushra Ali](#)
- Production of omega mesons in pp collisions at  $\sqrt{s} = 5.02$  TeV with ALICE [Merle Luisa Walde](#)
- Performance of the dielectron analysis in Pb-Pb collisions in Run 3 with ALICE [Emma Charlotte Ege](#)
- Dielectron production and topological separation of dielectron sources with ALICE in Run 3 [Florian Eisenhut](#)
- Beam test results for the new prototype ITS3 sensor design [Minyoung Chris Hwang](#)

**Soft Probes  
Detector  
Upgrades  
(6)**

# Summary

- **ALICE is successfully taking data after the significant detector upgrades in Run 3**
  - Many results from the new data are shown
- **Detector upgrades are progressing smoothly for the future Run 4 and ALICE 3**
- **ALICE presents 31 talks and 27 posters at Hard Probes 2024**

**Enjoy the conference!**