



KoALICE

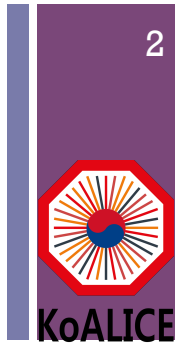
PNU-KoALICE Report 2019-01

In-Kwon Yoo

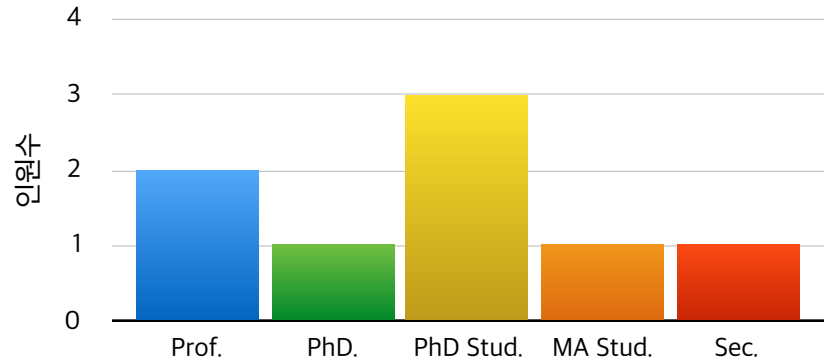
Pusan National University



PNU-KoALICE Team (WHO)

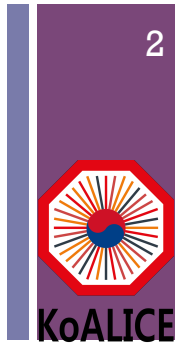


2016.05

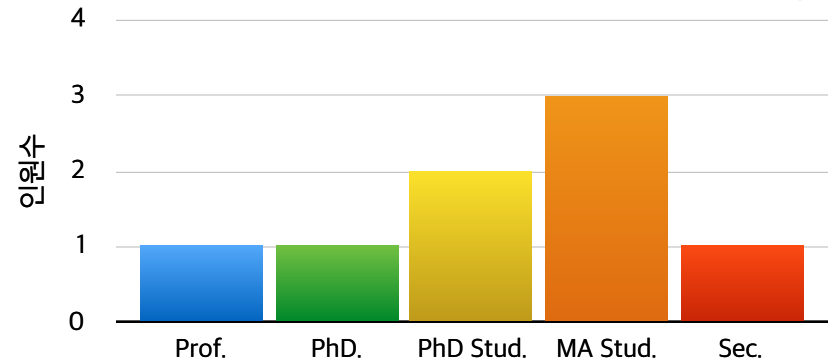




PNU-KoALICE Team (WHO)



2019.01



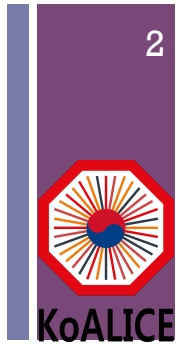
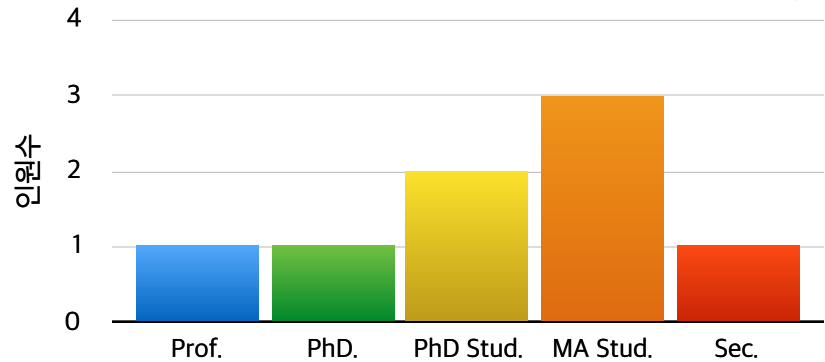


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■ 2017.05 - 2018.02: 2 Profs. + 3 PhD Stud. + 1 MA Stud. + 1 Sec. + 1 UG = 8

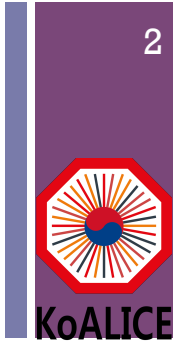
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- JHSong, BHLim, JSEum (3 PhD Stud.)
- SHLee (1 MA Stud.)
- MJKwon (1 UG)

2019.01





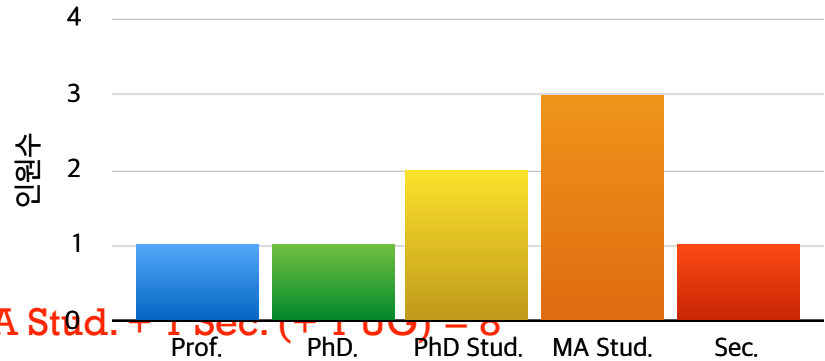
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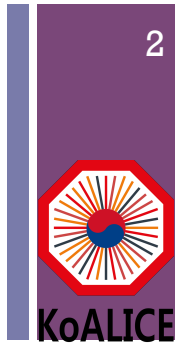


■ 2018.03 - 06: **1 Prof. + 1 PhD + 1 PhD Stud. + 2 MA Stud. + 1 Sec. (+ 1 UG) = 8**

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- NEW! JHSong (PhD) + JHJeong (MA Stud.)



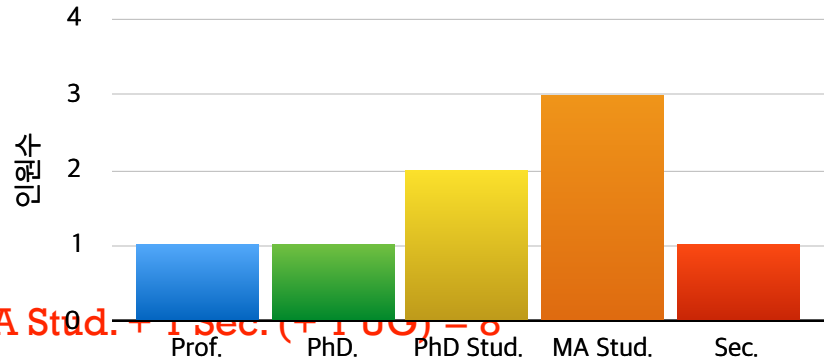
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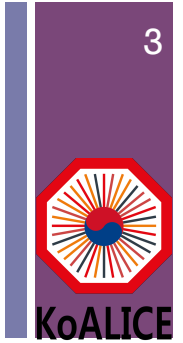
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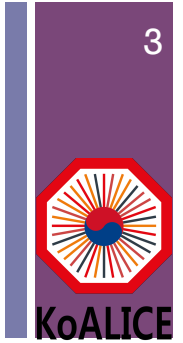
- JSEum return back to ALICE for HIC production
- MJKwon upgraded to MA Stud.
- New Internship Stud. > SYChoi, JHYoon (+2UG)
- Potential: 1MA (SHLee) - 1PhD (JHSong leaves for Houston)

+ PNU-KoALICE Team Working Frame



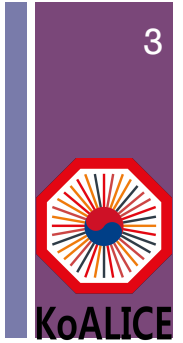
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- Goal: Expertise (Education) + Contribution (Research)



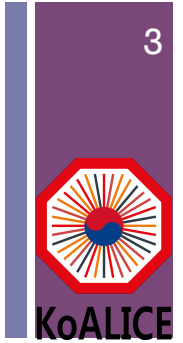
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- Timeline: 2009 - 2022 - 2025 - 2028 (modified with Silicon)



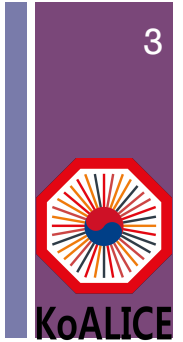
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 - Software (DA): HF (NPE) → LF (Resonance)/Exotic/HF → various Charmness

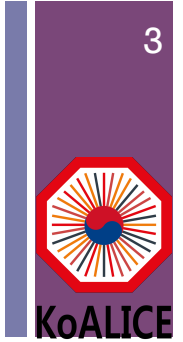


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 - PhD Stud.: PNU - CERN (2-3Y) - PNU for Physics Analysis
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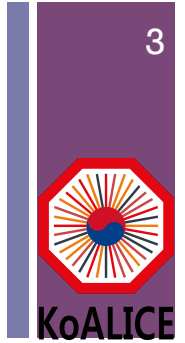


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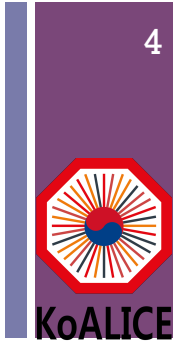
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- Working Group (<http://hipex.phys.pusan.ac.kr>) - **using Google disk**
 - PWG/WP (1~2/wk): protocol → Lab.M (2 wks): report + discussion
 - LF PWG / MCT / HIC / PNU-Inha Vidyo Meeting



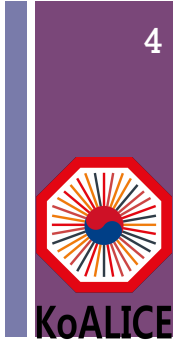
Working Theme





Working Theme

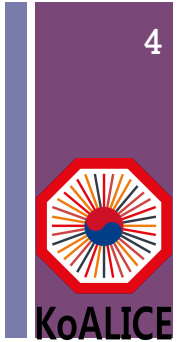
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 - Heavy Ion > LF / Exotic > Matter@LHC > Phase Transition in high μ
 - Scintillator > RICH + Silicon > Silicon
 - Research/Education Infrastructure/System in KR > RAON (When?)





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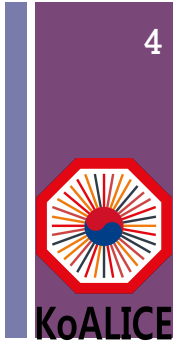
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 - Resonance / THERMUS / 1 short - 1 long paper on THERMUS > **Pending**



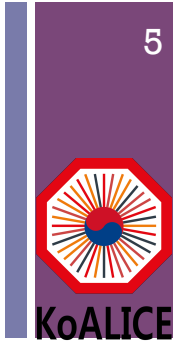


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- JHSong (CERN/PNU) (2018)
 - LF, Σ , Σ^* , Ξ^* Resonances > ' Ξ^* in PbPb' [paper](#) in 2018
> **delayed due to Ξ correction**
 - ' Σ^0 in pp' paper: soon submitted to the 1st round with IRC
 - Research/ITS Coordinator at PNU/CERN for KoALICE



+ Working Themes for Stud.

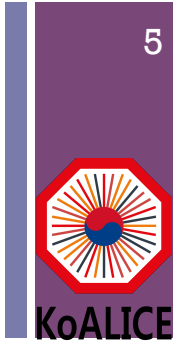




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- HIC Assembly System (Soldering) > **Mass Chip Test Infrastructure 2016**
- **ITS Coordinator 2017, ITS Commissioning during LS2 (2019-2021)**
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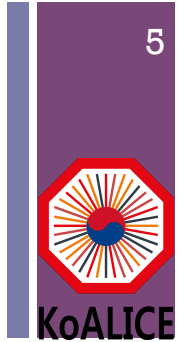
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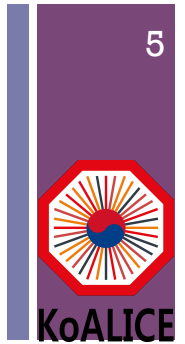
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- (MVD vs. ALPIDE chip study for CBM)





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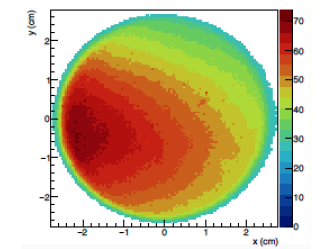
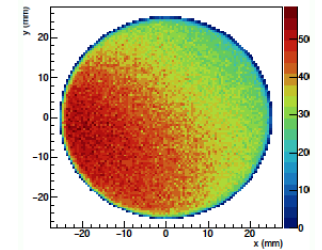
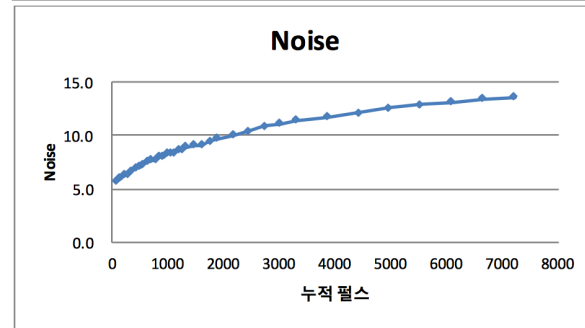
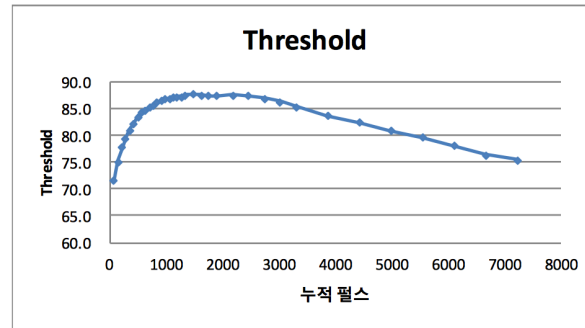
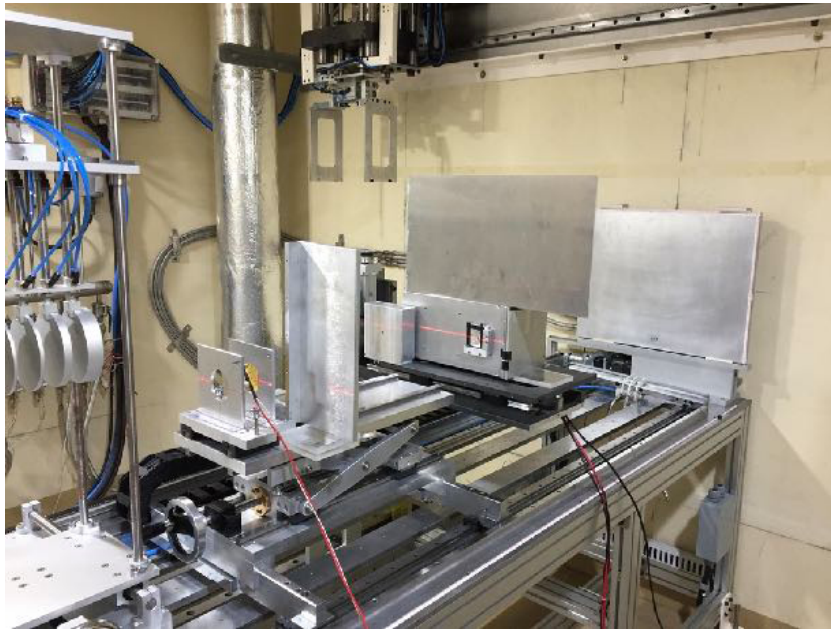
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■ **MJKwon (Lab. 2016.12 -): Internship UG > MA Stud. since 2018.12**

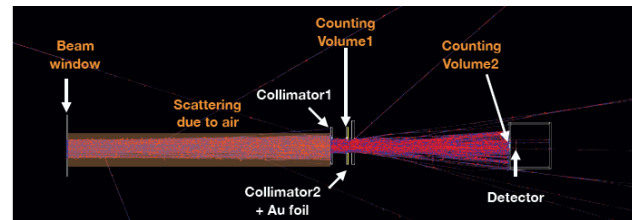
- Mass Chip Test 2017.07 - 2018.04, HIC Electrical Tests incl. Setup (2017.10 - 2018.06 - 2019)
- MA Stud. in 2019 + ITS Commissioning during LS2 (temp. stay at CERN)
- MVD vs. ALPIDE chip + ALICIA study for CBM + Target/beamline study



+ ALPIDE TID Study at KOMAC (JSEum, MJKwon) - KPS2017/18 → NP



- 20MeV proton, $10^{15}/\text{sec.cm}^2$
- Target inserted, Distance + Off-axis
- KOMAC looks to be feasible for MAPS R&D (TID)
- GEANT Simulation on-going



	Input Event	Au Foil	Mount Window (area=7.2cm ²)	MountWindow/Au Foil
KOMAC	None	$(2.46 \pm 0.20) \times 10^{12}$	$(6.11 \pm 1.72) \times 10^{10}$	$2.48 \pm 0.72 \%$
Simulation (17MeV)	15300000	2957786 ± 1720	93510 ± 306	$3.161 \pm 0.011 \%$

A New Proposal for 2020-30

KoALICE2030

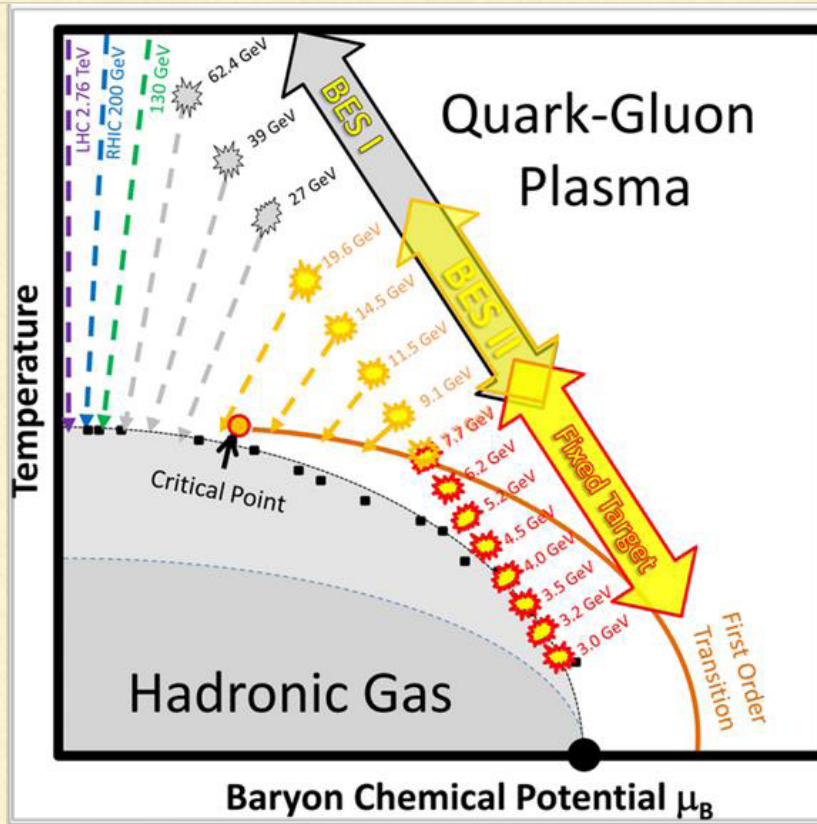


- Exploring a new area in QCD Phase diagram
- A totally new concept of 'Co'-llision > 'Tri'-llision
- Technical challenge
- A new probes with various 'charmness' (ITS2-ITS3)

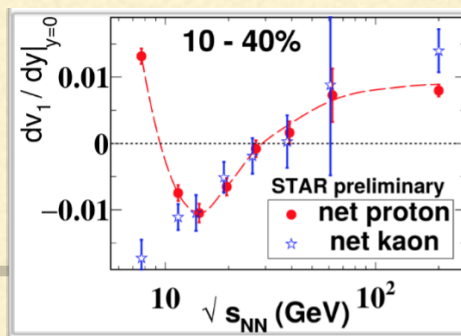
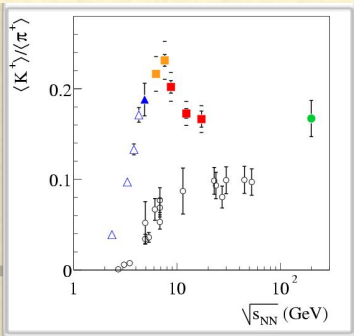
EXPLORING QGP PHASE



KoALICE



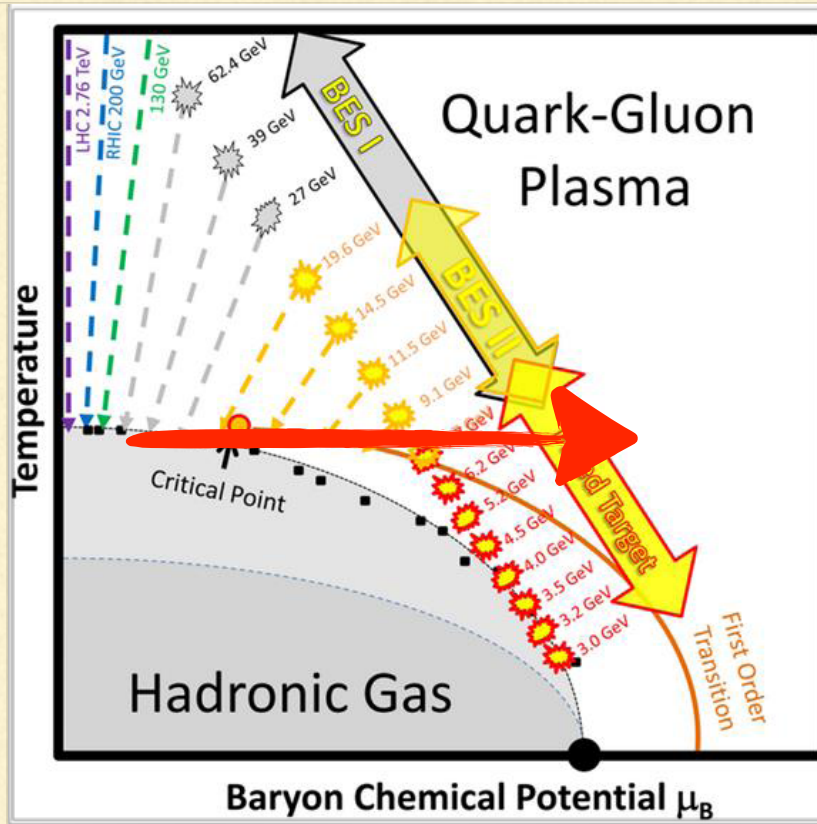
- Cross-over Region via URHIC @ LHC
 - Canonical Ensemble in AA
 - semi-canonical Ensemble in pA & even in pp (high-mul events)
 - QGP(? or any?) property study
 - no 1st-order Phase Transition
- High μ_B region
 - Critical point Search (QGP? !!)
 - 1st-order Phase Transition (QGP? !)
 - BESII with STAR (lower $\sqrt{s_{NN}} \sim$ boost of μ_B)
 - even higher μ_B ?



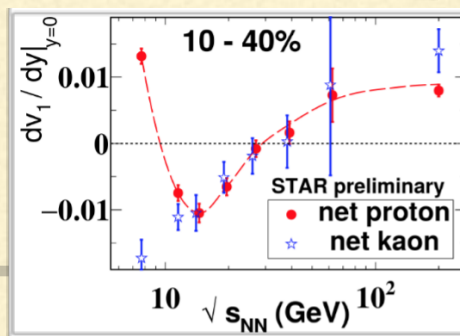
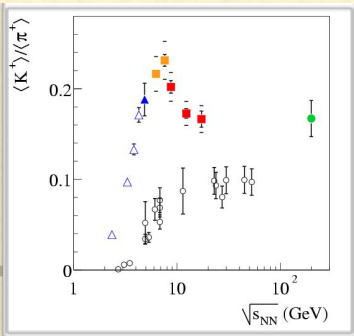
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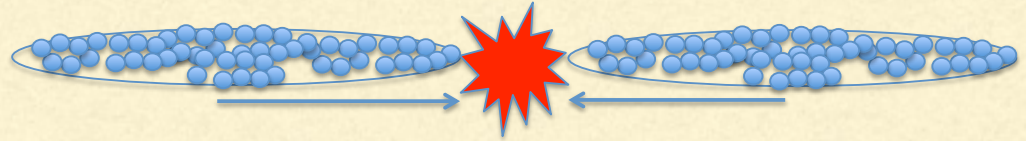


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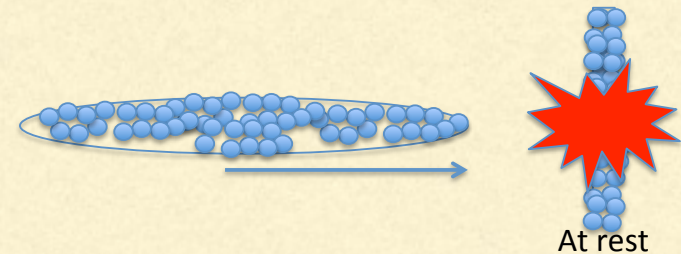
ORDINARY COLLISION EXPERIMENTS

- Collider Experiment



- higher $\sqrt{s_{NN}}$, but lower statistics
- $\mu_B \sim 0$, pQCD prediction, Hard process study

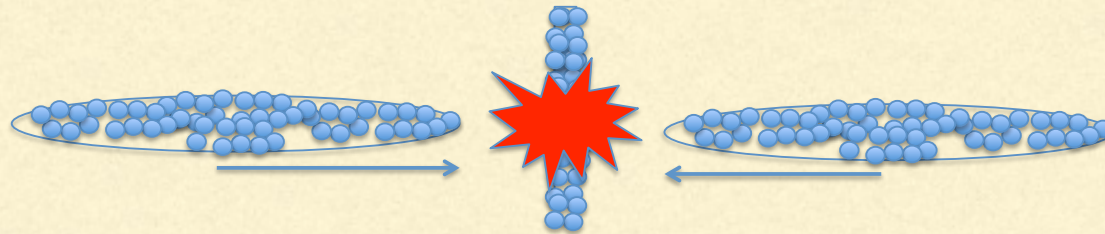
- Fixed Target experiment



- high statistics and low $\sqrt{s_{NN}} \sim \mu_B \neq 0$

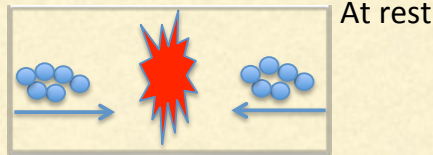
AN IDEA ON EXTREME COLLISION EXPERIMENT

- Extreme Collision Experiment for higher μ_B
 - A target at the colliding point

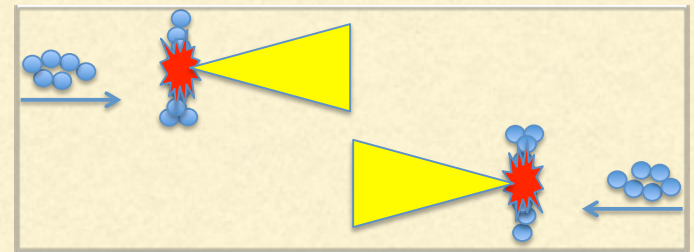


- Complicated collisions

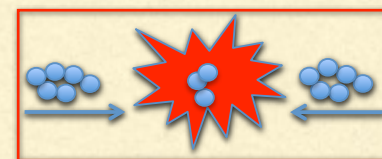
- Colliding events



- fixed target collision events



- tripple (AAA) collision events ($2 \times \mu_B$)

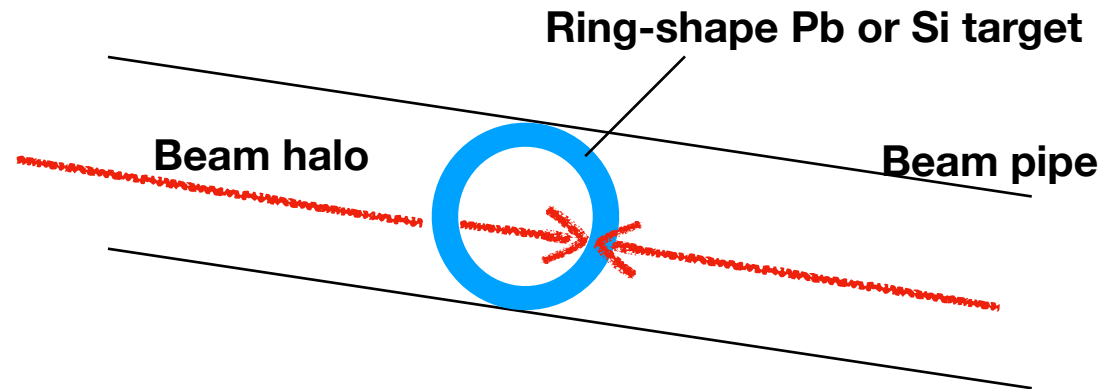


ALITE in RUN4

KoALICE2030



$\sqrt{s_{NN}} = 60 \text{ .. } 75 \text{ GeV}$



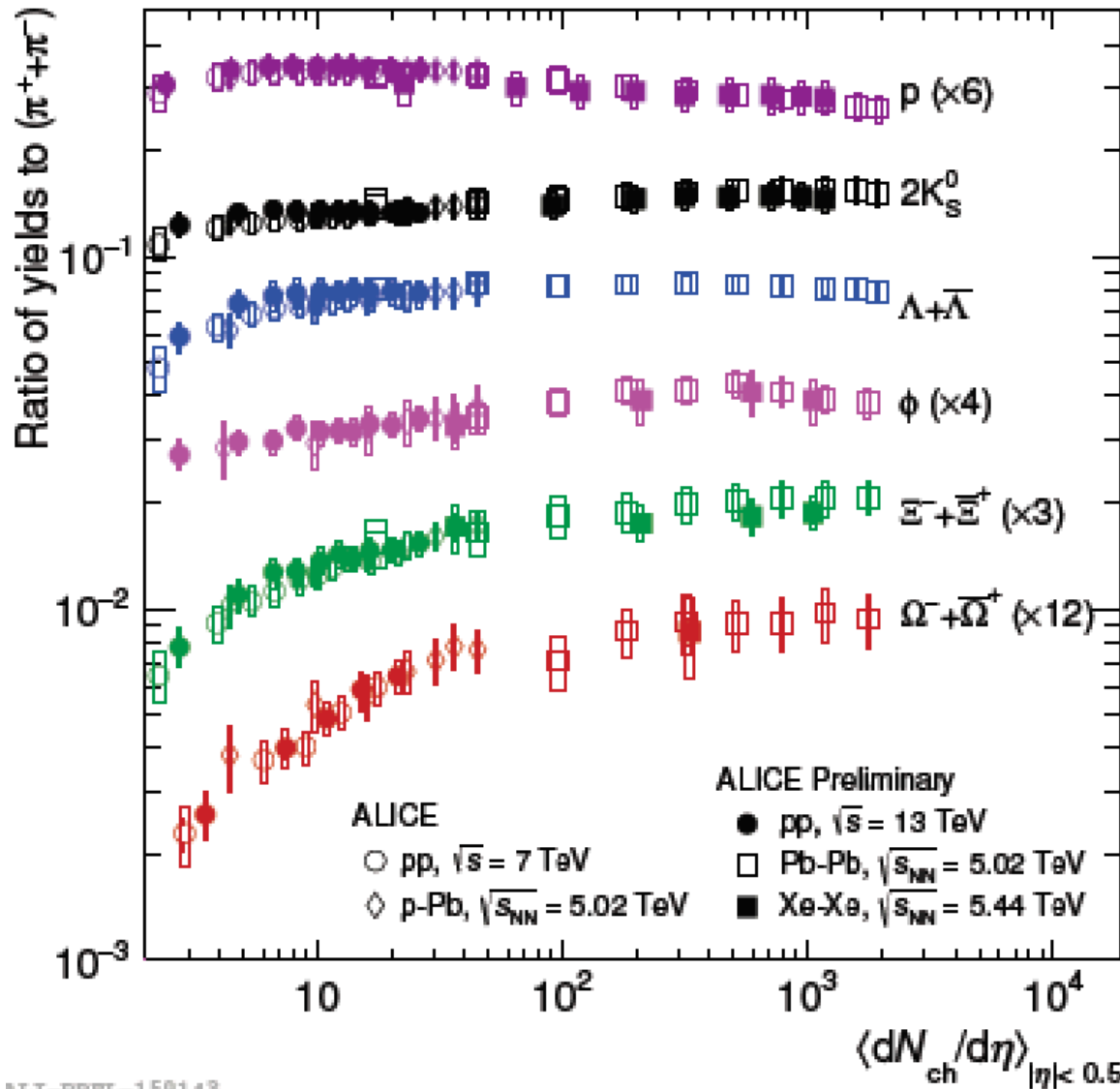
- **ALI Target Experiment**
 - A short period of Target (Test) Experiment (in RUN5-6 with ALICEs)
 - Higher Interaction rate at (little) lower $\sqrt{s_{NN}}$
 - Closer IP
 - Trillision (3 nuclei collision) event?
- Silicon R&D + Production for ALICEs in RUN5-6
 - ITS3 + 7 tracking barrel layers +
 - (Active Target Experiment at SPS)
- Exploring QCD diagram with Charm

ALICE RUN3



KoALICE2030

KoALICE



2022

2023

RUN3

/cm²s

interactions) PbPb ~ 10 x RUN1&2

double-charmed / strange-cc /

c-bb ... at low pT

al suppression? dN/dη-scaling?

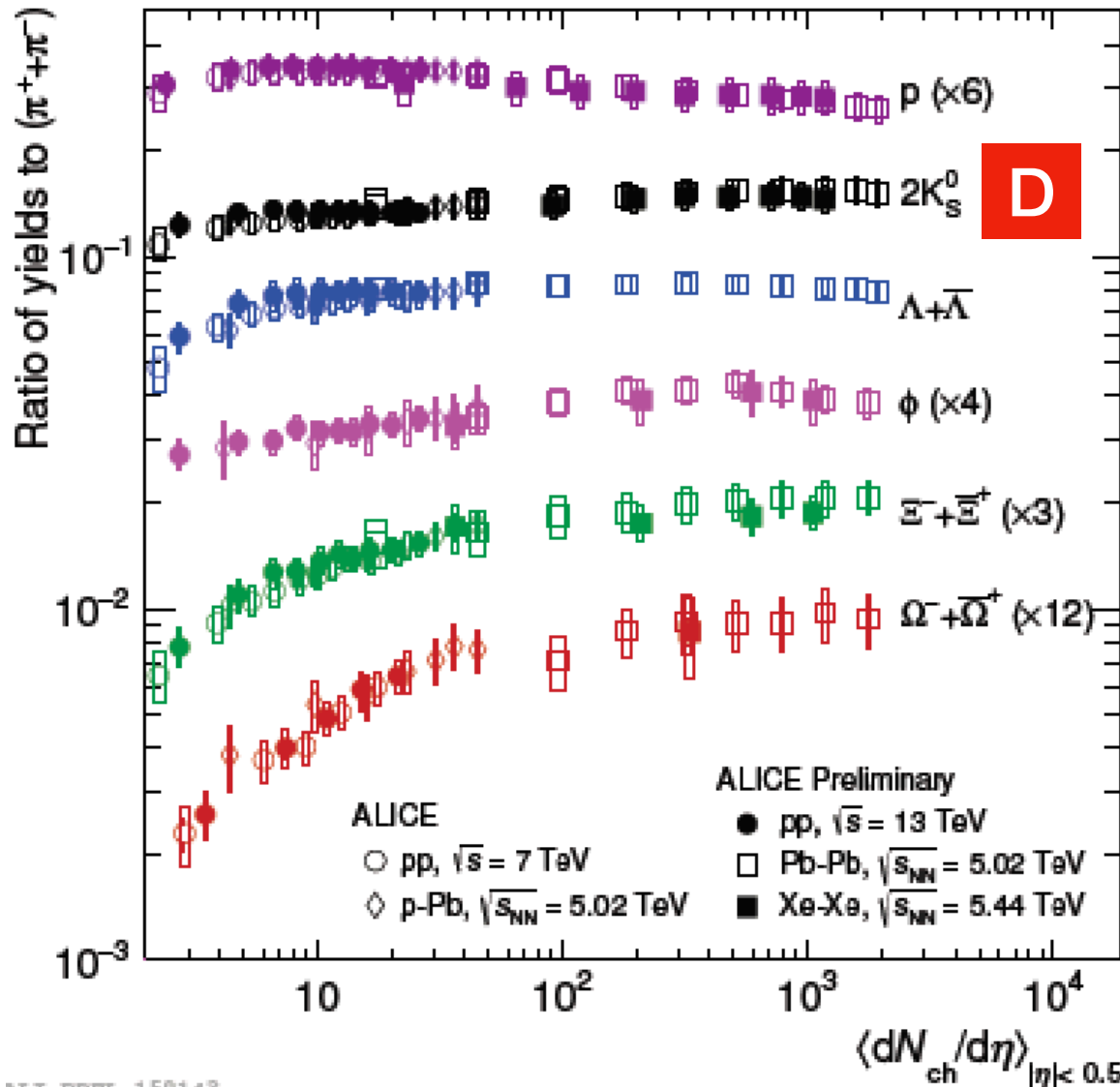
4140) ...

ALICE RUN3



KoALICE2030

KoALICE



2022

2023

RUN3

μ /cm²s

interactions) PbPb $\sim 10 \times$ RUN1&2

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c-bb ... at low pT

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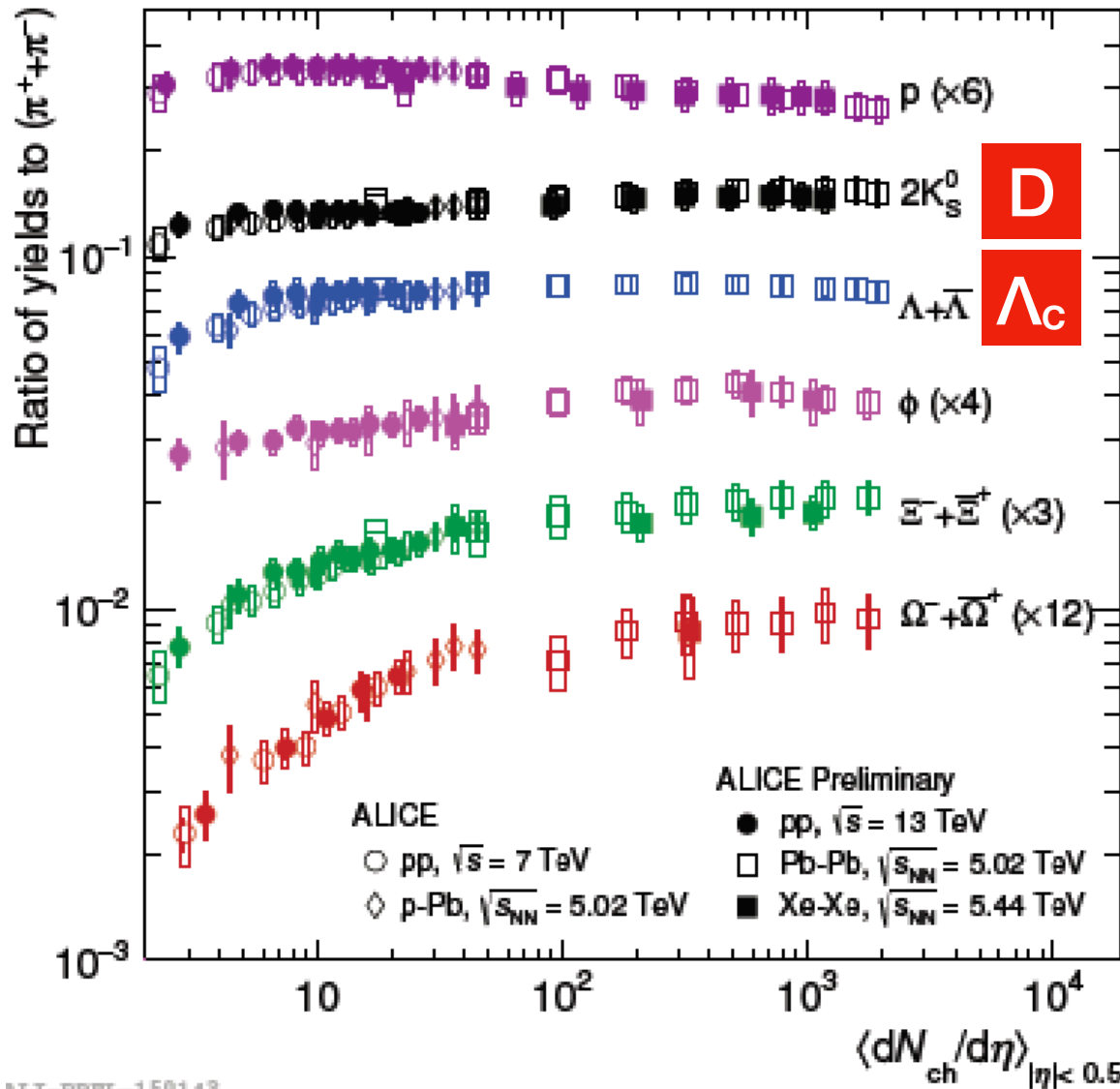
4140) ...

ALICE RUN3



KoALICE2030

KoALICE



2022

2033

RUN3

μ /cm²s

interactions) PbPb ~ 10 x RUN1&2

double-charmed / strange-cc /

c-bb ... at low pT

al suppression? dN/dη-scaling?

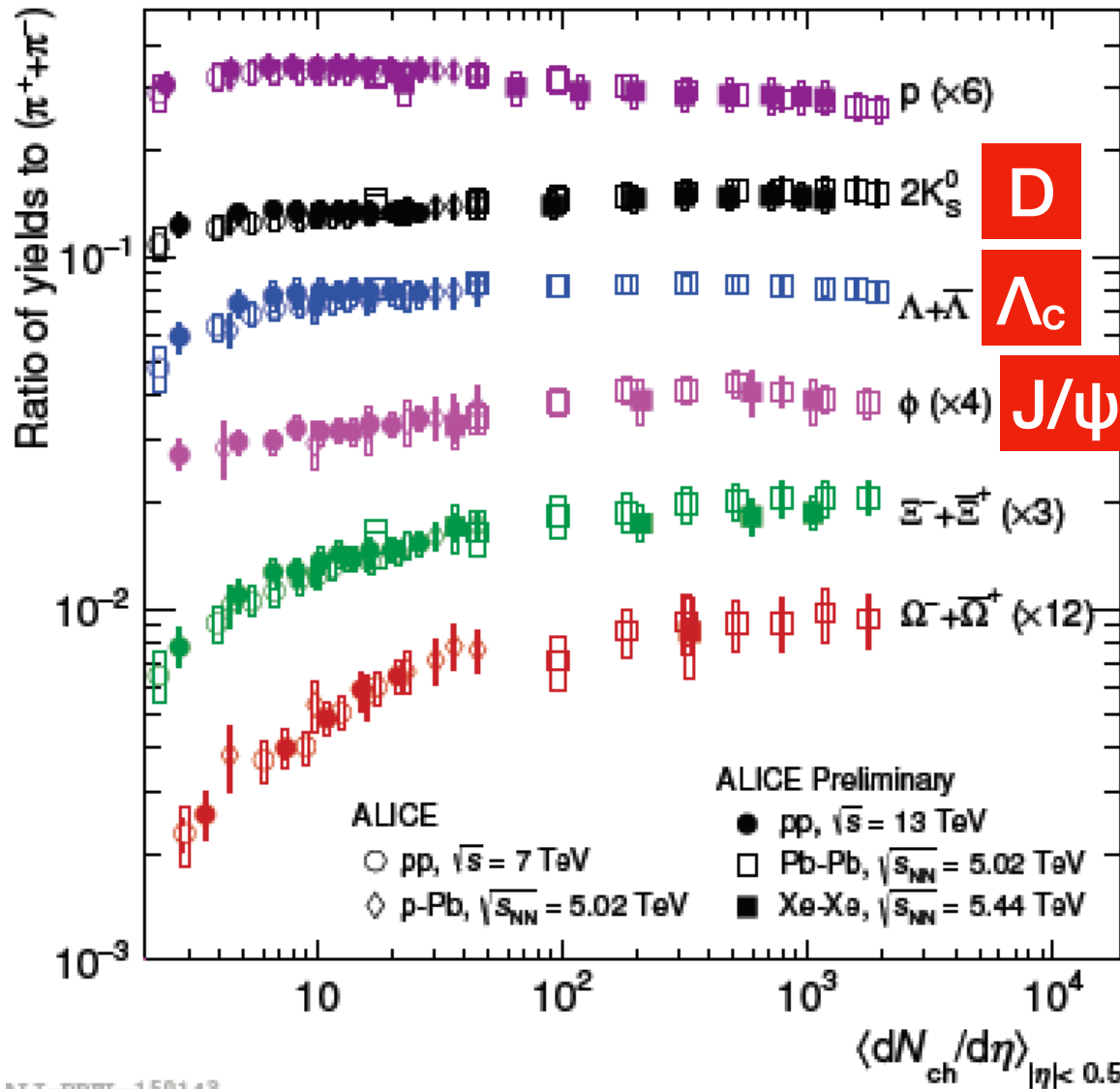
4140) ...

ALICE RUN3



KoALICE2030

KoALICE



2022

2023

RUN3

$\sqrt{s_{NN}}$

(interactions) PbPb $\sim 10 \times$ RUN1&2

double-charmed / strange-cc /

c-bb ... at low p_T

charm suppression? $dN/d\eta$ -scaling?

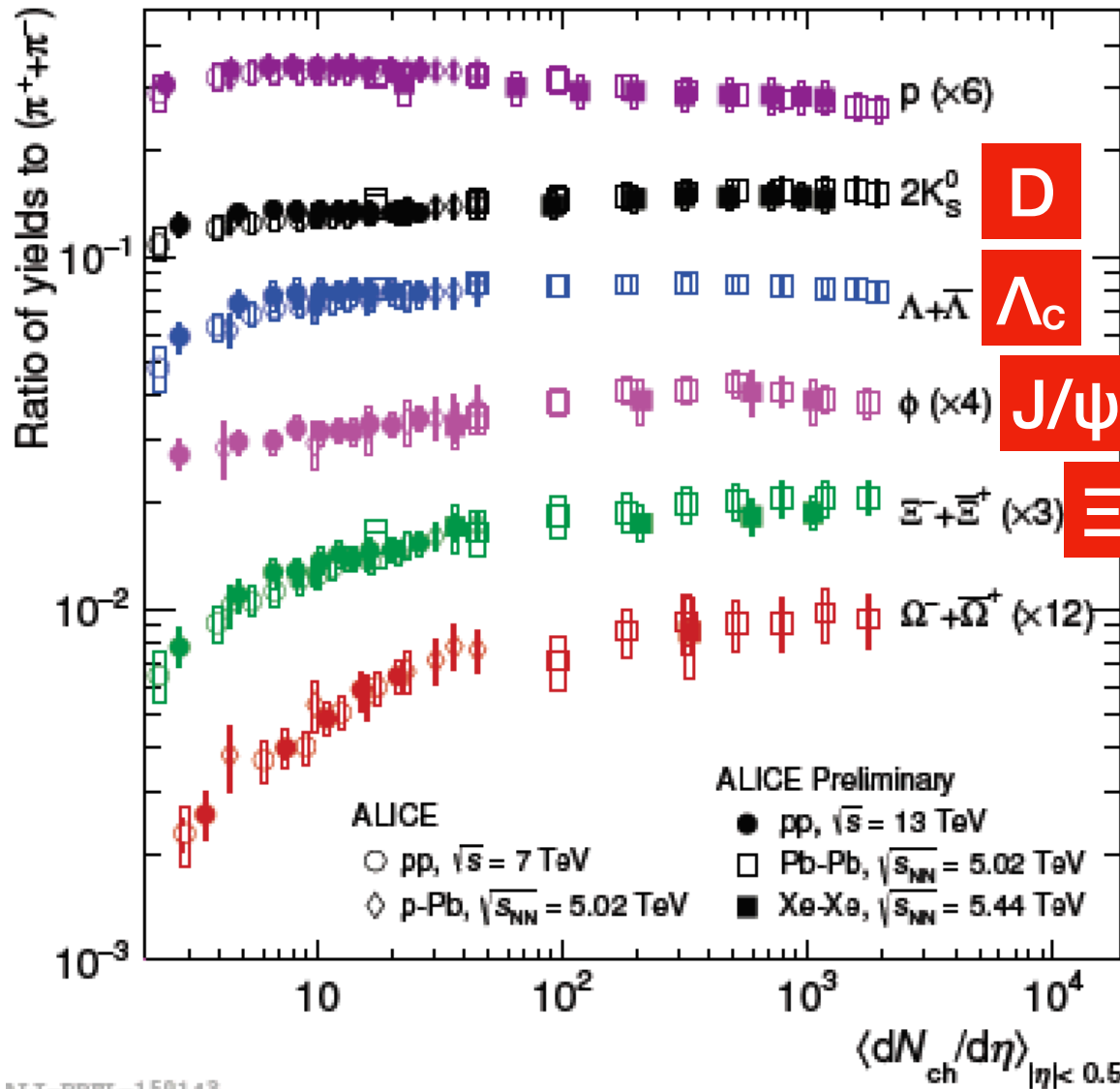
(140) ...

ALICE RUN3



KoALICE2030

KoALICE



2022

2033

RUN3

μ /cm²s

(interactions) PbPb ~ 10 x RUN1&2

double-charmed / strange-cc /

c-bb ... at low pT

suppression? dN/dη-scaling?

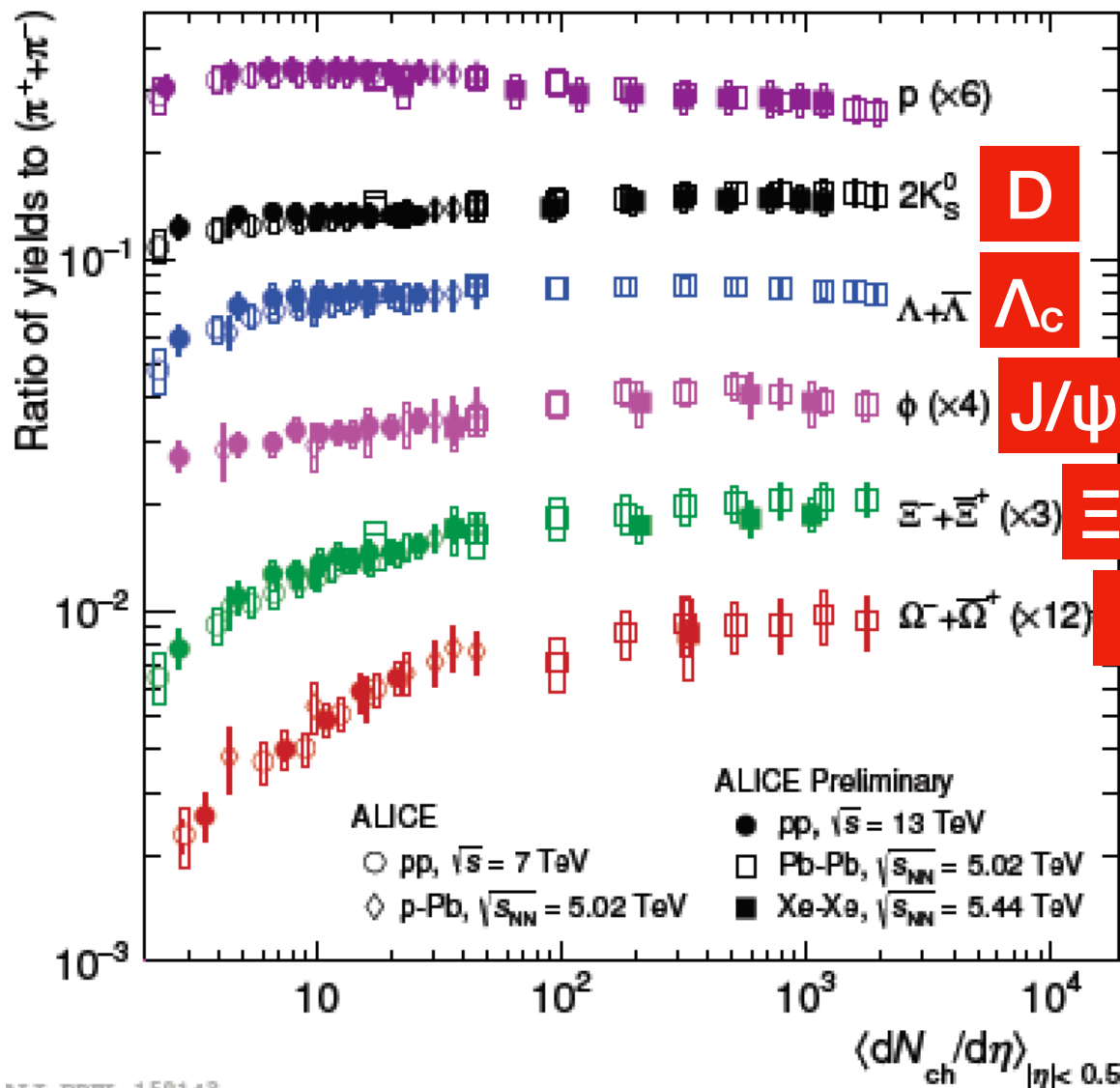
4140) ...

ALICE RUN3



KoALICE2030

KoALICE



2022

2023

RUN3

10000/cm²s

(interactions) PbPb ~ 10 x RUN1&2

double-charmed / strange-cc /

c-bb ... at low pT

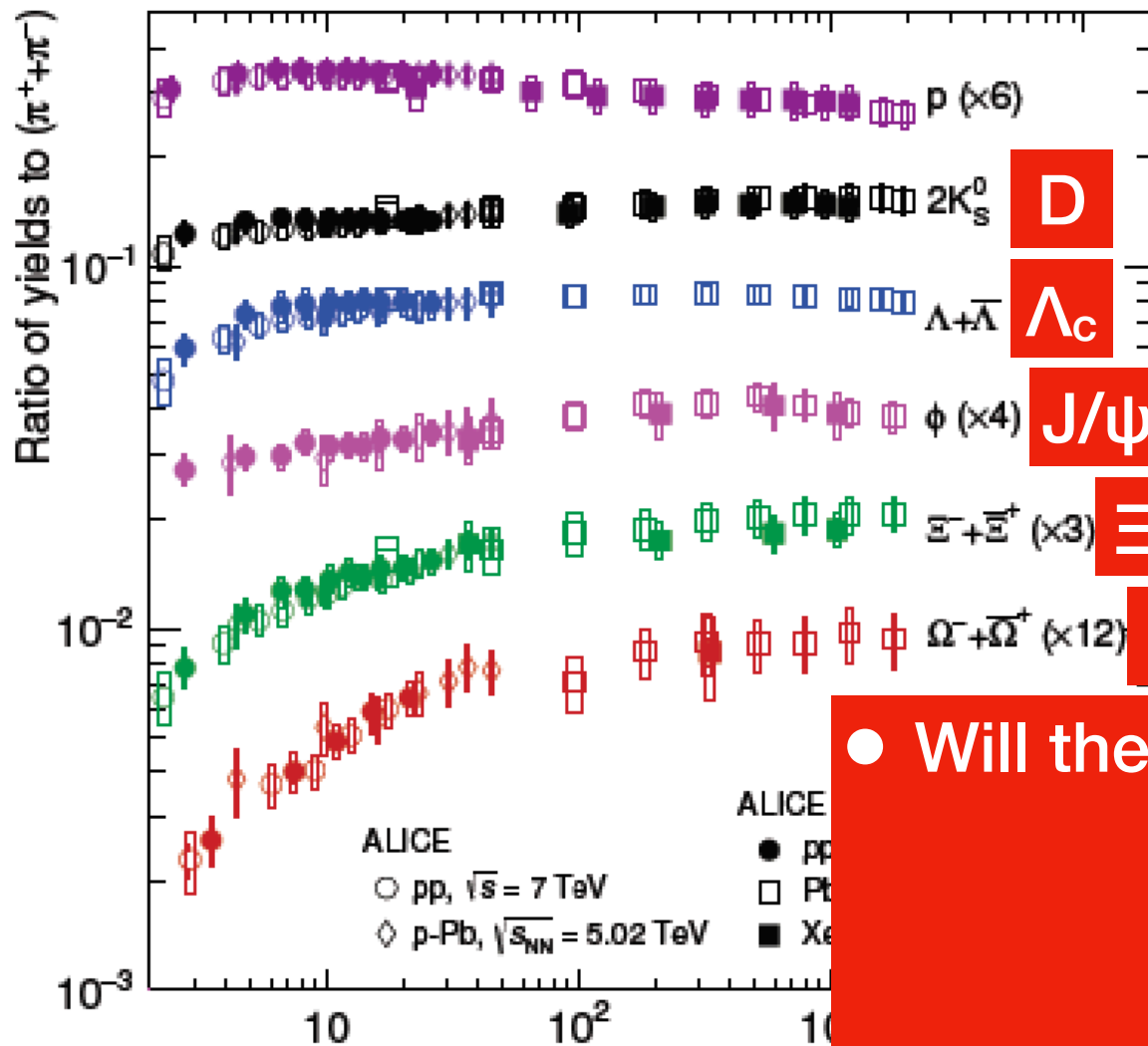
suppression? dN/dη-scaling?

ALICE RUN3



KoALICE2030

KoALICE



2022

2033

RUN3

10000/cm²s

(interactions) PbPb ~ 10 x RUN1&2

double-charmed / strange-cc /

c-bb ... at low pT

suppression? dN/dη-scaling?

Ω_{ccc}

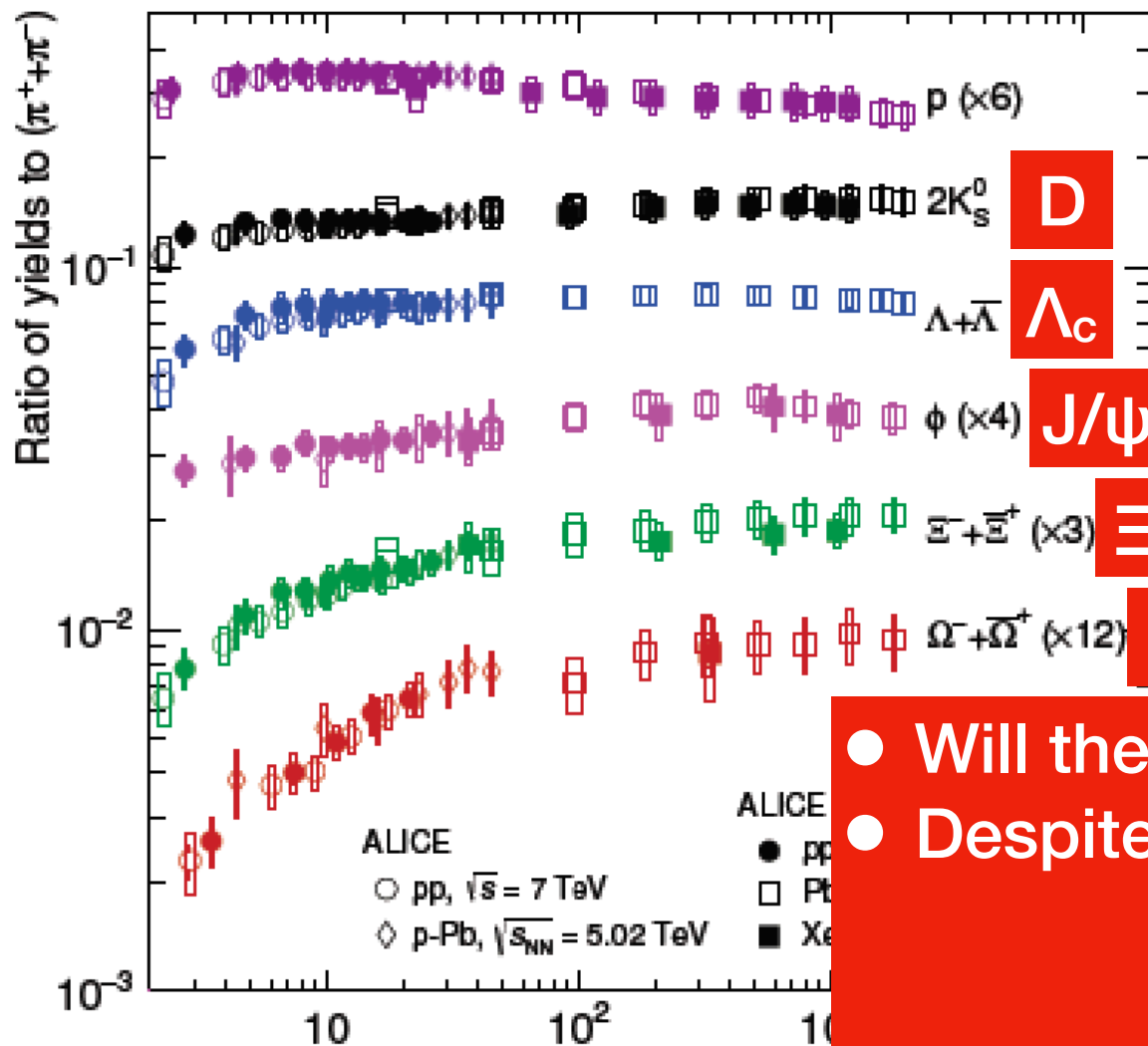
● Will they behave similar to s?

ALICE RUN3



KoALICE

KoALICE2030



2022

2033

RUN3

/cm²s

interactions) PbPb ~ 10 x RUN1&2

double-charmed / strange-cc /

c-bb ... at low pT

suppression? dN/dη-scaling?

Ω_{ccc}

- Will they behave similar to s?
- Despite different birth-origin?

ALICE RUN3



KoALICE2030

2022

2033

RUN3

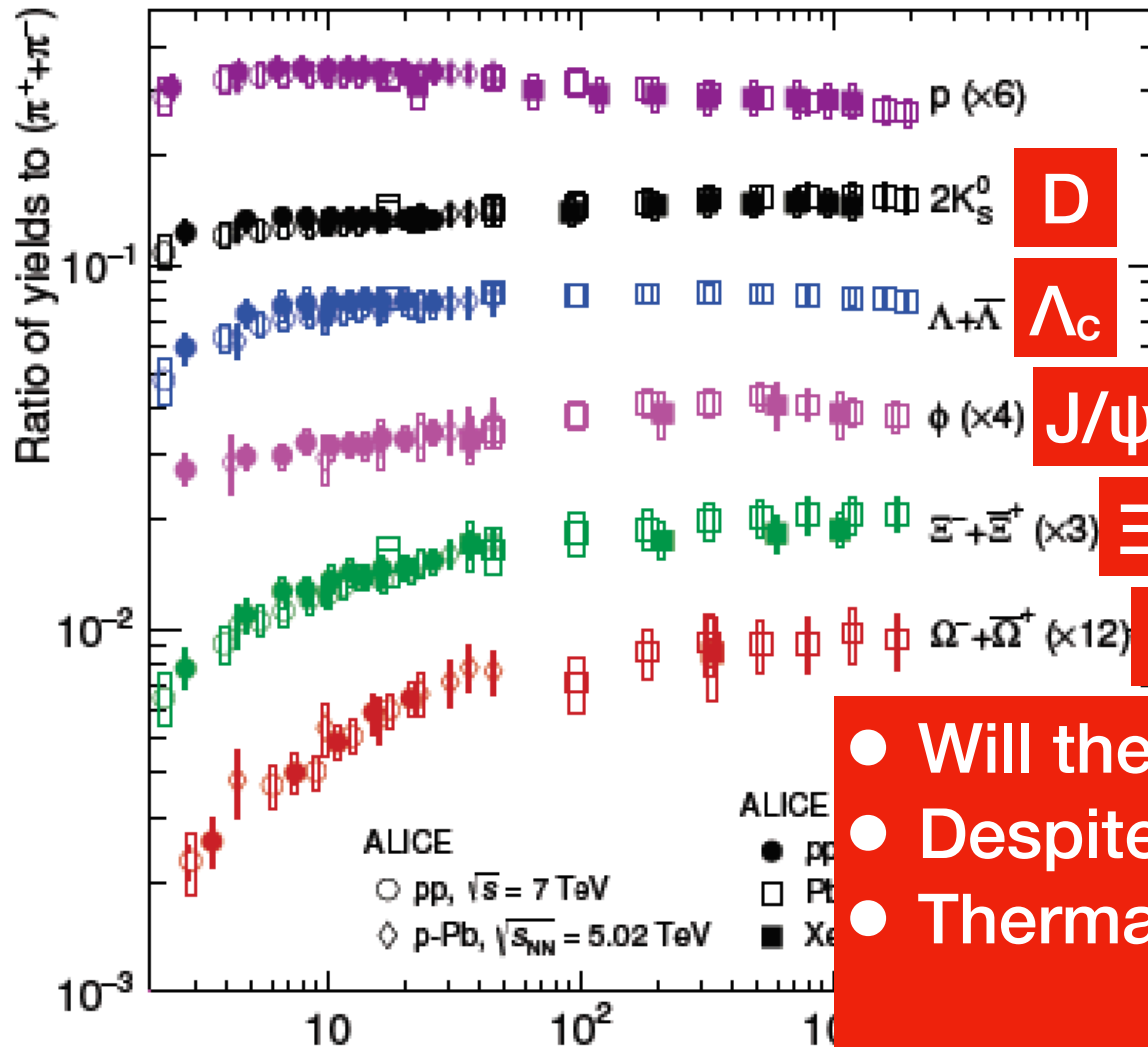
$\mu\text{cm}^2\text{s}$

(interactions) PbPb $\sim 10 \times$ RUN1&2

double-charmed / strange-cc /

c-bb ... at low p_T

suppression? $dN/d\eta$ -scaling?



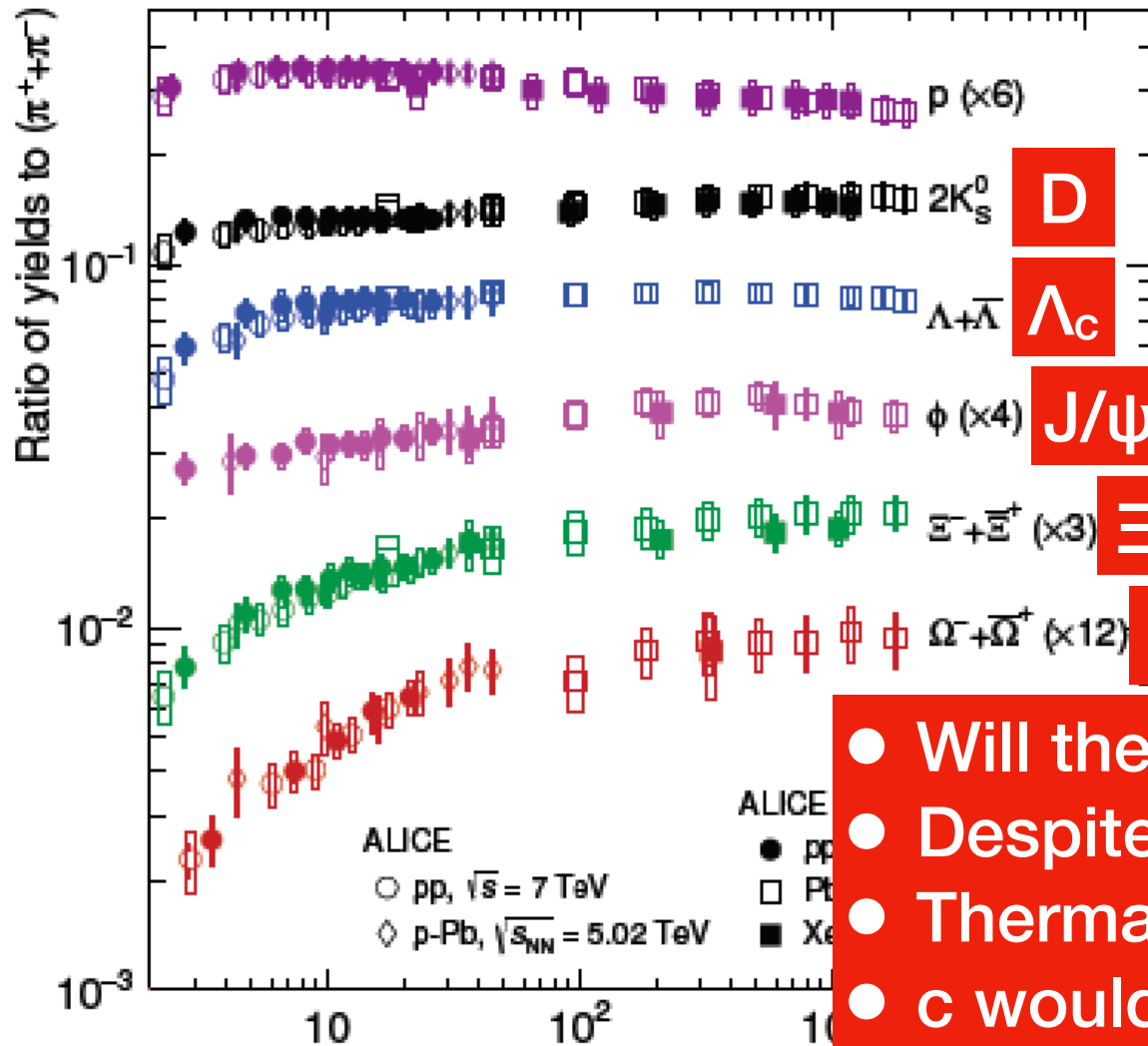
- Will they behave similar to s?
- Despite different birth-origin?
- Thermally produced c?

ALICE RUN3



KoALICE

KoALICE2030



2022

2033

RUN3

/cm²s

interactions) PbPb ~ 10 x RUN1&2

double-charmed / strange-cc /

c-bb ... at low pT

suppression? dN/dη-scaling?

Ω_{ccc}

- Will they behave similar to s?
- Despite different birth-origin?
- Thermally produced c?
- c would be different from s!

ALICE RUN3



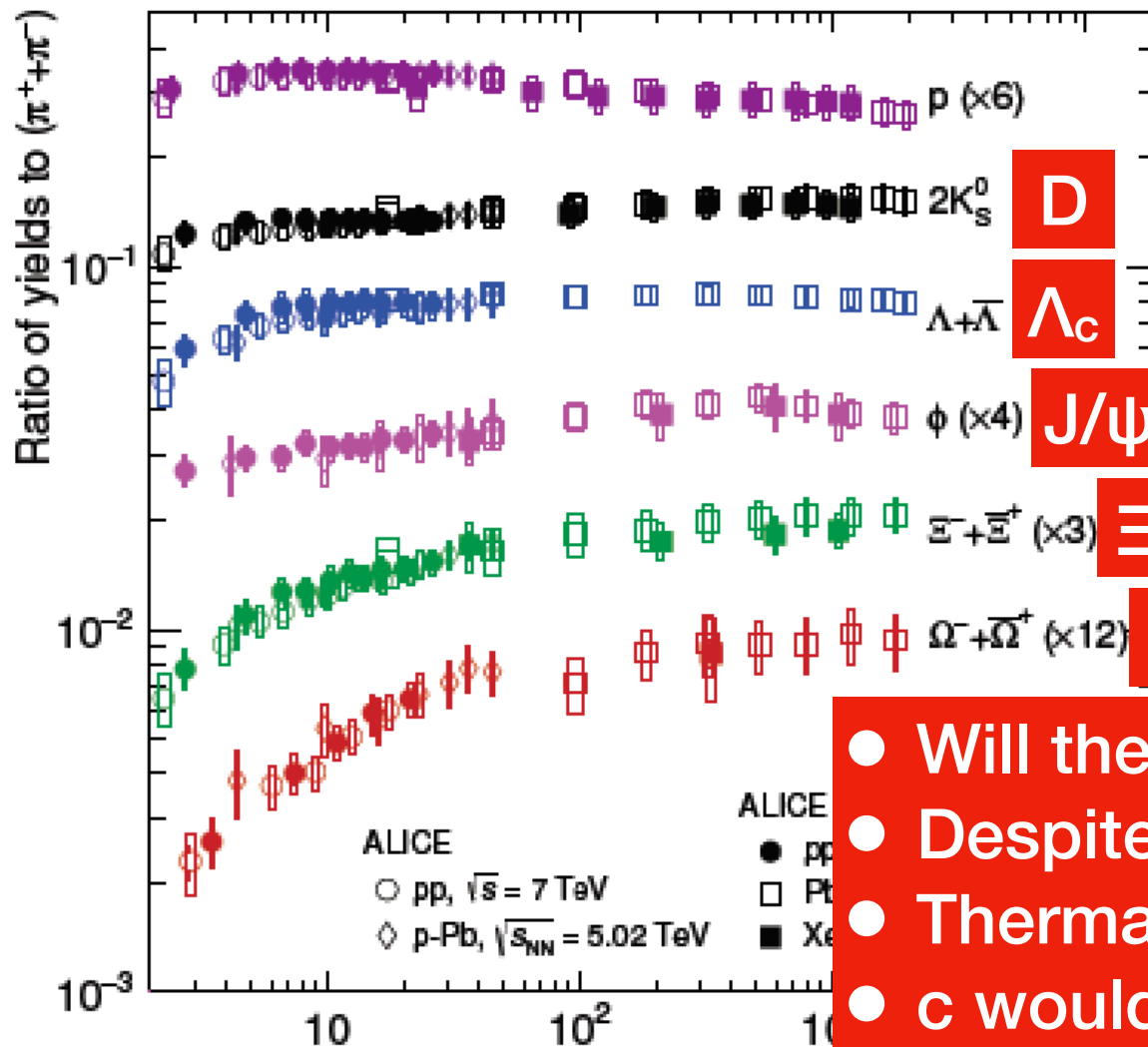
KoALICE

KoALICE2030

2022

2033

RUN3



D

Λ_c

J/ψ

Ξ_{cc}

Ω_{ccc}

$1/\text{cm}^2\text{s}$

(interactions) PbPb $\sim 10 \times$ RUN1&2

double-charmed / strange-cc /

c-bb ... at low pT

suppression? dN/dη-scaling?

- Will they behave similar to s?
- Despite different birth-origin?
- Thermally produced c?
- c would be different from s!
- Have to confirm!