

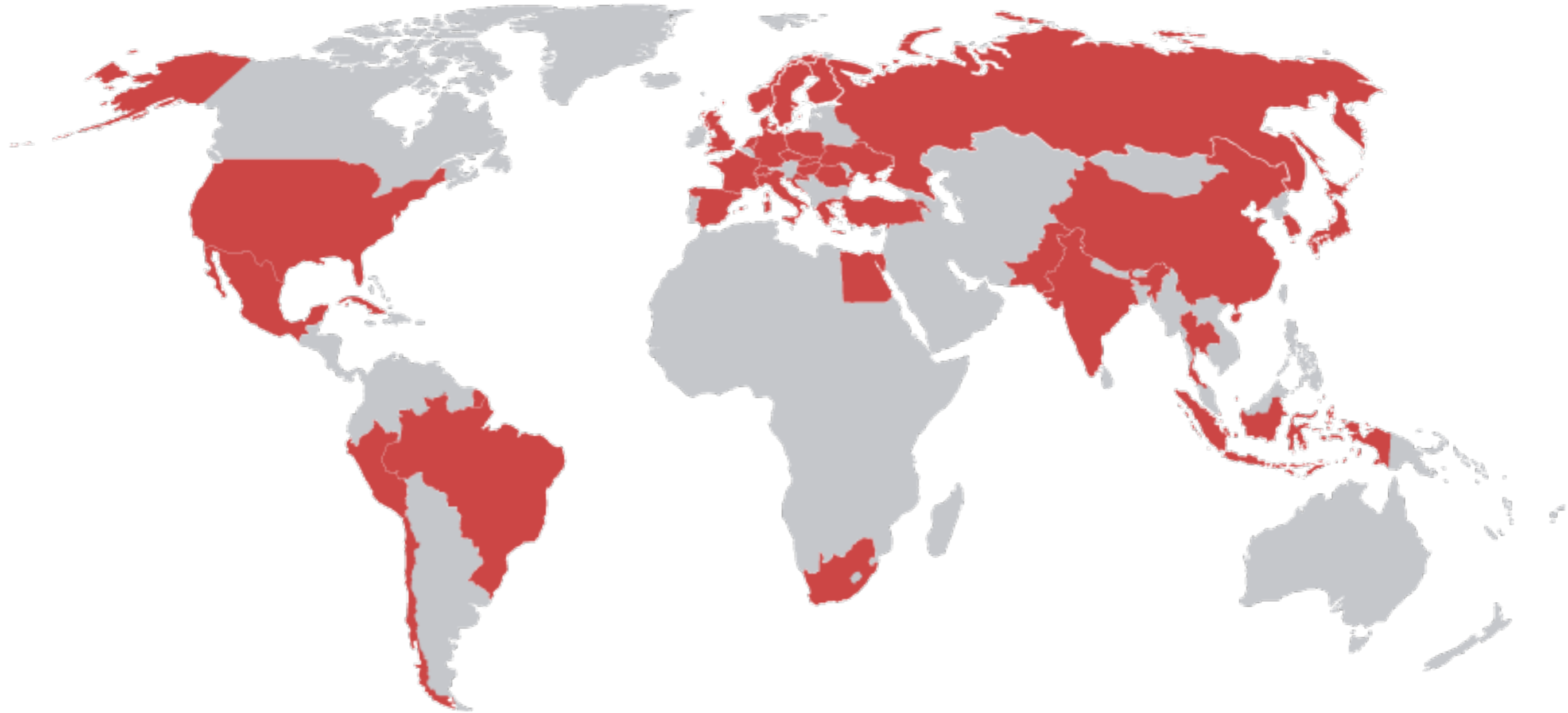
ALICE highlights

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ALICE Collaboration

37 countries, 151 institutes, 1550 members



The ALICE detector

a dedicated heavy-ion experiment at the LHC

designed to cope with

very high multiplicities

$$dN_{ch}/d\eta \leq 8000$$

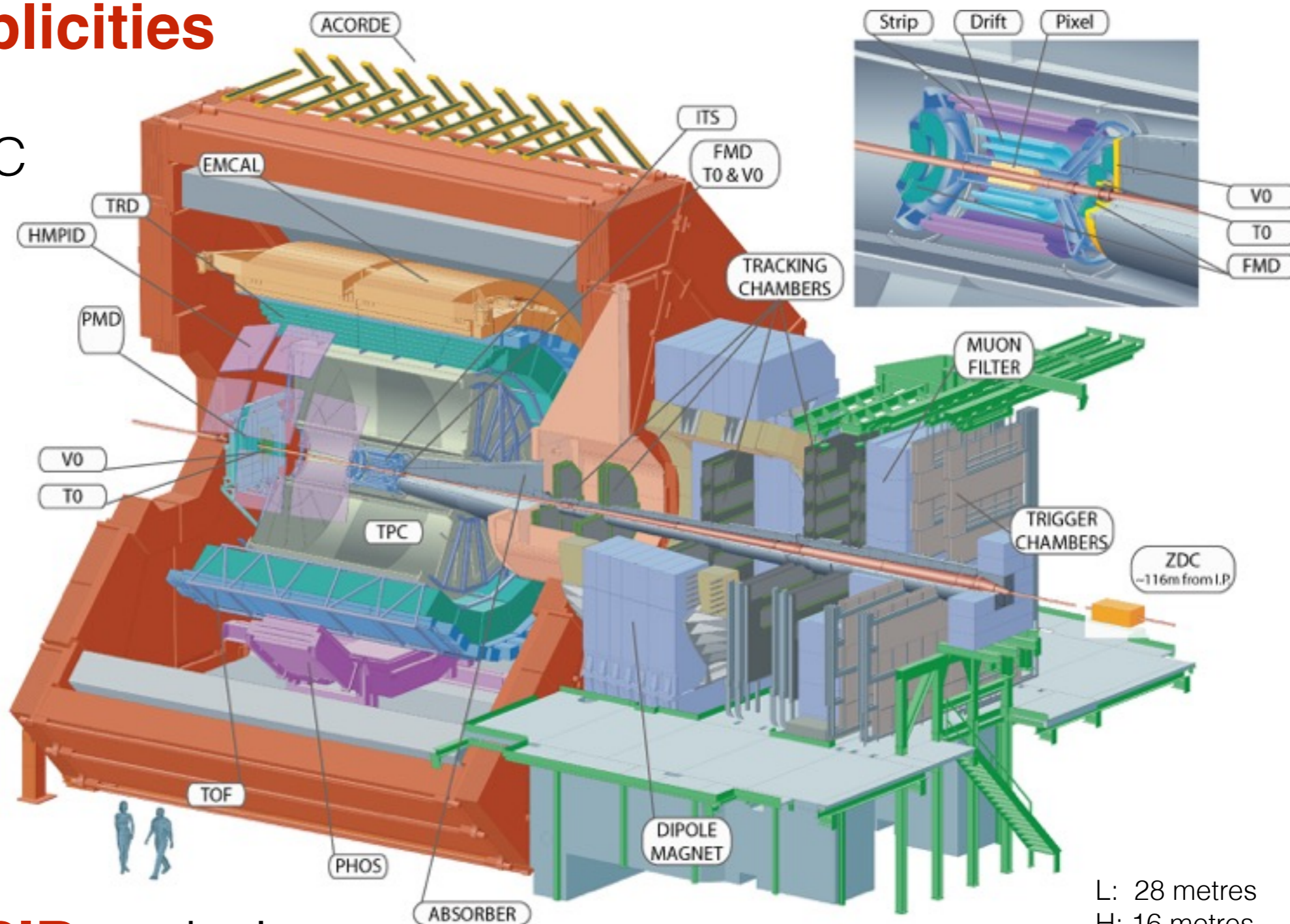
3D tracking with TPC

low- p_T tracking

moderate $B = 0.5$ T

thin materials

uses all known **PID** techniques



L: 28 metres

H: 16 metres

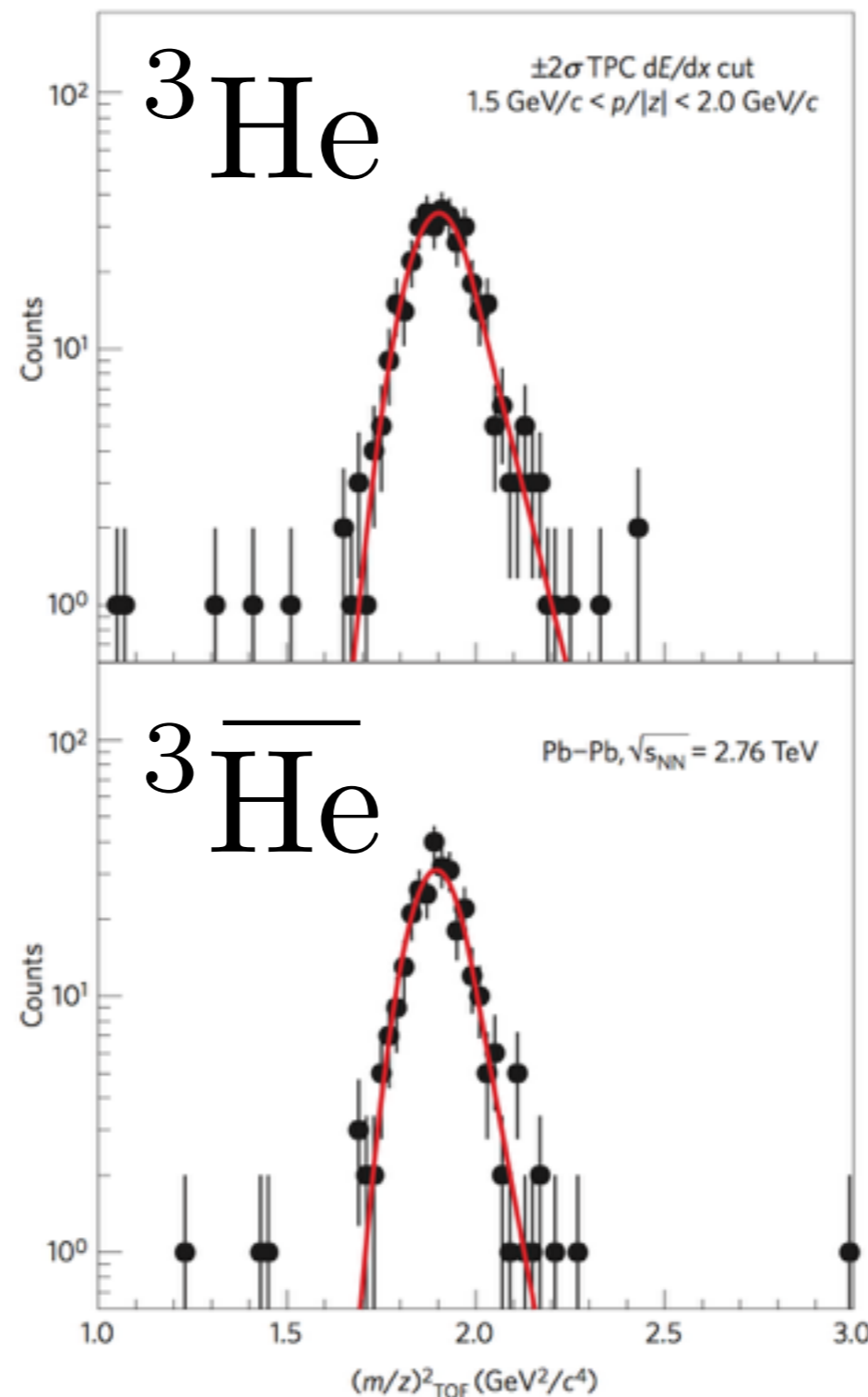
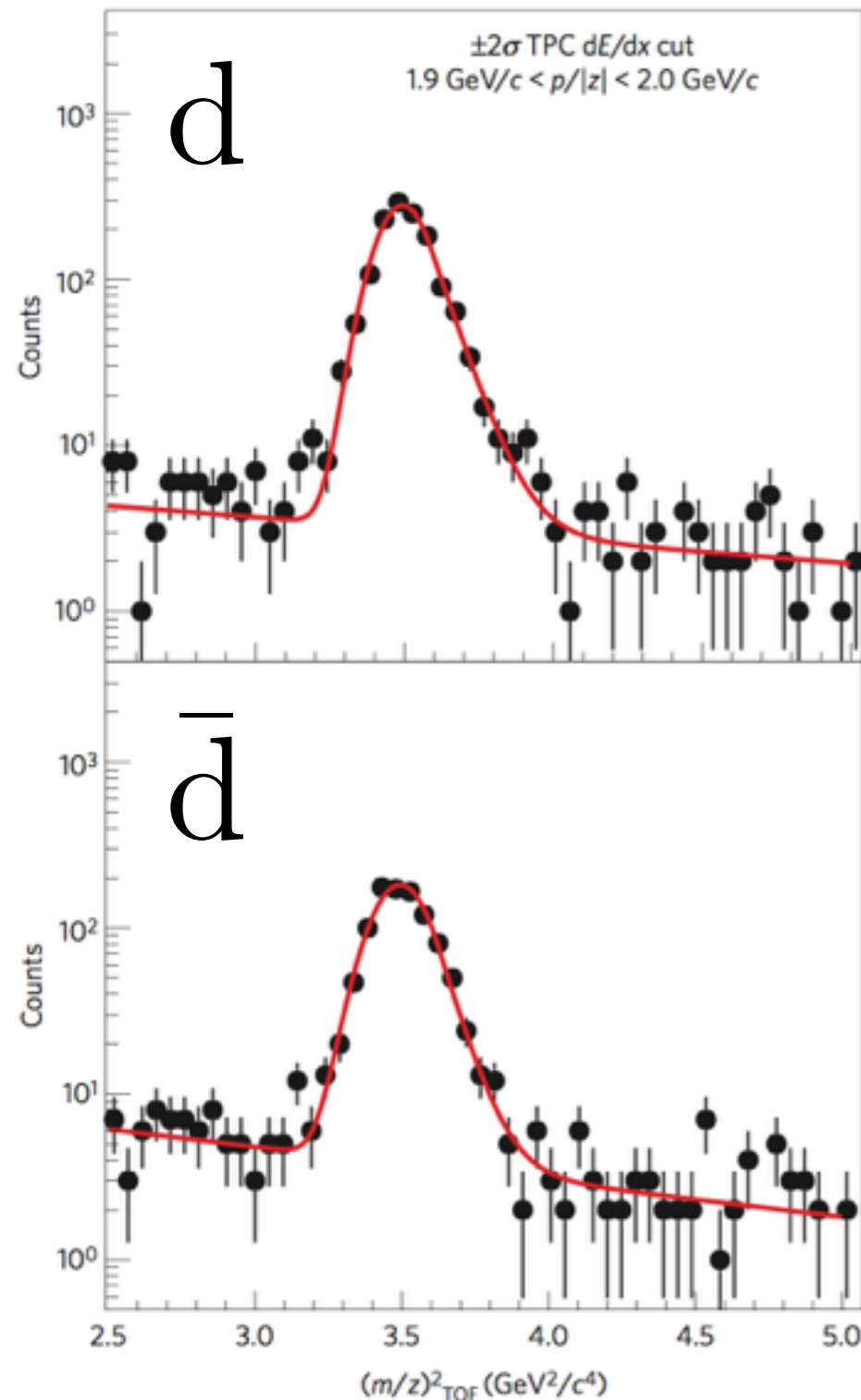
W: 10k t

**A few selected recent results
from LHC Run-1 and Run-2**

CPT invariance in nuclear systems

precision measurement of nuclei mass with time-of-flight

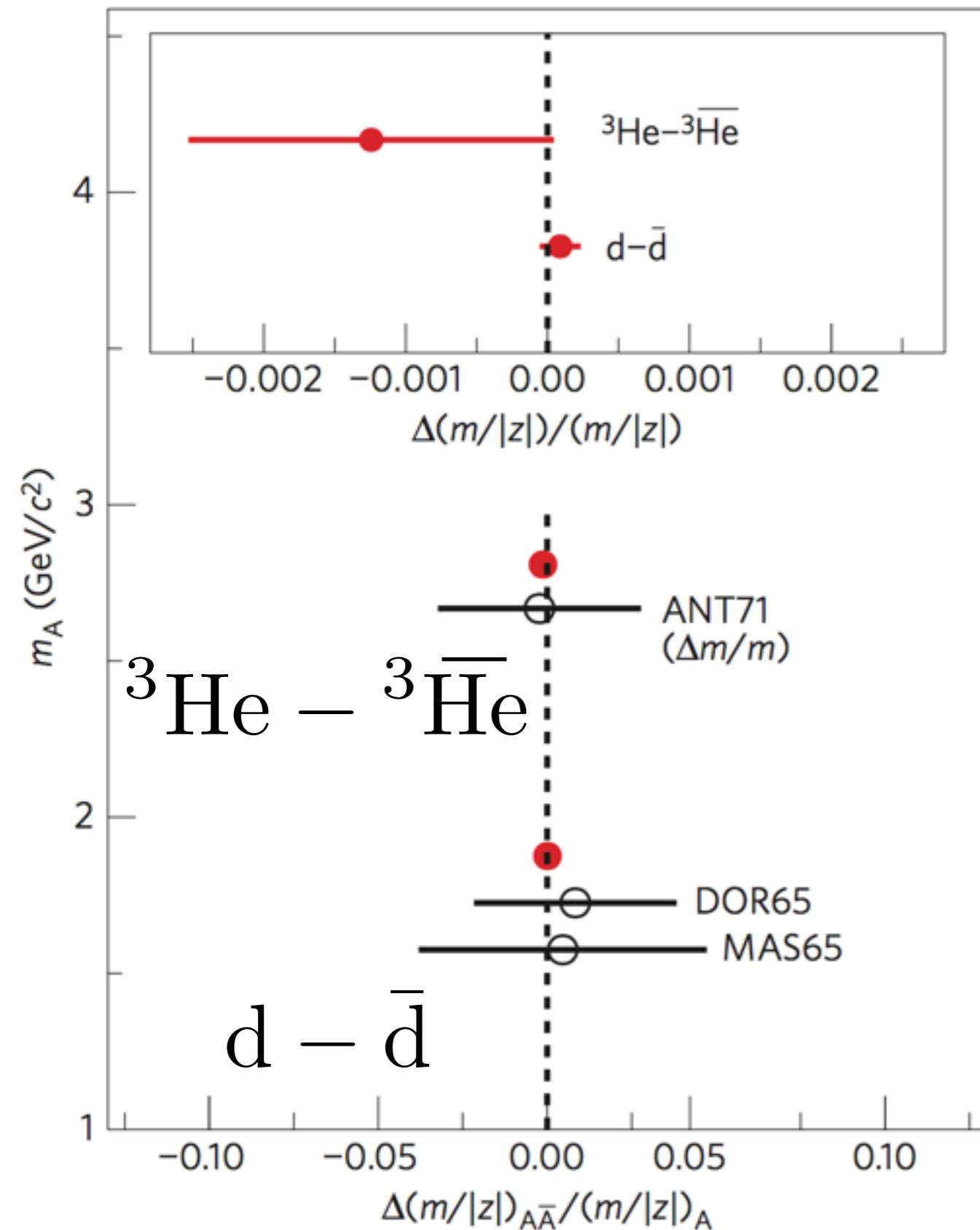
$$(m/z)_{\text{TOF}}^2 = (p/z)^2 [(t_{\text{TOF}}/L)^2 - 1/c^2]$$



makes use of heavy-ion collisions as an **efficient source of nuclei and anti-nuclei**

combined with high-precision **tracking and identification** capabilities of ALICE

CPT invariance in nuclear systems



$$(m/z)_{\text{TOF}}^2 = (p/z)^2 [(t_{\text{TOF}}/L)^2 - 1/c^2]$$

measuring mass differences

rather than absolute values

→ reduced uncertainties

momentum, time-of-flight, track length

these results are

the highest precision direct measurement of the mass

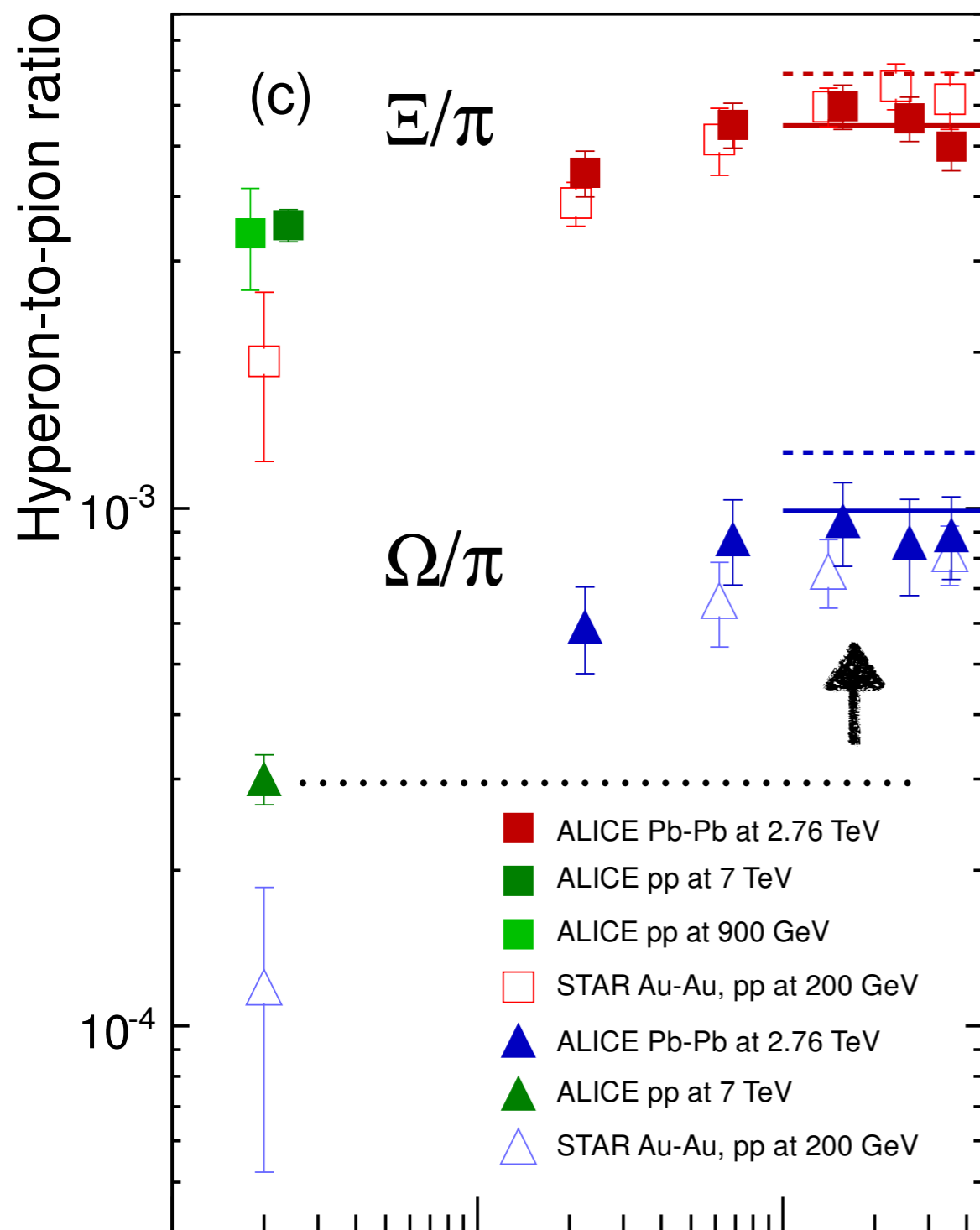
difference of nuclei/anti-nuclei improved by one to two orders of

magnitude wrt. previous

measurements

(dating back to 1965 and 1971)

Strangeness enhancement



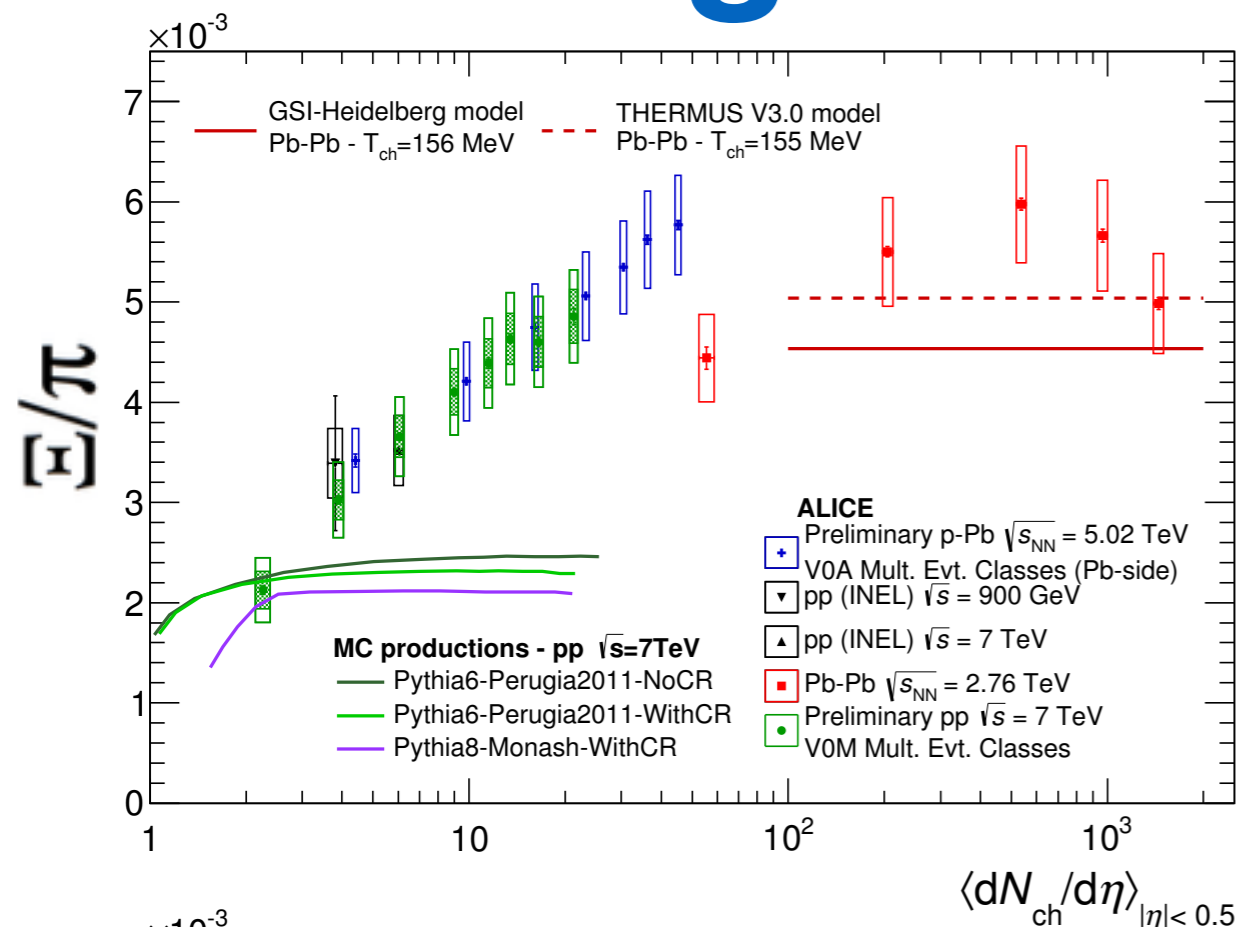
clear increase of strangeness production from minimum bias pp to central Pb-Pb collisions

one of the first proposed
QGP signatures

Rafelski & Müller, PRL 48 (1982) 1066

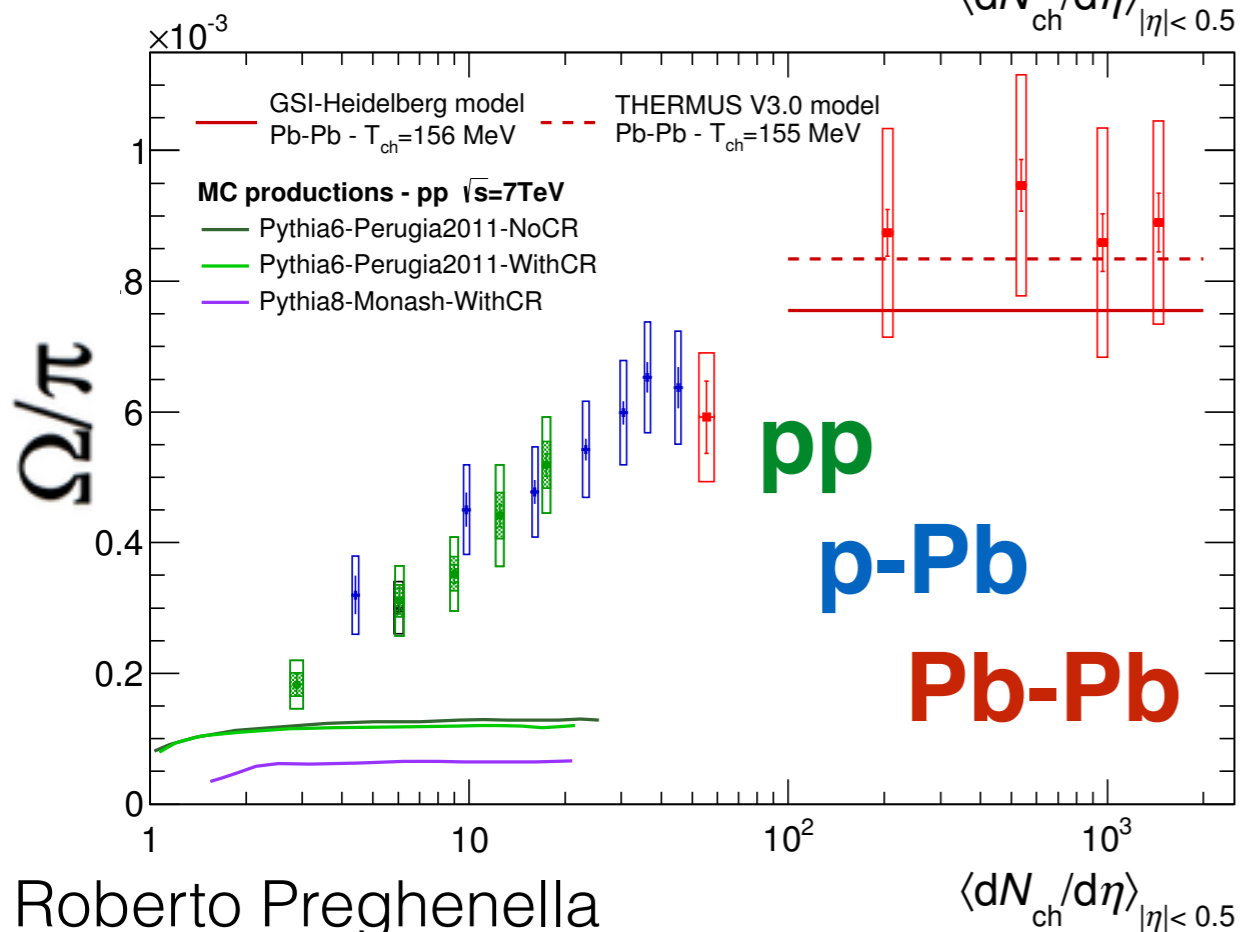


Strangeness enhancement



also measured in pp and p-Pb collisions as a function of charged-particle multiplicity

first **observation of enhanced production of strange particles in pp and p-Pb collisions**

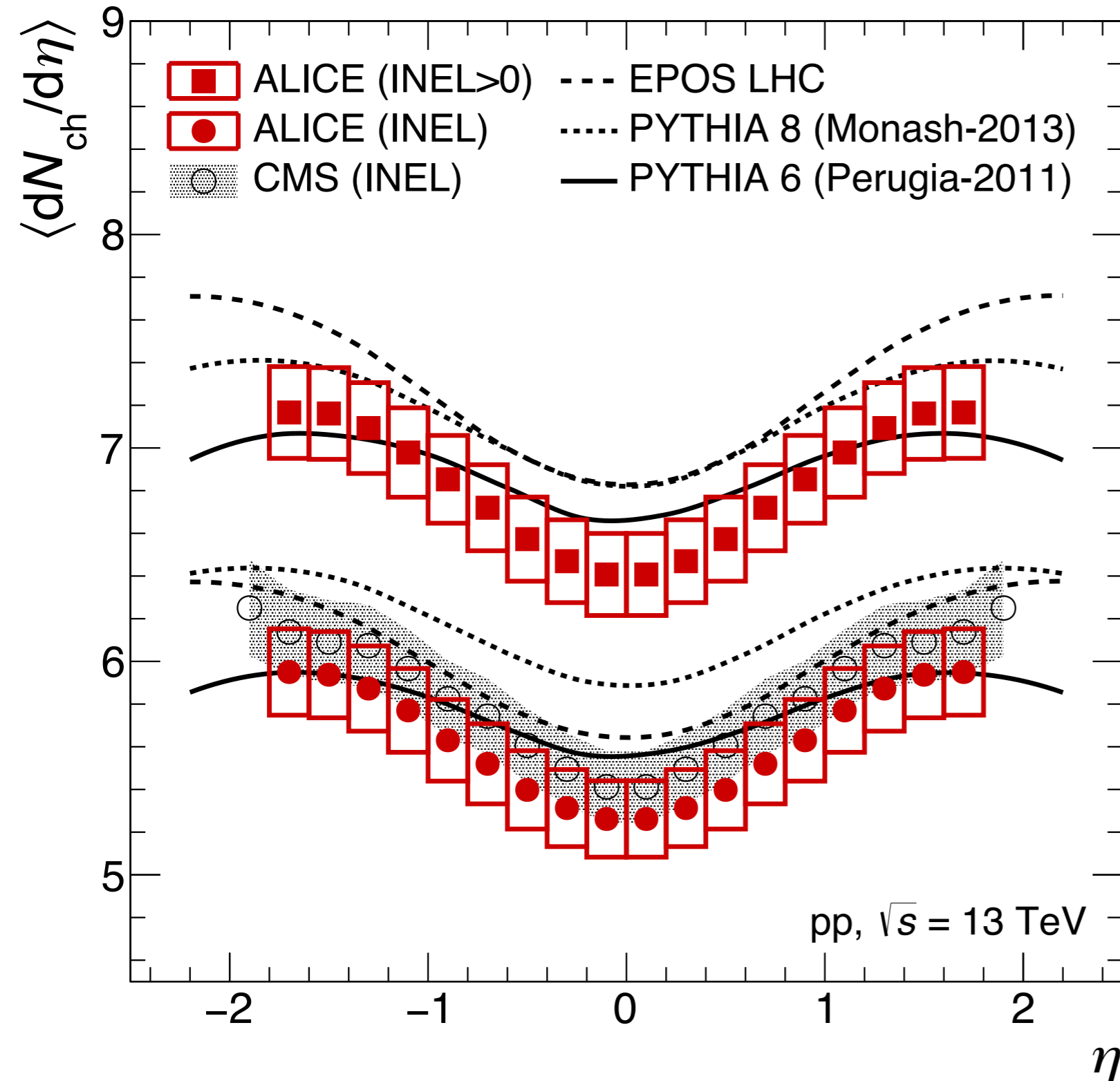


ratios to pions reach values measured in Pb-Pb collisions

PYTHIA cannot reproduce the data

Charged particles in pp@13 TeV

pseudorapidity dependence



measured in INEL events and in events with at least one charged particle in $|\eta| < 1$

agreement with CMS results for INEL class

charged-particle multiplicity density

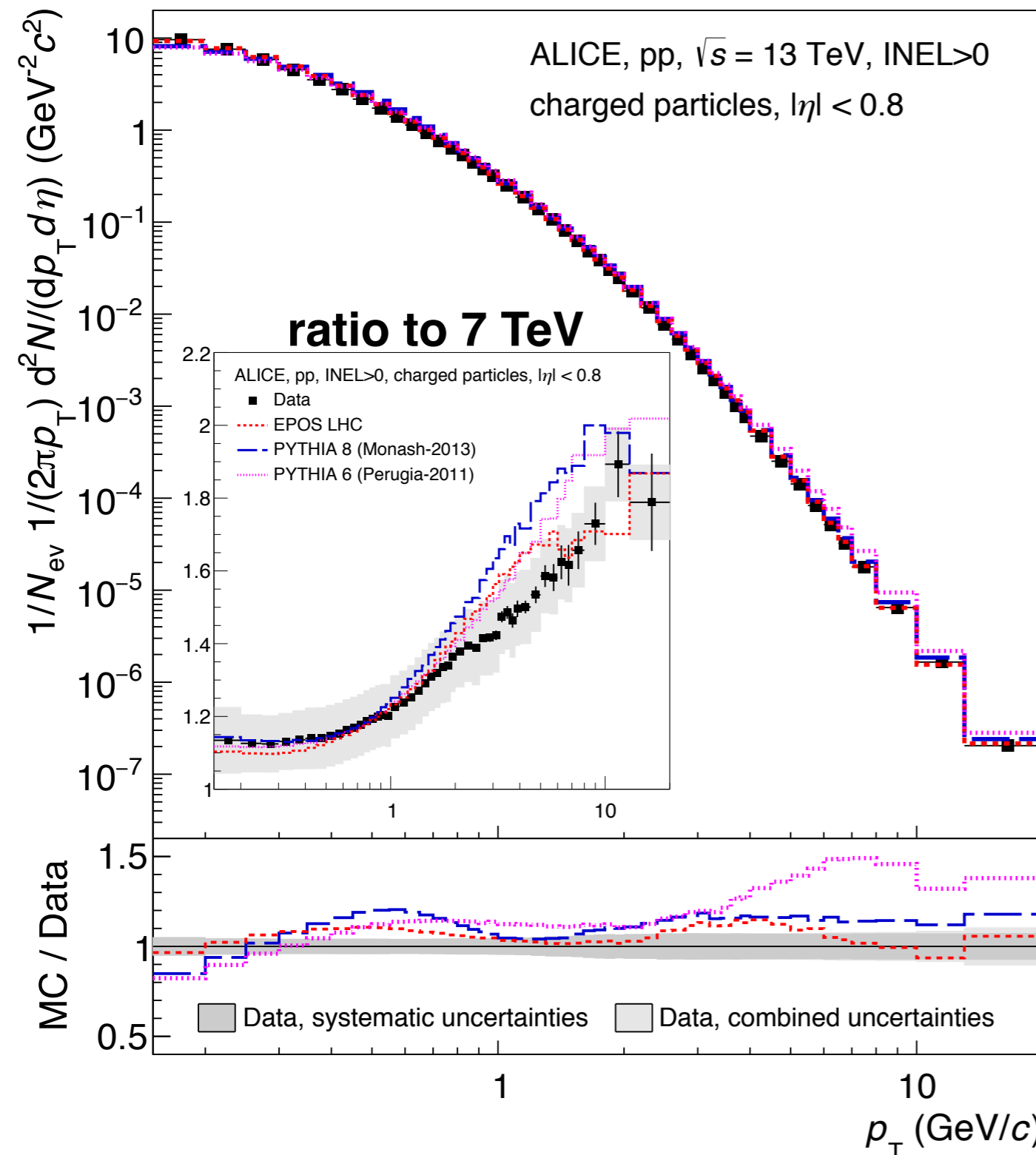
at mid-rapidity, $|\eta| < 0.5$

5.31 ± 0.18 (INEL)

6.46 ± 0.19 (INEL>0)

Charged particles in pp@13 TeV

transverse-momentum dependence

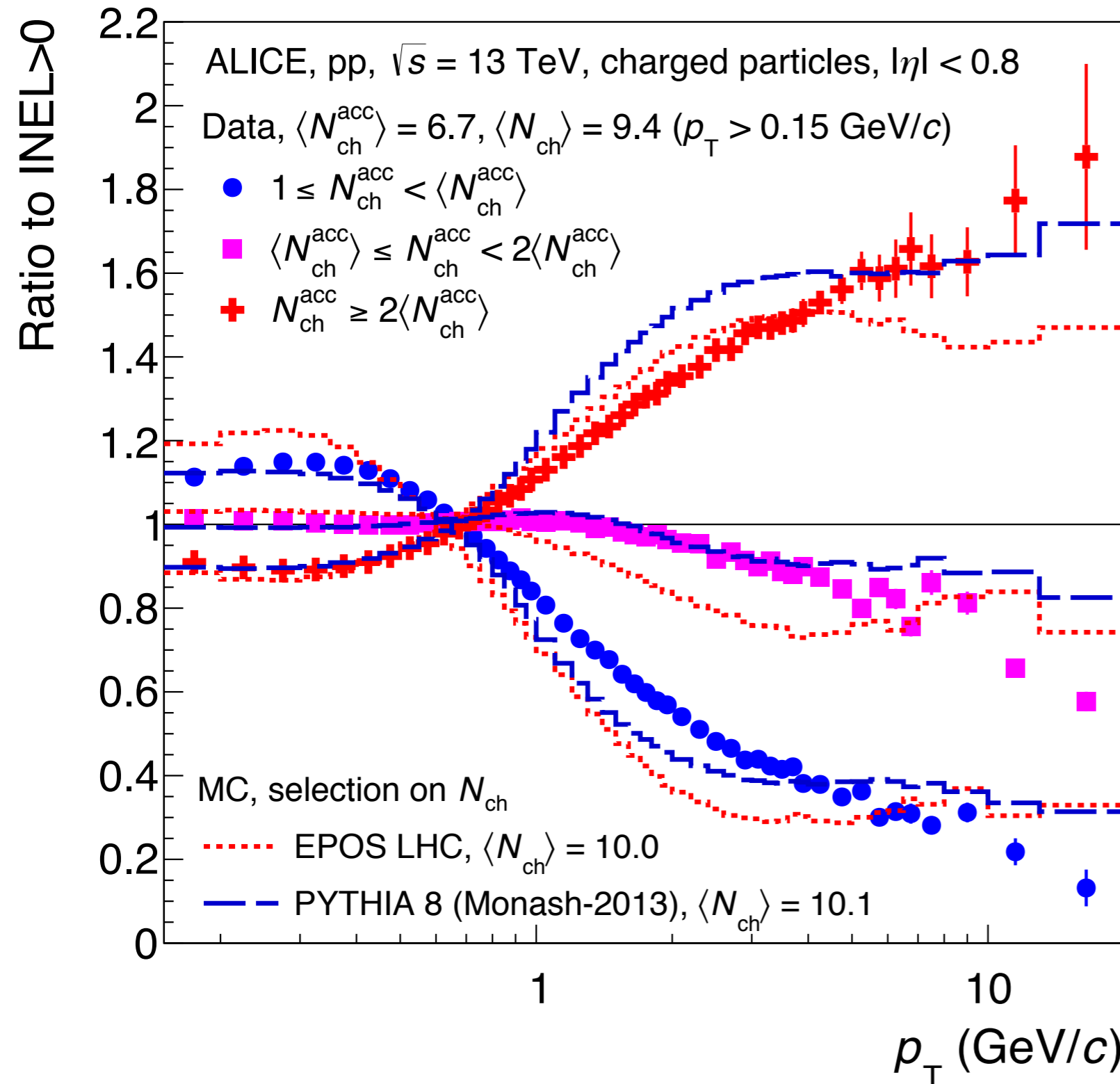


p_T distribution measured
for events with at least one
charged particle in $|\eta| < 1$
 $0.15 < p_T < 20$ GeV/c
 $|\eta| < 0.8$

**spectrum significantly
harder than at $\sqrt{s} = 7$ TeV**
crucial measurements to tune
Monte Carlo models

Charged particles in pp@13 TeV

evolution of p_T spectra with multiplicity



ratio of spectra to the inclusive sample
measured in three intervals of multiplicity

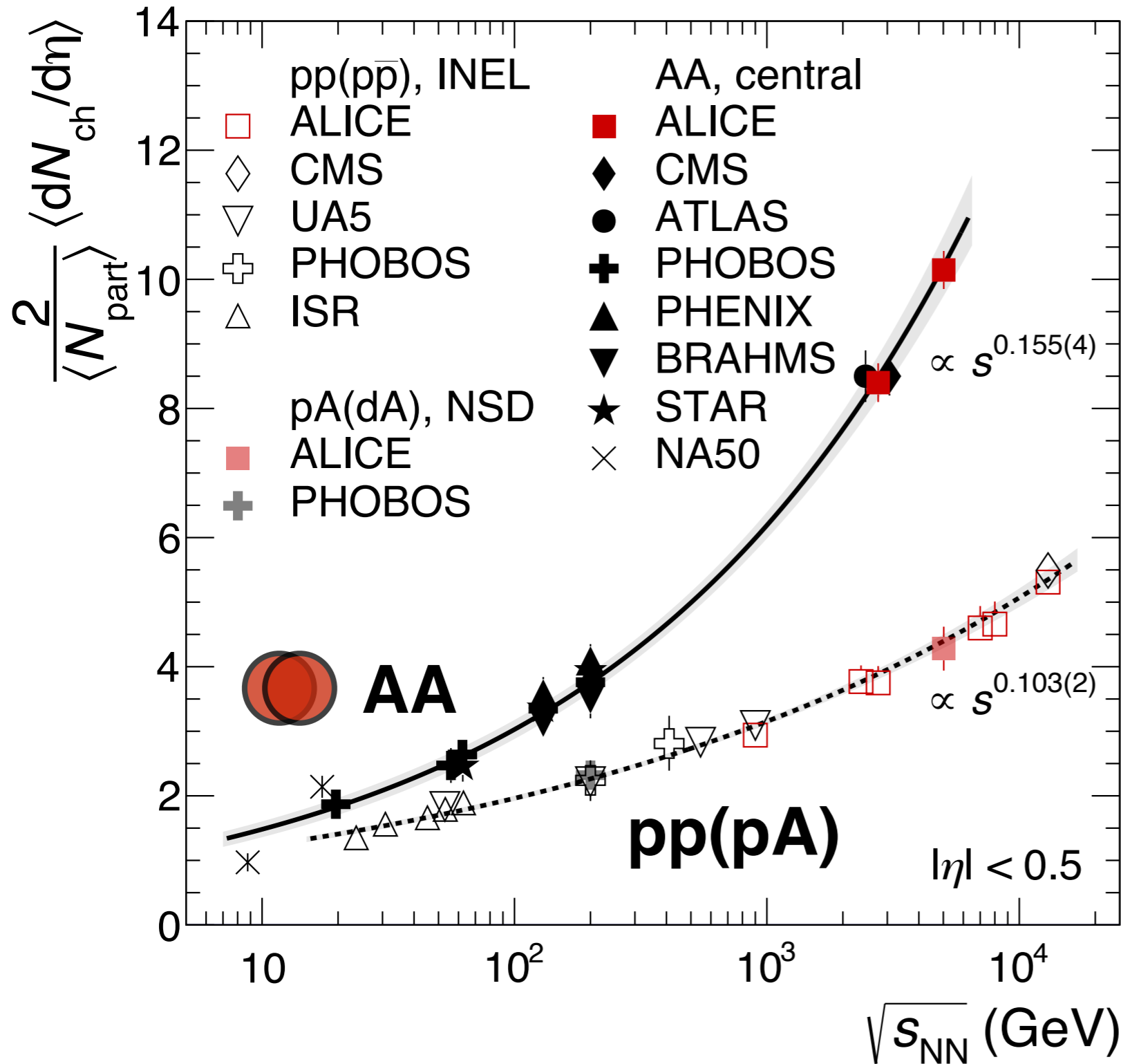
low / intermediate / high

general features are reproduced by the models
but not in all details

Charged particles in Pb-Pb@5.02 TeV

Submitted today

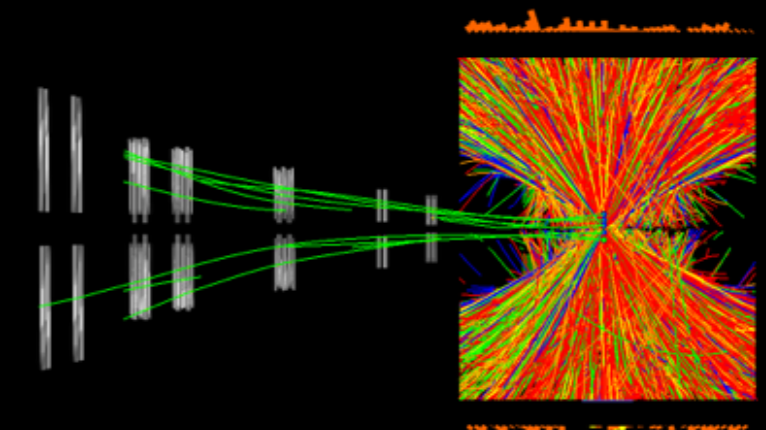
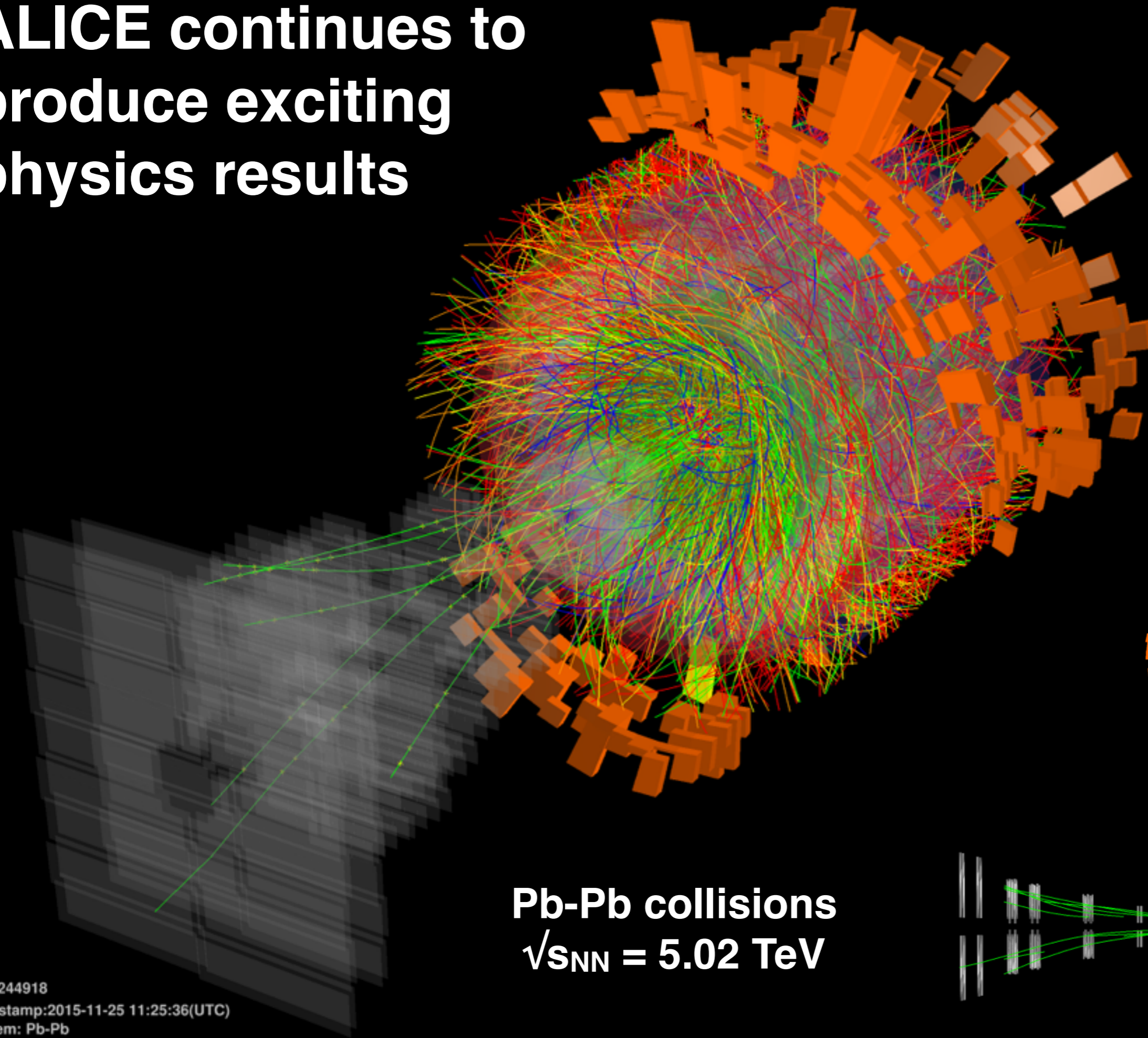
centre-of-mass energy dependence



charged-particle multiplicity density
 at mid-rapidity, $|\eta| < 0.5$
 reaches a value of
 1943 ± 56
 in most central collisions

much stronger \sqrt{s} dependence than pp
2.4x larger charged-particle multiplicity than p-Pb
 at same energy
 scaled by the average number of participating nucleon pairs $\langle N_{part} \rangle / 2$

ALICE continues to produce exciting physics results



Pb-Pb collisions
 $\sqrt{s_{NN}} = 5.02$ TeV

Run:244918
Timestamp:2015-11-25 11:25:36(UTC)
System: Pb-Pb
Energy: 5.02 TeV