

The Monash 2013 Tune of PYTHIA 8

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Current Default = **4C** (from 2010)

LEP tuning undocumented (from 2009)
LHC tuning only used very early data

+ S. Rojo & S. Carrazza recently added a new PDF set: NNPDF 2.3 LO ($\alpha_s(M_Z)=0.13$)

Aims for the Monash 2013 Tune

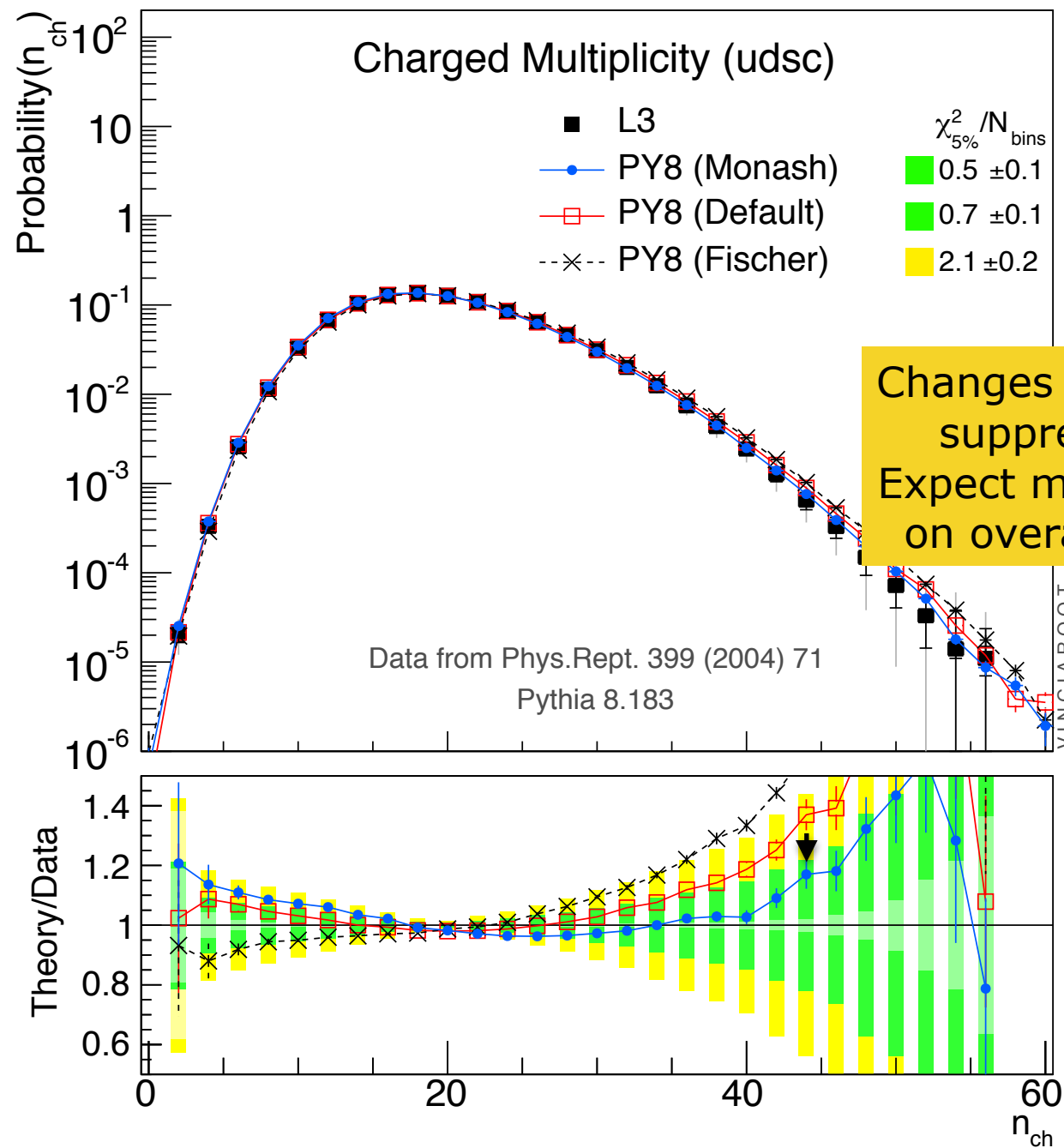
- Revise (and document) constraints from e^+e^- measurements
 - In particular in light of possible interplays with LHC measurements
- Test drive the new NNPDF LO PDF set for pp / ppbar
 - Update min-bias and UE tuning + energy scaling → 2013
 - Follow “Perugia” tunes for PYTHIA 6: use same α_s for ISR and FSR
 - Use the PDF value of α_s for both hard processes and MPI

In Pythia 8.185
+writeup available soon

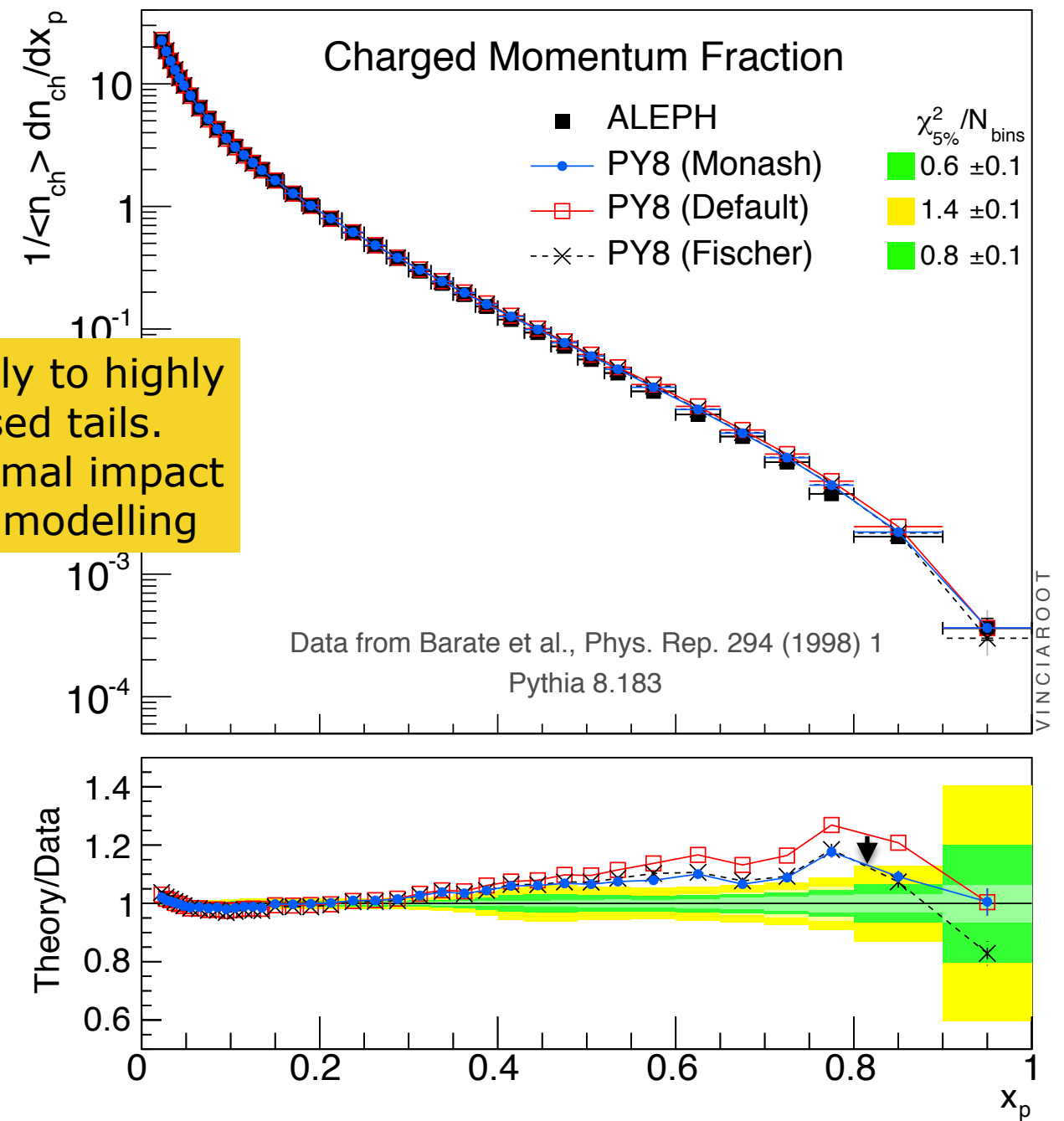
LEP : N_{ch} & x_p

$= 2|p|/M_z$

Slightly lower large- N_{ch} tail



Slightly softer ultra-hard tail

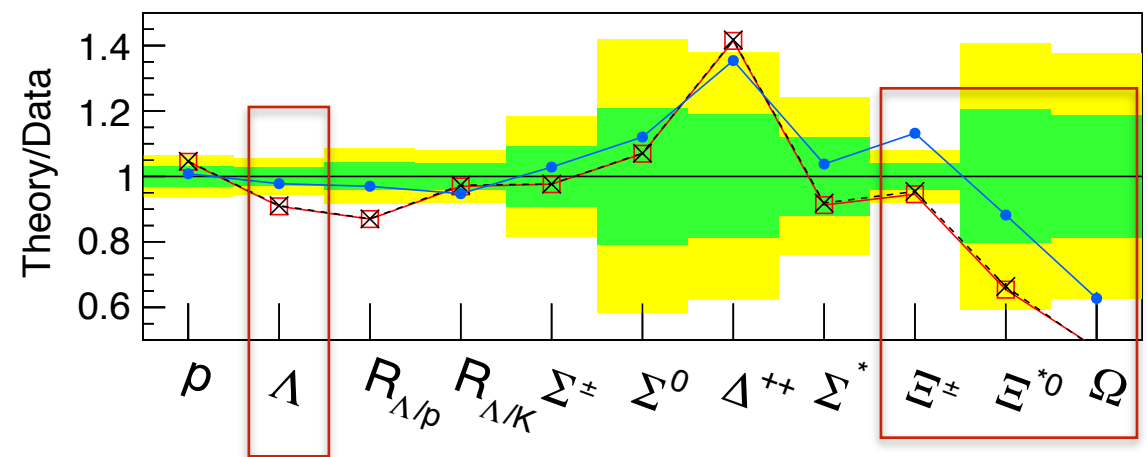
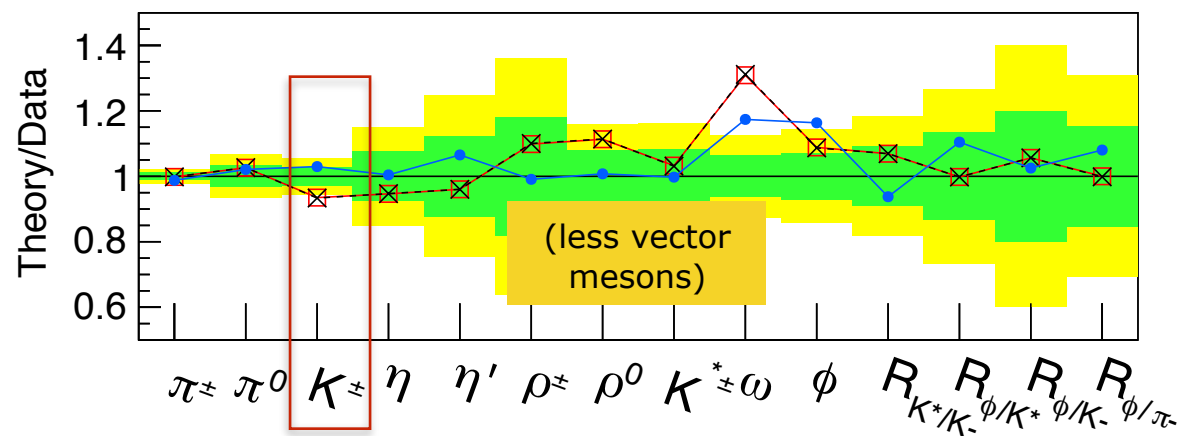
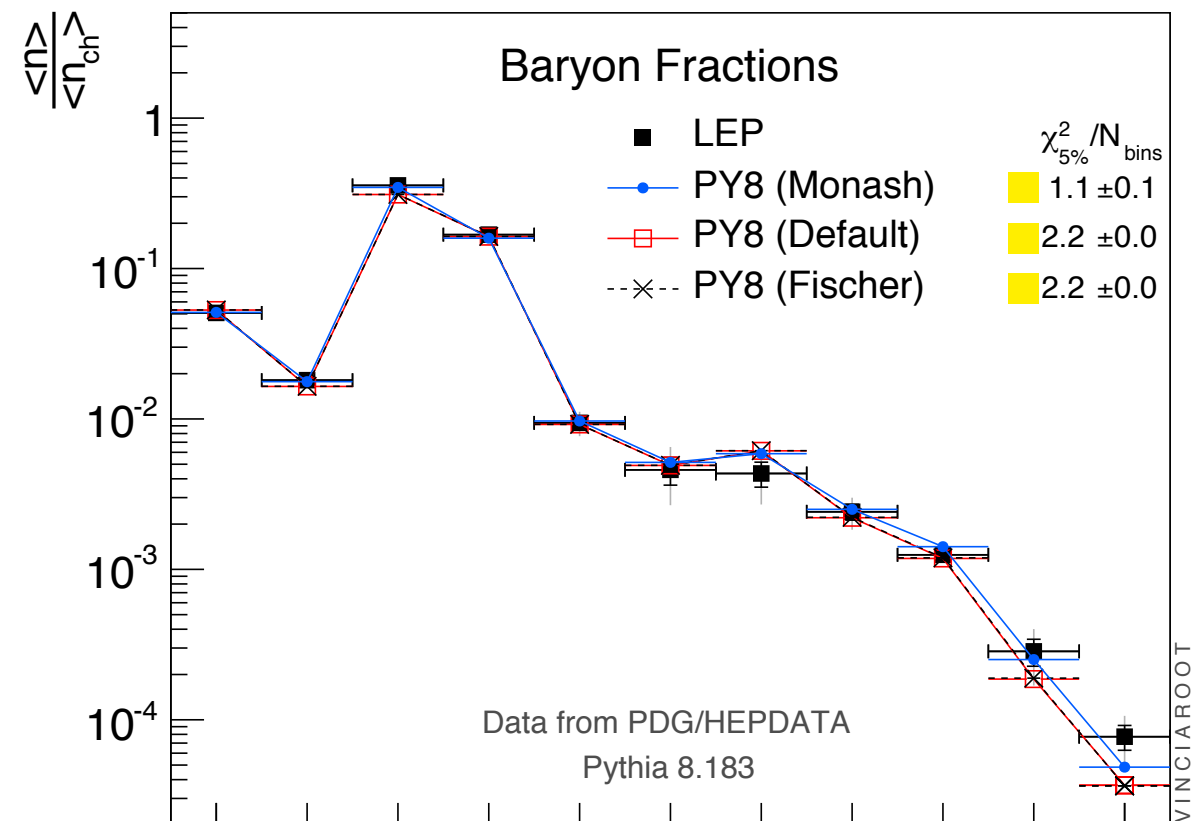
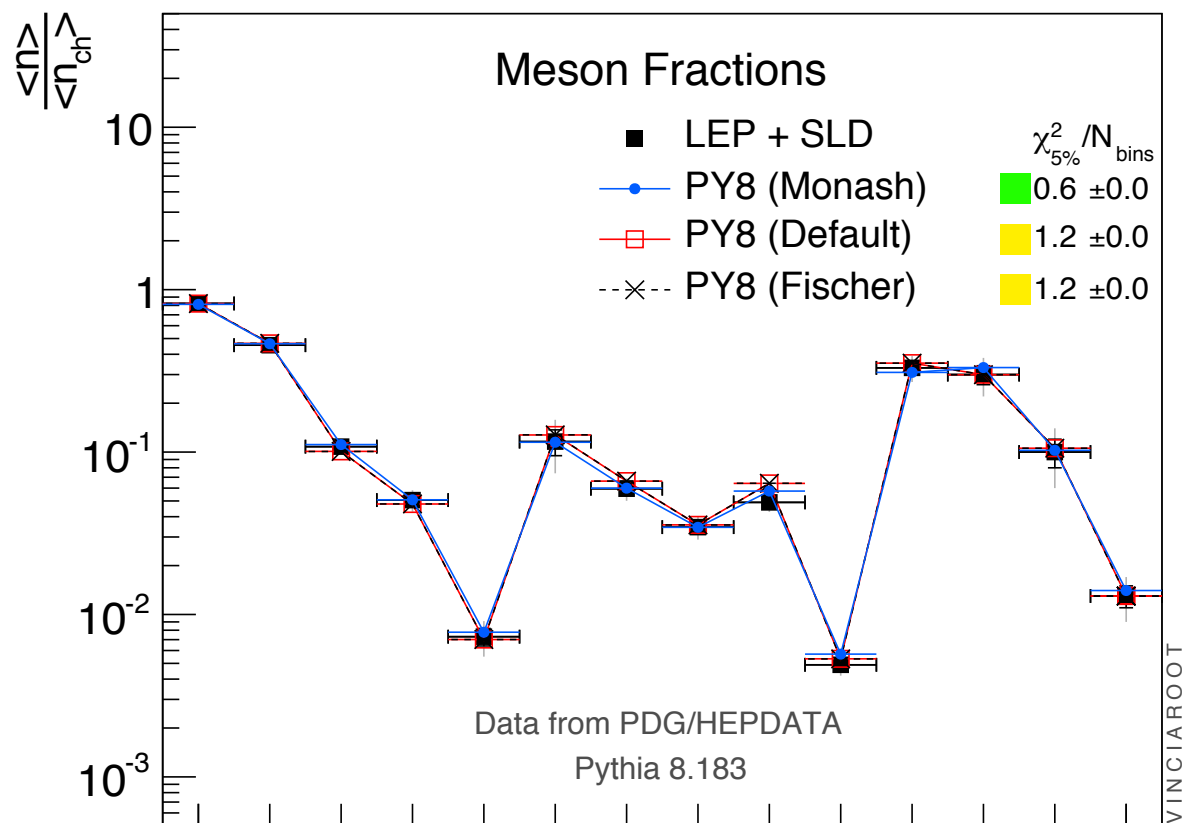


Changes only to highly suppressed tails.
Expect minimal impact on overall modelling

Note: these fragmentation parameters go directly into the modelling of diffraction

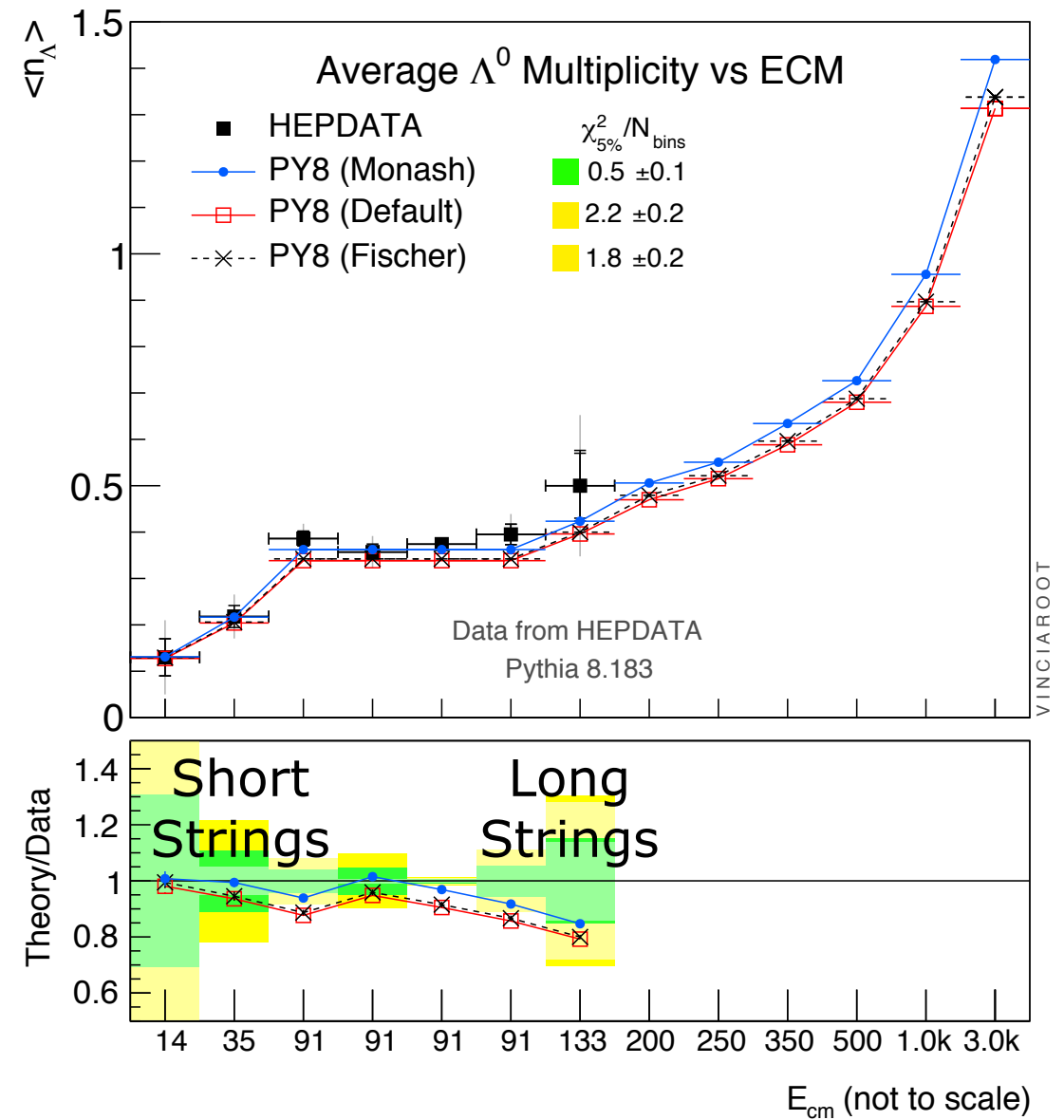
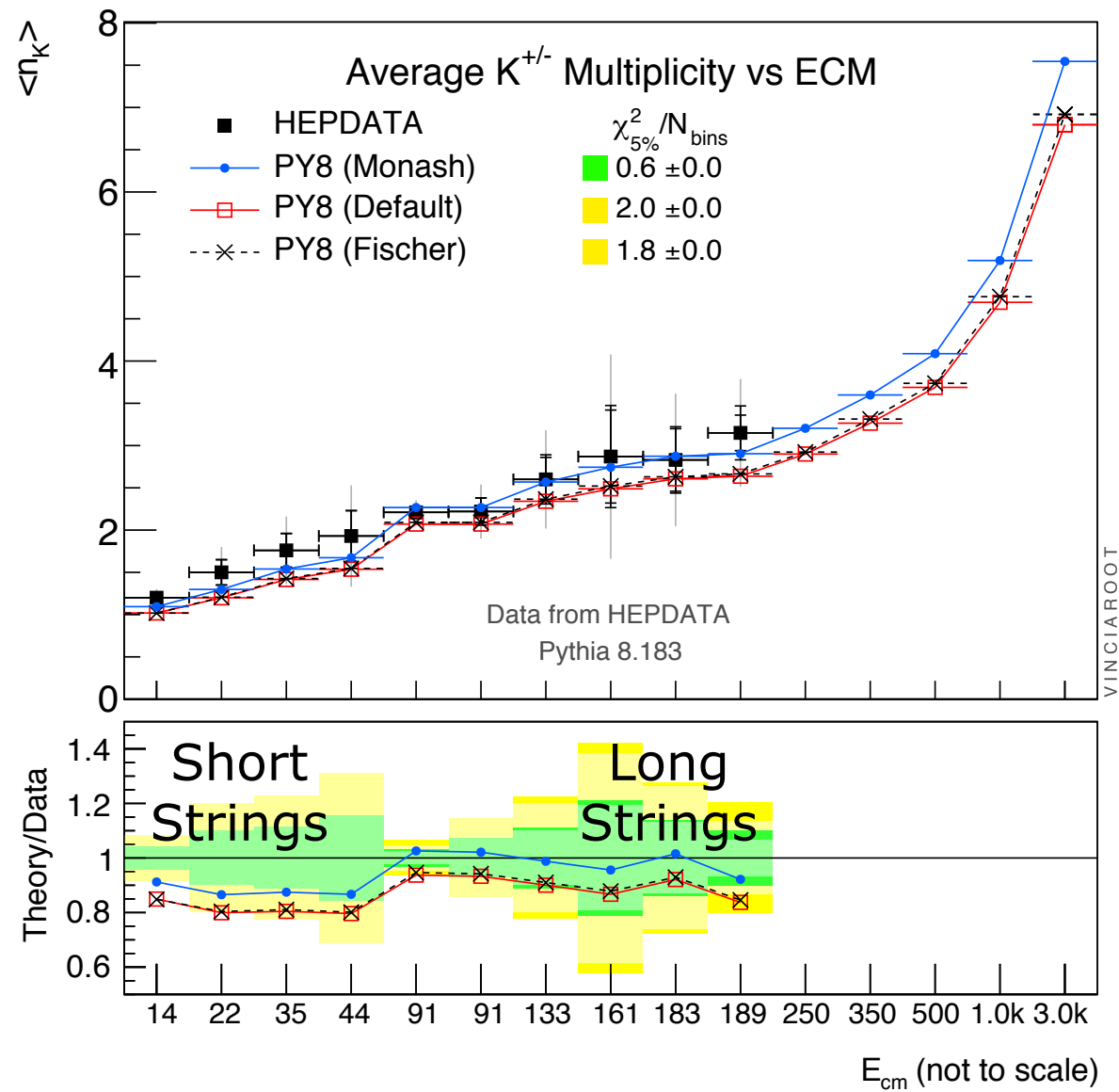
Strangeness

10% More Strangeness



Consistency: Rates of D_s and B_s also improve. Kaon fraction at LHC also improves

Strangeness: scaling

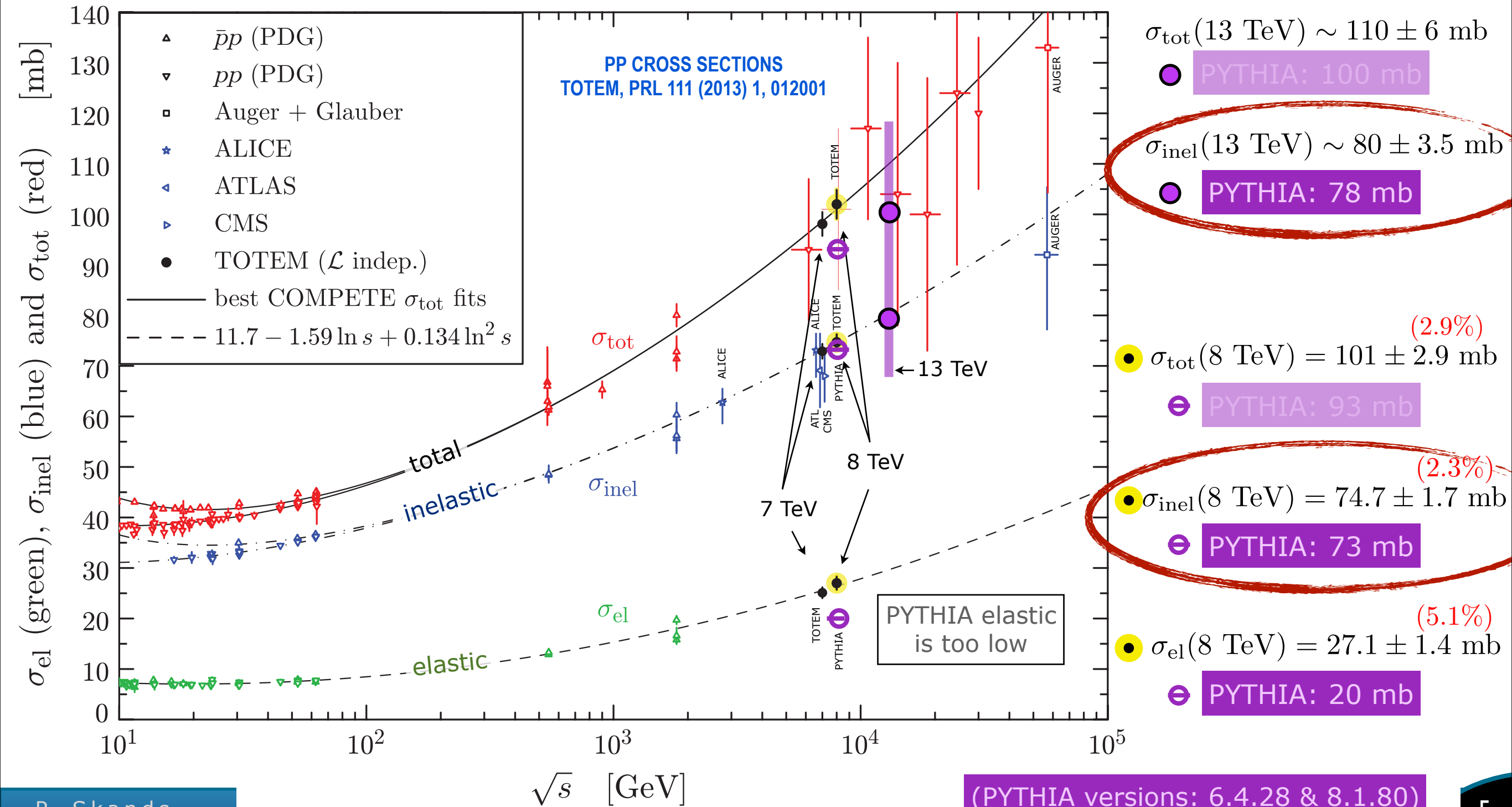


Consistency: improvements repeated across all ee energies

PP: the Total Cross Section

Pileup rate $\propto \sigma_{\text{tot}}(s) = \sigma_{\text{el}}(s) + \sigma_{\text{inel}}(s) \propto s^{0.08}$ or $\ln^2(s)$?

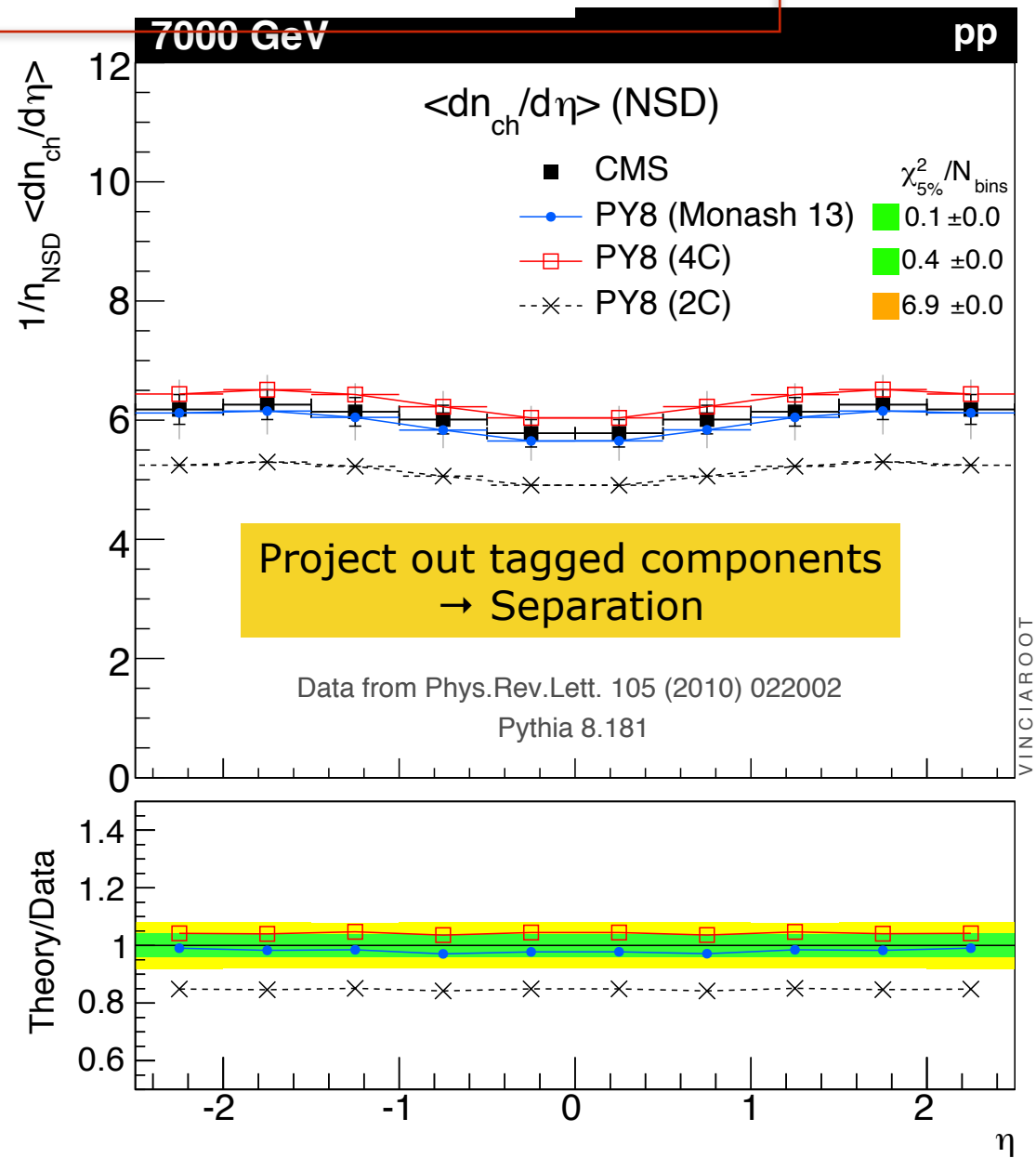
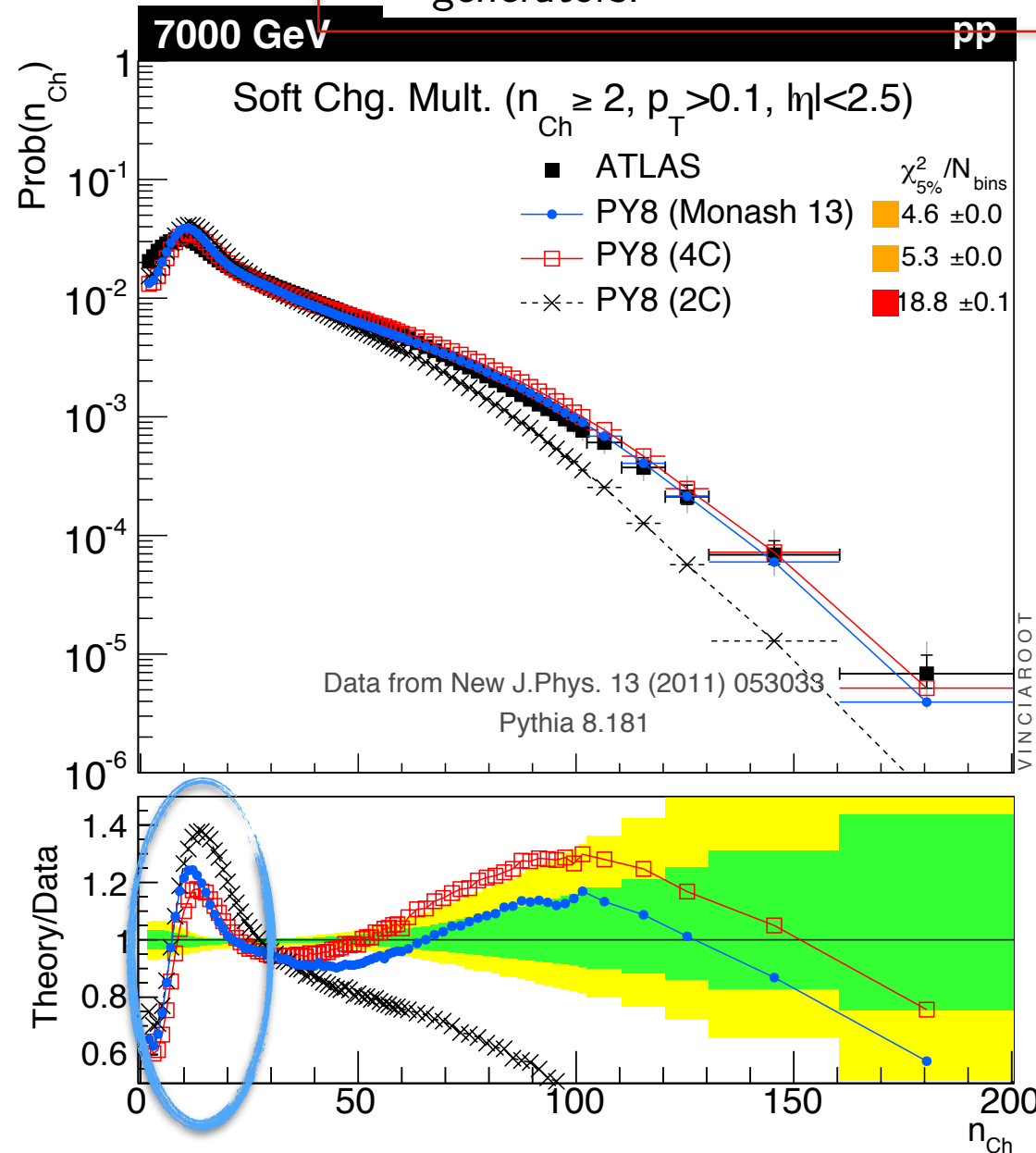
Donnachie-Landshoff (0.096?) Froissart-Martin Bound



Charged-Particle Multiplicities

Shown with/without diffractive tag in T. Martin's talk yesterday

- The enhancement of double dissociation in AFP tagged events with PYTHIA 8 is nicely contained at low overall charged particle multiplicity ($|\eta| < 2.5$).
- Good degree of model separation observed when comparing the generators.

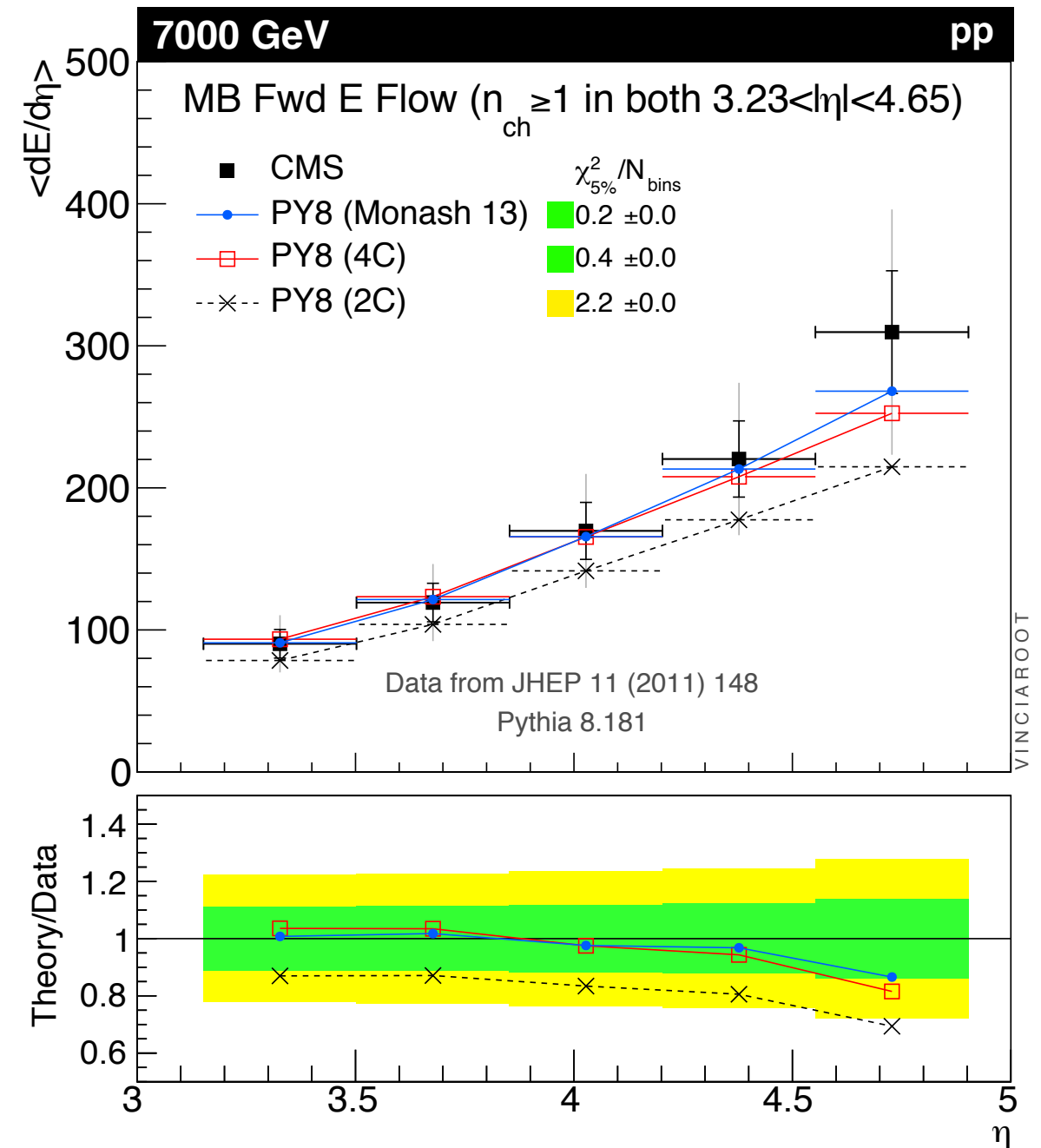
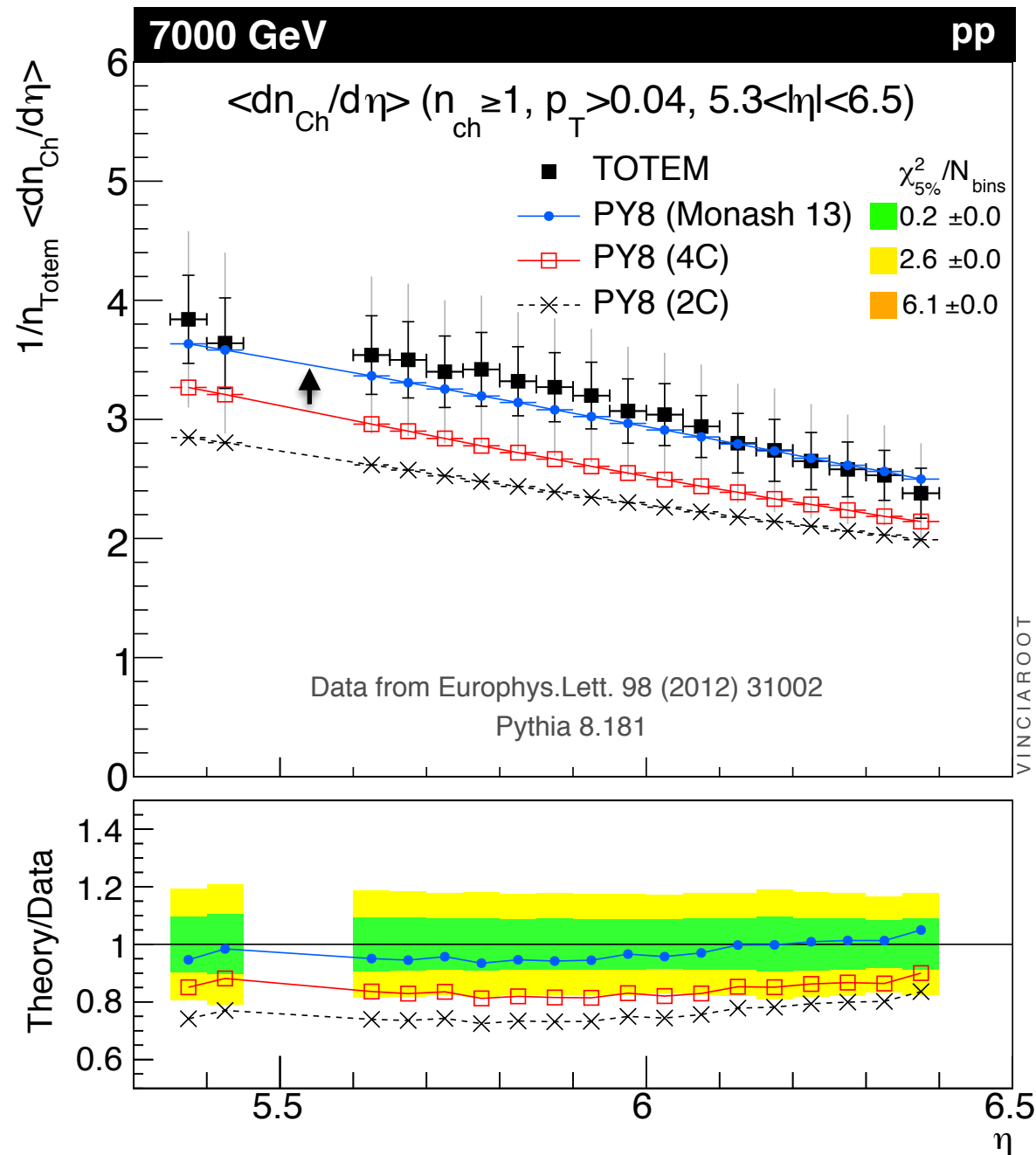


(Note: here standard ones, without fwd tag)

Going Forward

Shown with/without diffractive tag in T. Martin's talk yesterday

- Forward tag greatly enhances spread of model predictions.



Increased $\langle N_{Ch} \rangle$ in TOTEM acceptance. Slightly steeper CMS FWD E flow.

Summary

Apologies: did not do dedicated study of diffraction

E.g., gap-size distributions not included, though interesting

Revised ee fragmentation parameters and pp tune using new NNPDF2.3 LO PDF set

Increased strangeness and more forward activity

Low-multiplicity region and strangeness spectra still challenging

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Pythia 8.185 Monash 2013
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Tune:ee=7; Tune:pp = 14;
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Work underway:

Improved colour-reconnection model (PS + J.R. Christiansen)

Inclusion of diffractive Z (T. Sjostrand + C. Rasmussen)

pT distributions and Fragmentation

