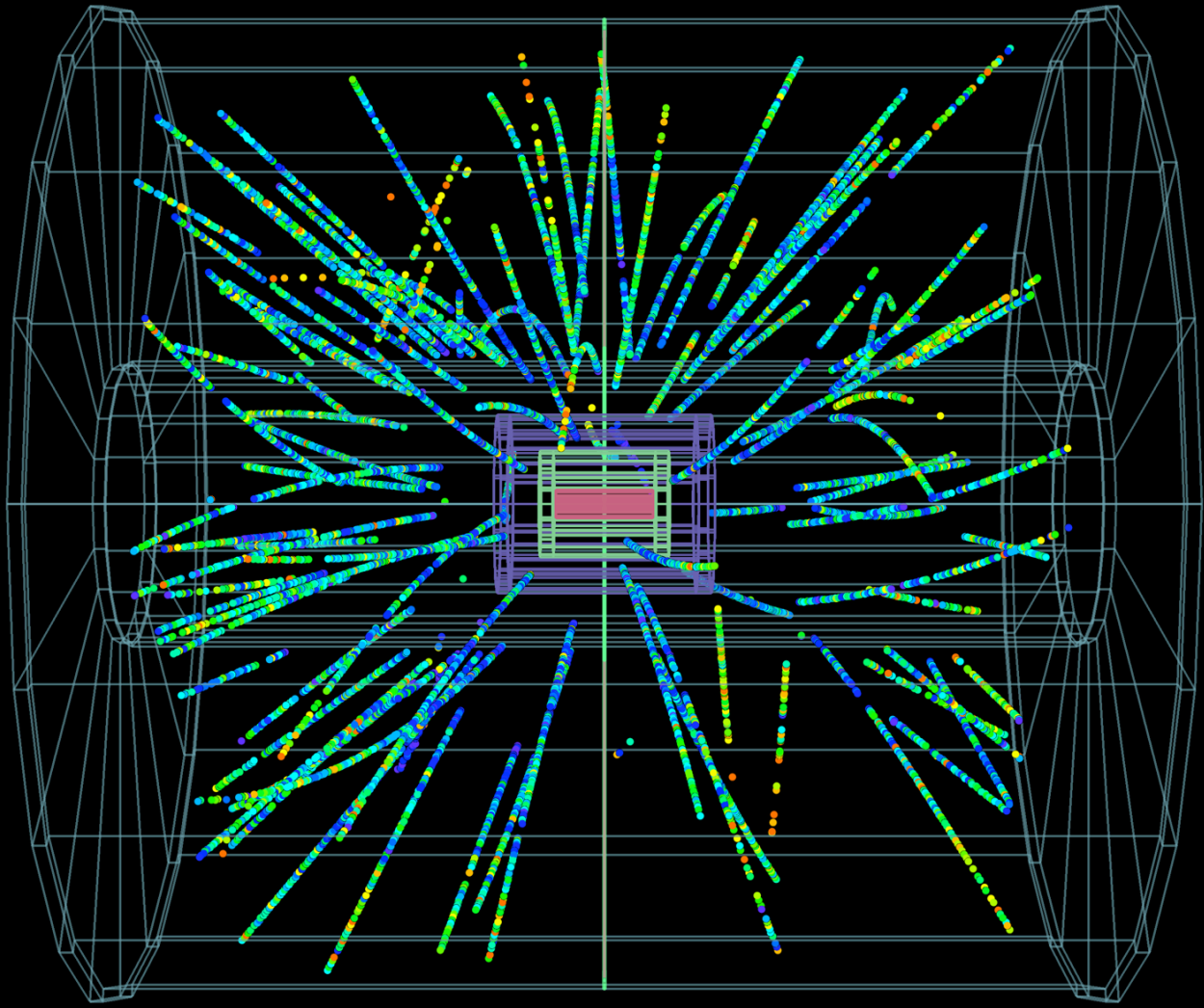


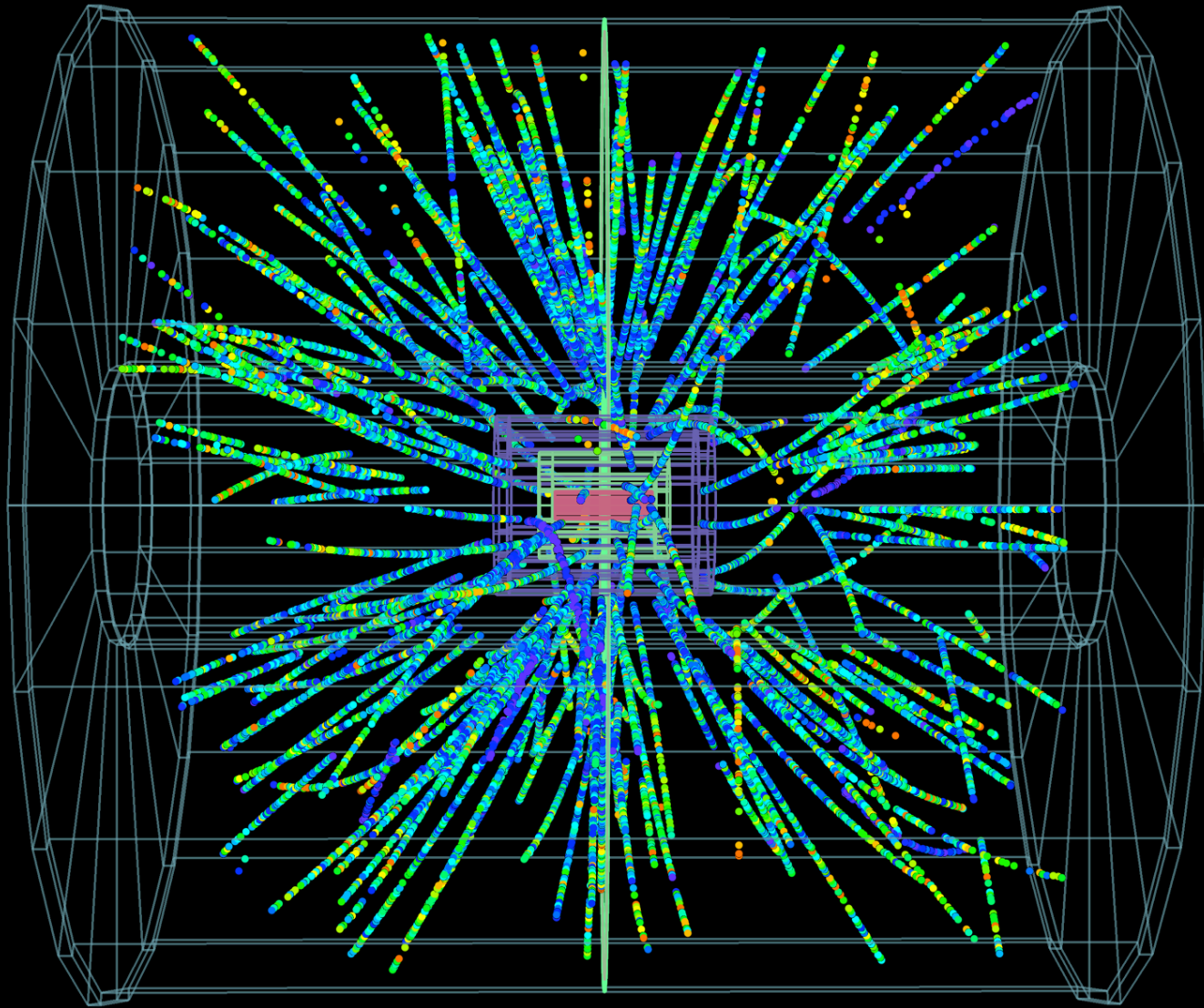


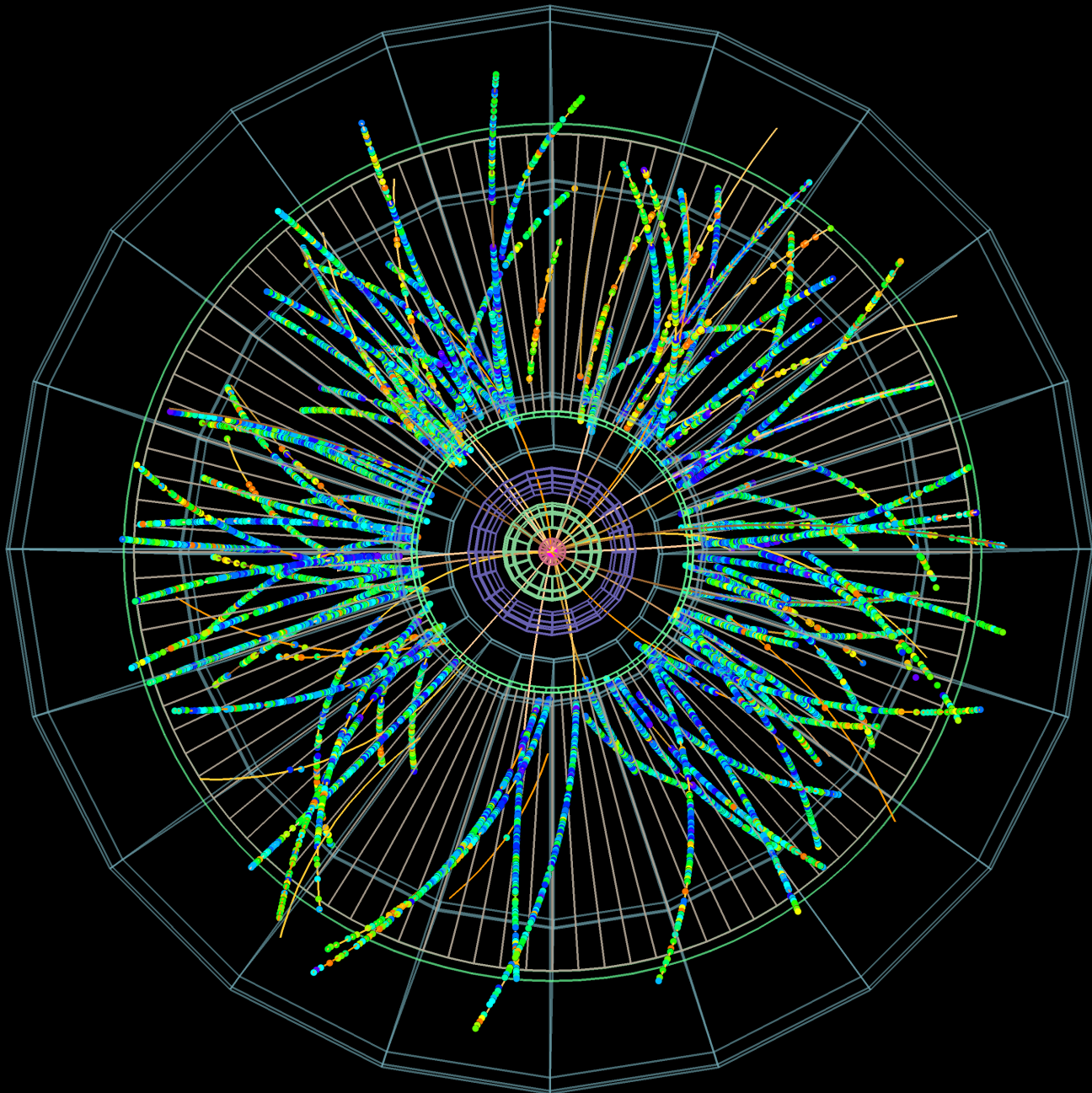
#askCERN

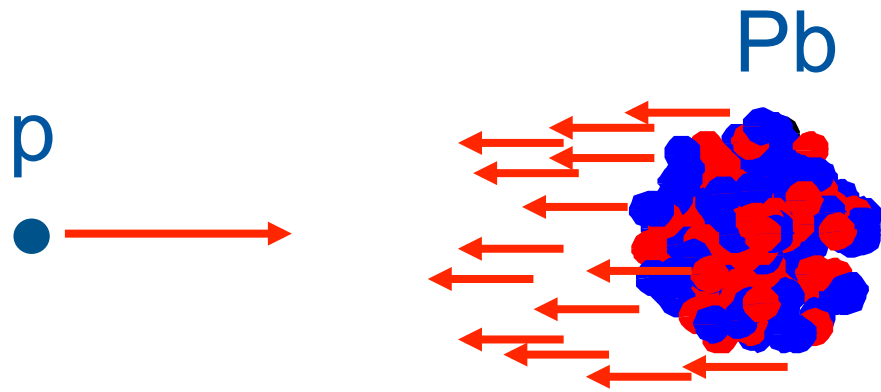
# **Hangout with CERN: Mouse smashes mammoth - protons collide with lead ions**

**24 January 2013**







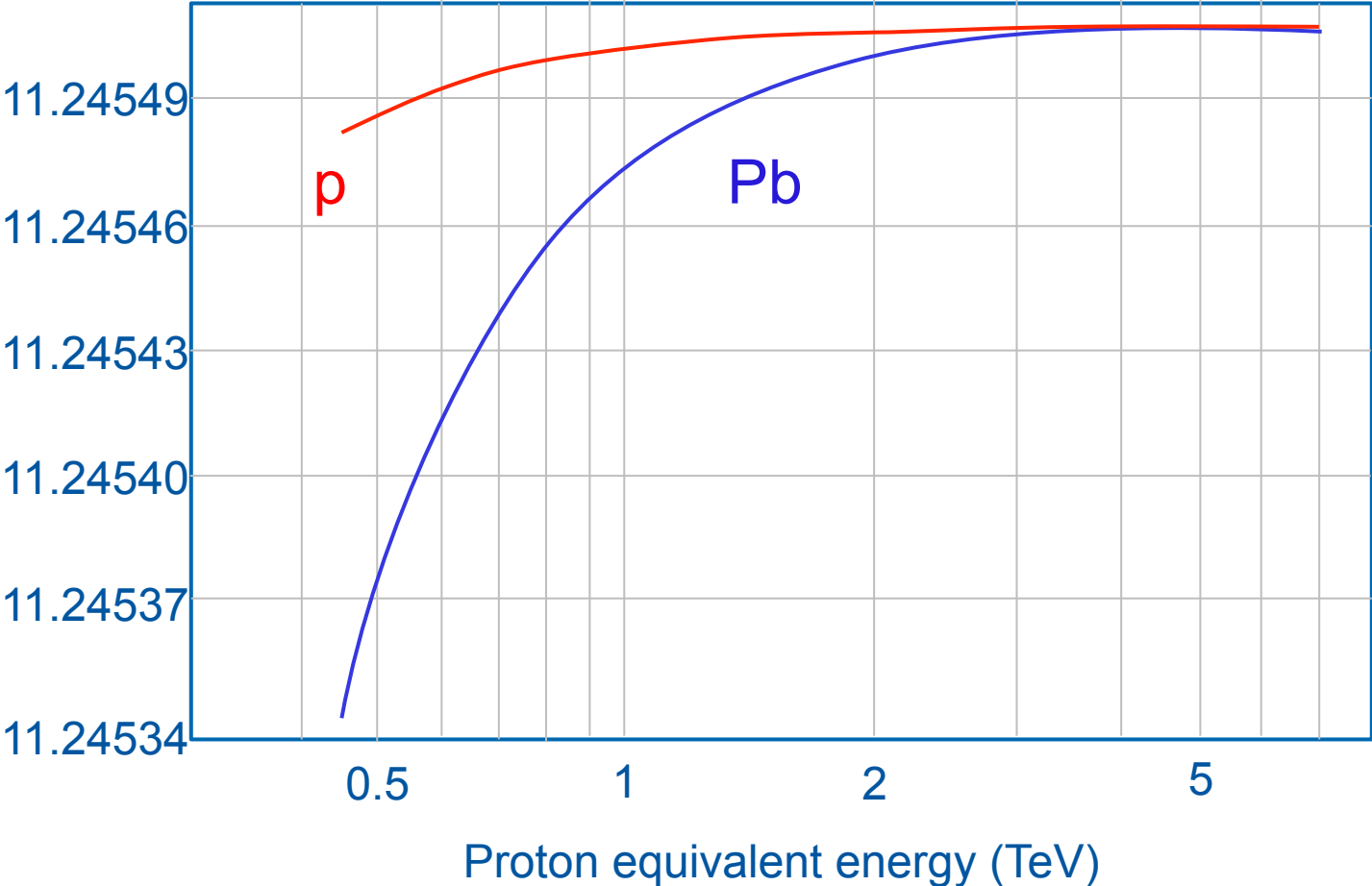


Energy (p)	Energy (Pb)	Speed (p)	Speed (Pb)
0.45 TeV injection)	36.9 TeV	0.99999783	0.99998622
4 TeV (collisions)	328 TeV	0.99999997	0.999999826

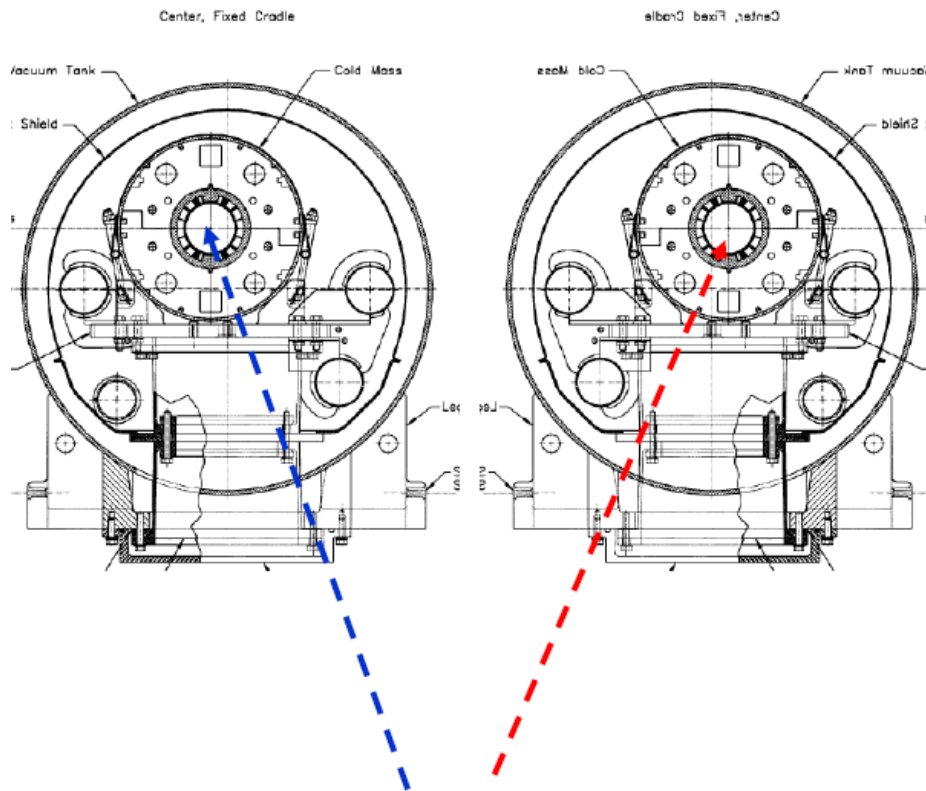
At *injection* energy, the **p beam** makes 674729 turns of the 27 km LHC in 1 minute.

At *injection* energy, the **Pb beam** makes 674721 turns of the 27 km LHC in 1 minute.

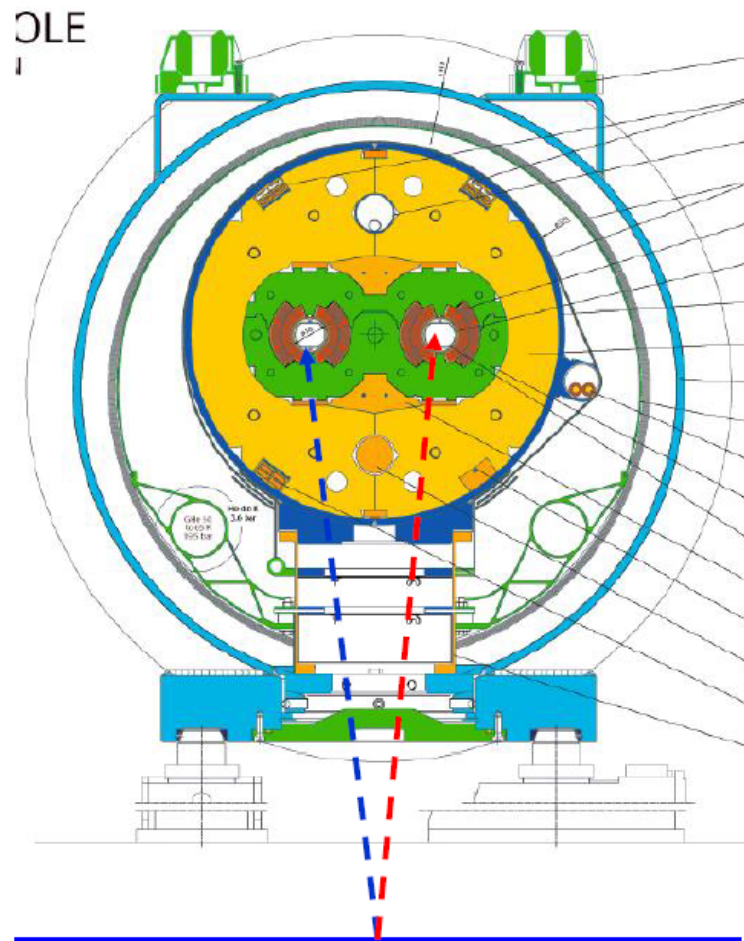
Thousands of turns per second







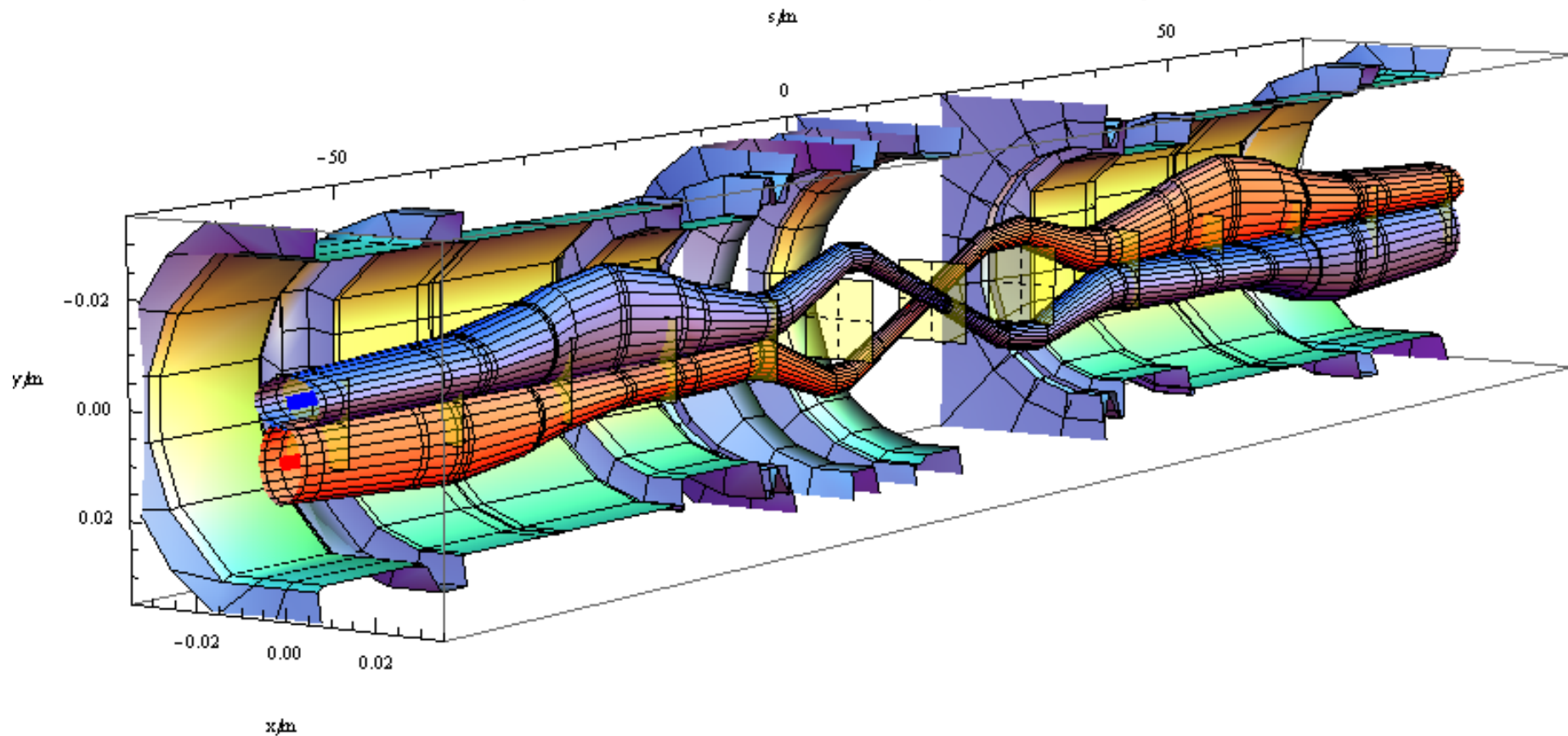
RHIC: Independent bending field for the two beams



LHC: Identical bending field in both apertures of two-in-one dipole

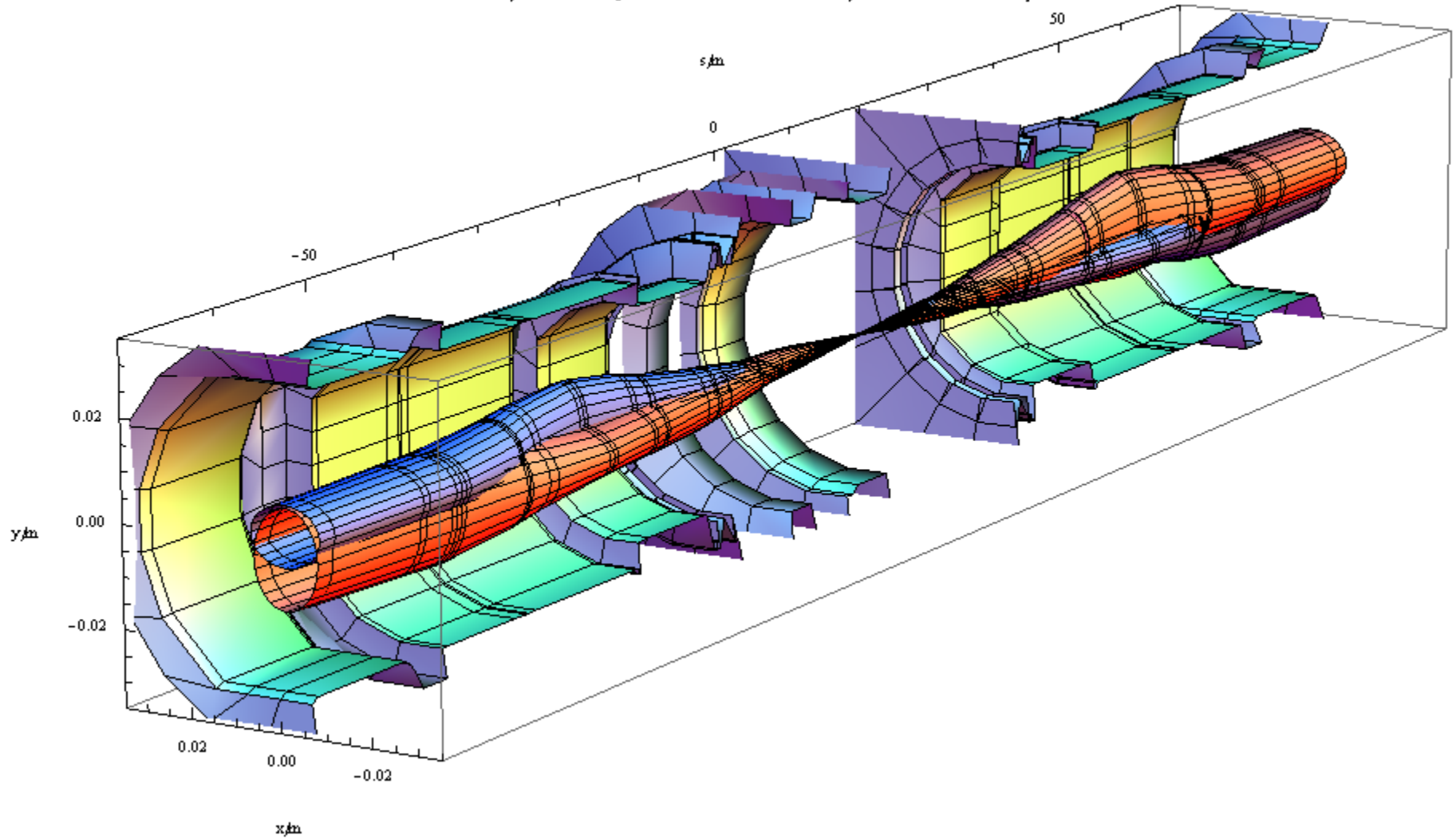
# Beams separated at ALICE, injection energy, 0.45 TeV

$(7\sigma_x, 7\sigma_y, 5\sigma_z)$  envelope for  $\epsilon_x = 7.81893 \times 10^{-9}$  m,  $\epsilon_y = 7.81893 \times 10^{-9}$  m,  $\sigma_z = 0.000306$



# Beams colliding at ALICE experiment, physics energy, 4 TeV

$(7\sigma_x, 7\sigma_y, 5\sigma_z)$  envelope for  $\epsilon_x = 5.8642 \times 10^{-10}$  m,  $\epsilon_y = 5.8642 \times 10^{-10}$  m,  $\sigma_z = 0.000306$

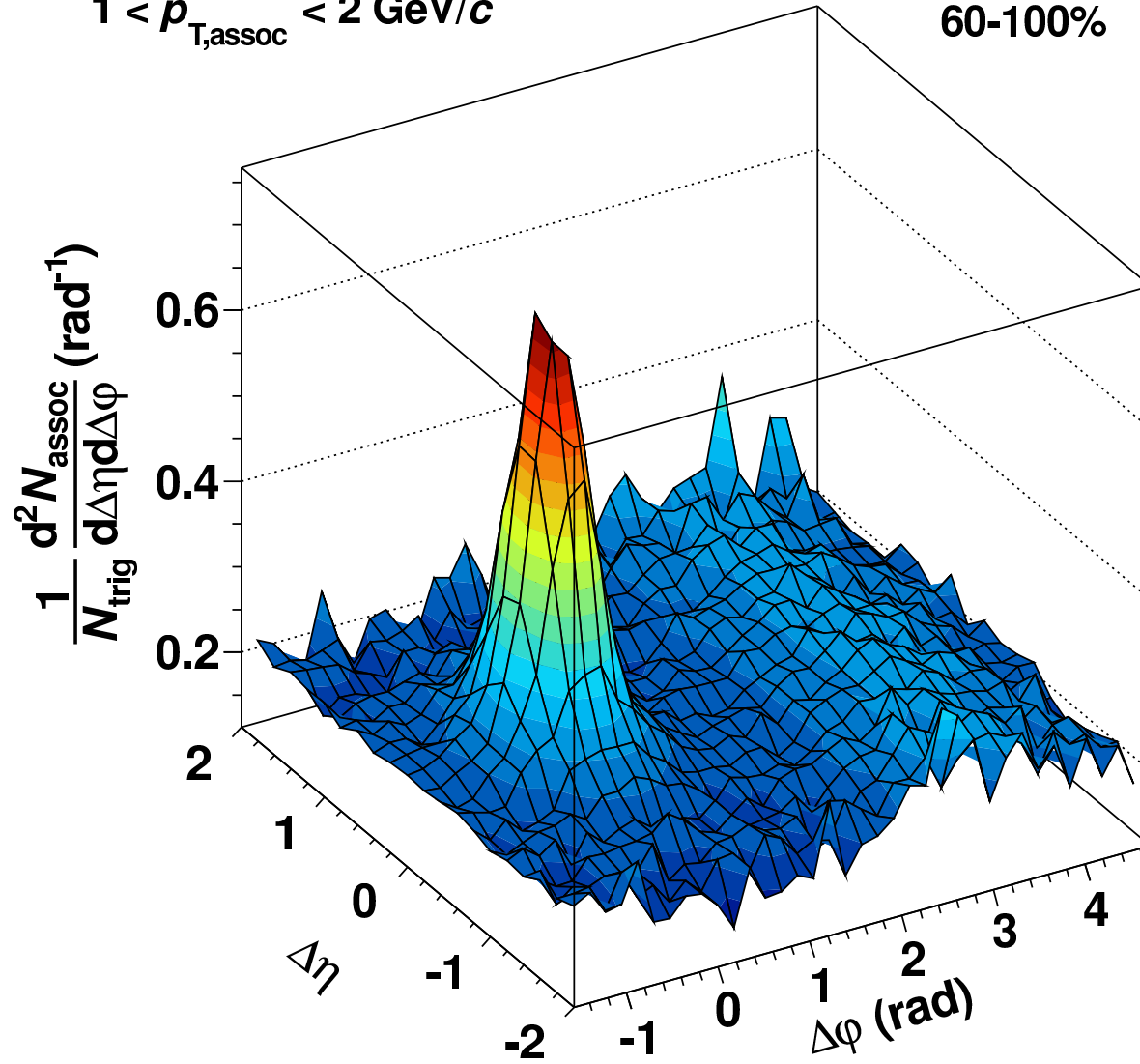


$$2 < p_{T,\text{trig}} < 4 \text{ GeV}/c$$

$$1 < p_{T,\text{assoc}} < 2 \text{ GeV}/c$$

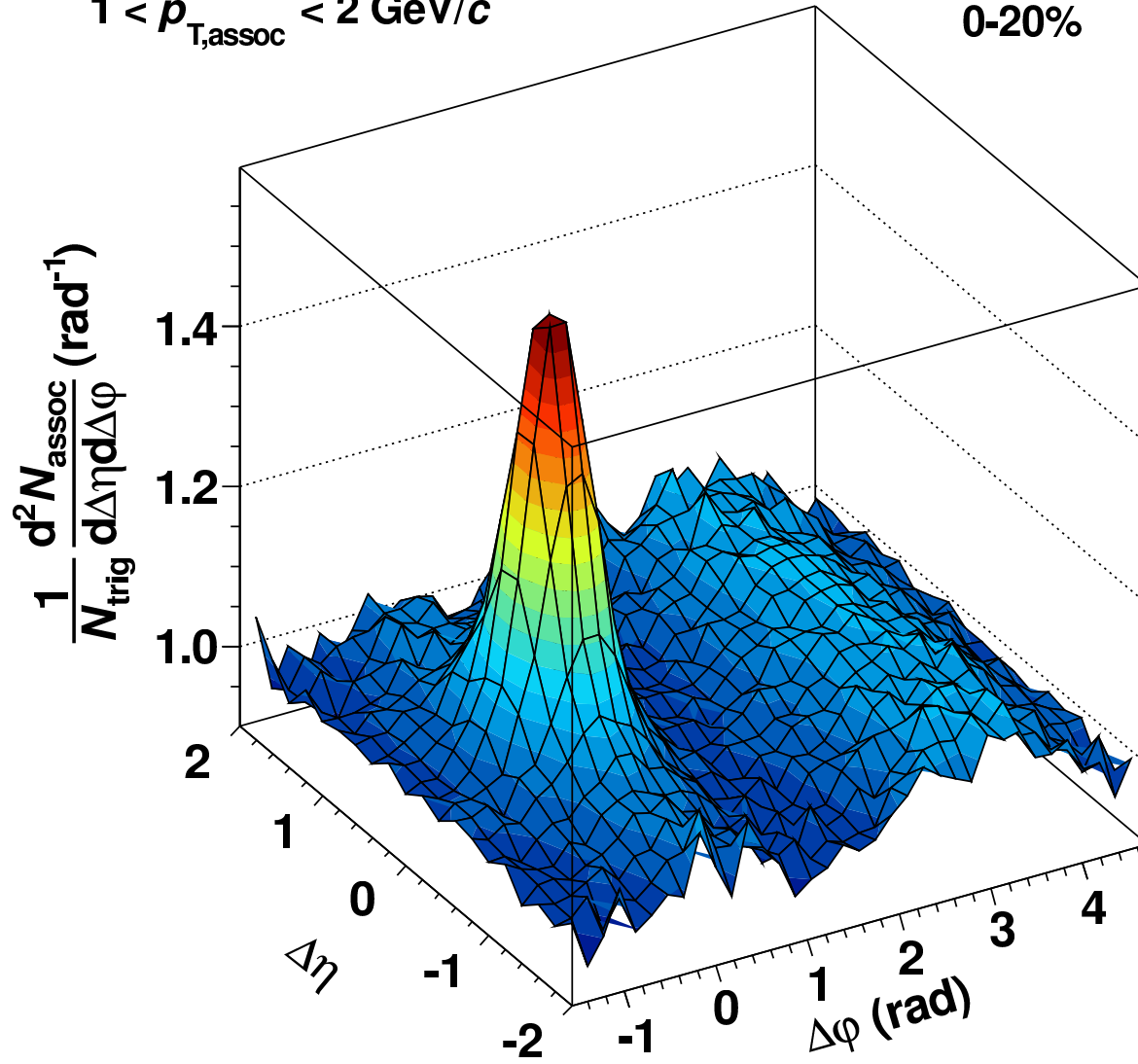
p-Pb  $\sqrt{s_{\text{NN}}} = 5.02 \text{ TeV}$

60-100%



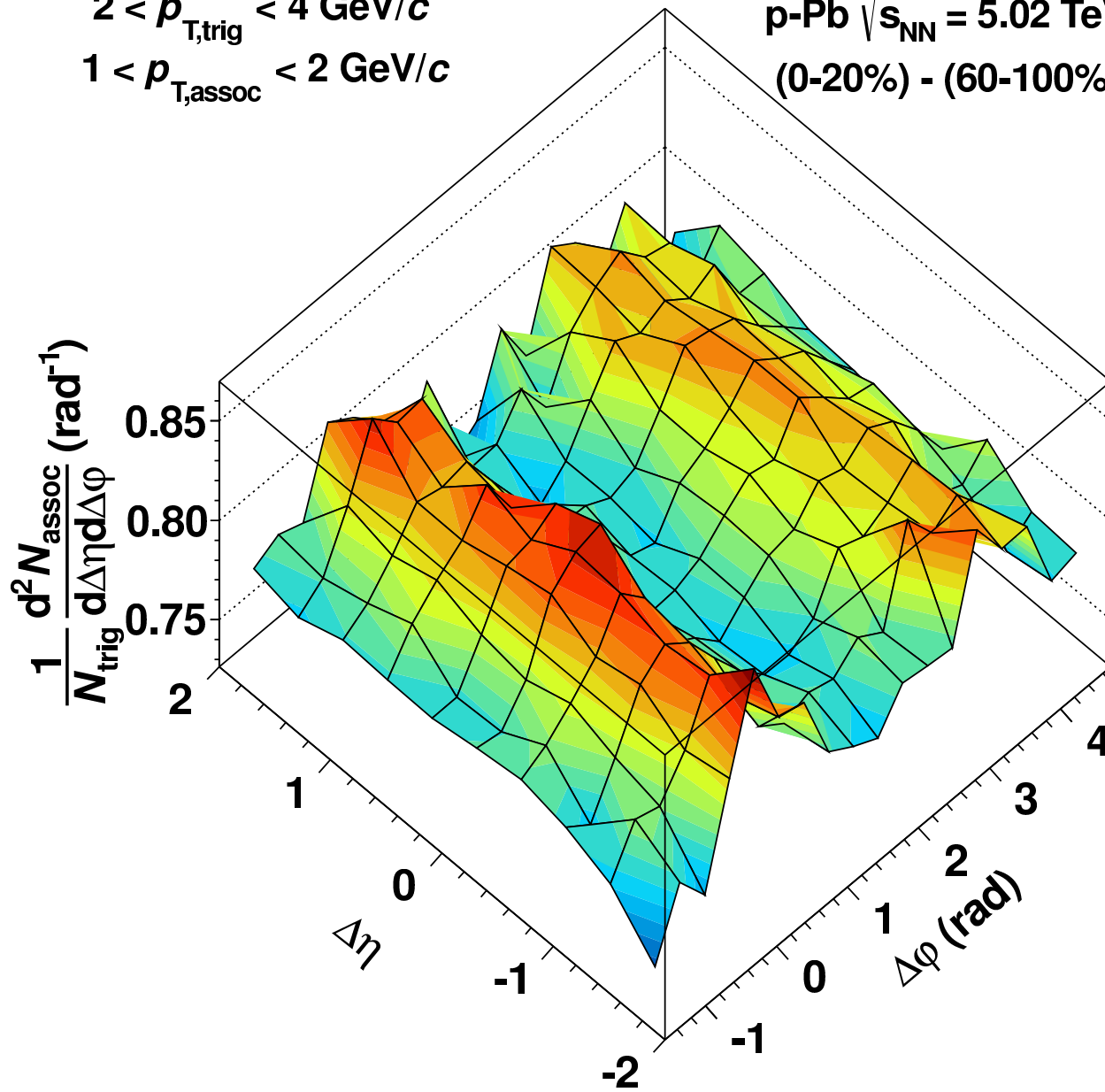
$$2 < p_{T,\text{trig}} < 4 \text{ GeV}/c$$
$$1 < p_{T,\text{assoc}} < 2 \text{ GeV}/c$$

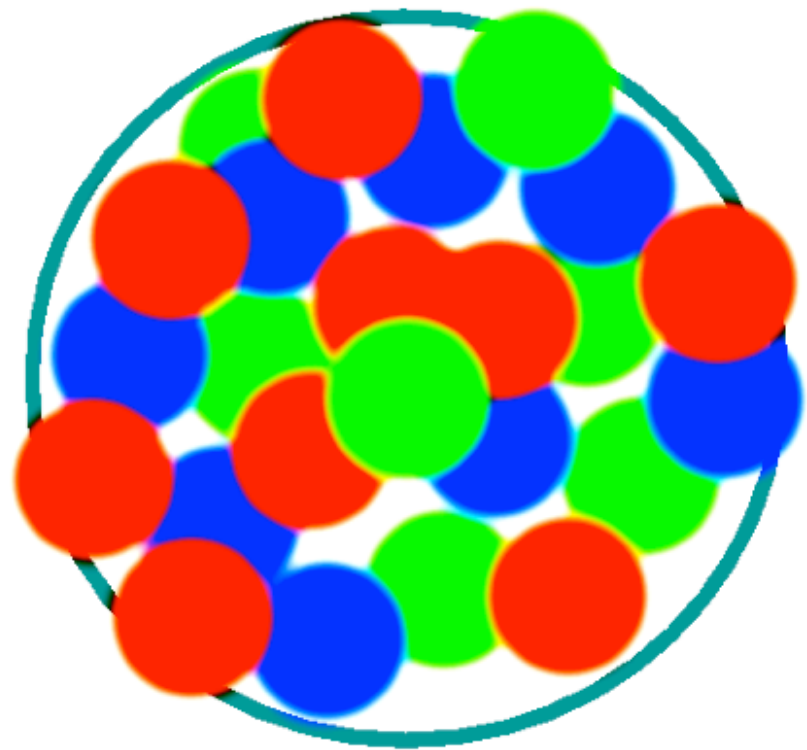
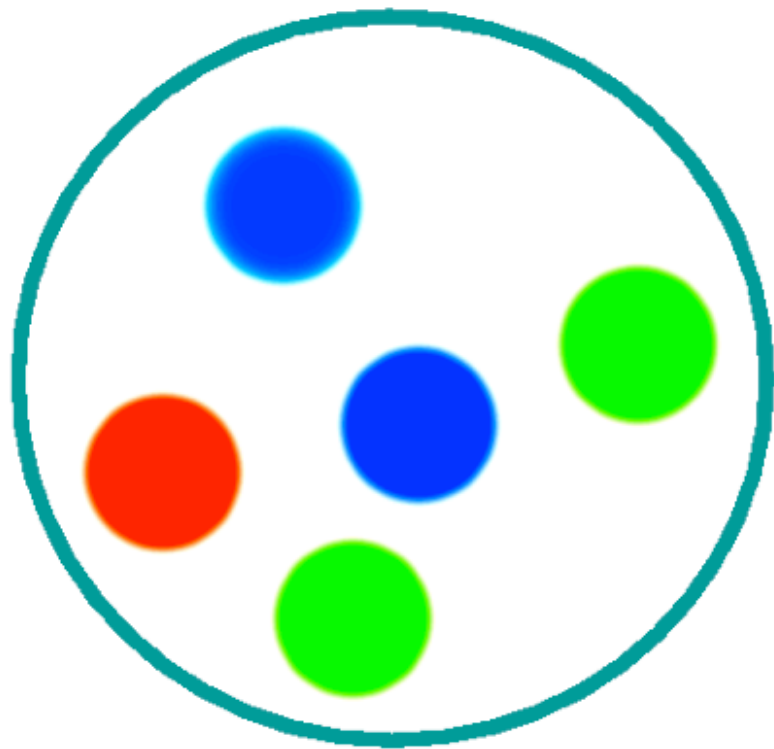
p-Pb  $\sqrt{s_{\text{NN}}} = 5.02 \text{ TeV}$   
0-20%

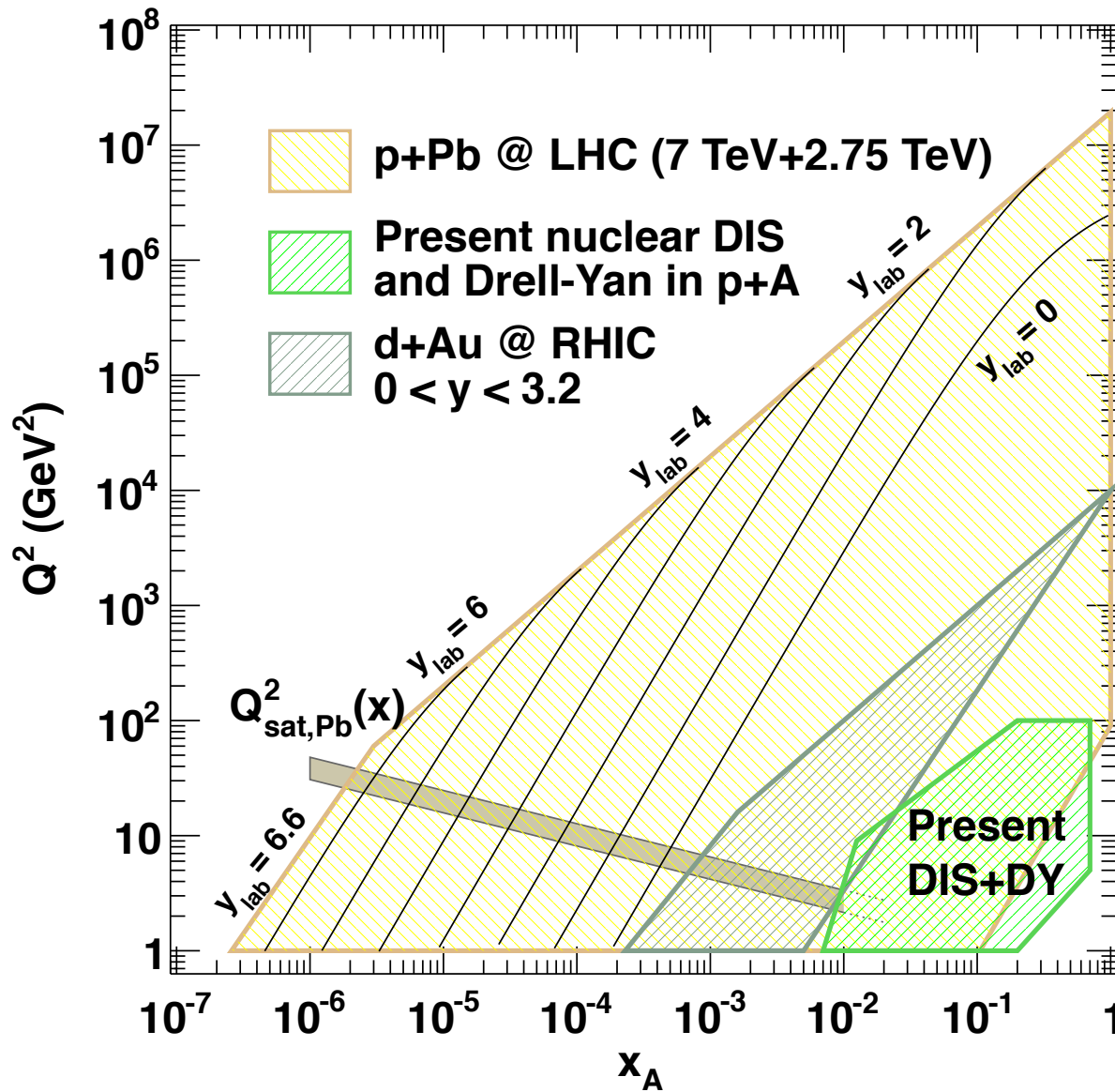


$2 < p_{T,\text{trig}} < 4 \text{ GeV}/c$   
 $1 < p_{T,\text{assoc}} < 2 \text{ GeV}/c$

p-Pb  $\sqrt{s_{NN}} = 5.02 \text{ TeV}$   
(0-20%) - (60-100%)









# CERN Summer Student Programme

- For undergraduate students of physics, computing and engineering.
- Learn more at <http://cern.ch/go/Sx8s>
- Deadline **THIS WEEK!**



# Next week

- Physics Roundtable
  - Informal chat with physicists, on proton-lead collisions
  - Send your questions on YouTube, event announcements on Google+ and Facebook, or on Twitter using #askCERN
  - Want to join the Hangout as a participant? Tell us why, and we may invite you!

# For the latest news

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- [atlas.ch](http://atlas.ch)
- [cern.ch/cms](http://cern.ch/cms)
- [cern.ch/lhcb-public](http://cern.ch/lhcb-public)

# CERN participants

John Jowett, LHC Accelerator Physicist

Reine Versteegen, LHC Accelerator Physicist

Despina Hatzifotiadou, ALICE Physicist

Jan Fiete Grosse-Oetringhaus, ALICE Physicist

Yvonne Pachmayer, ALICE Physicist

Carlos Salgado, Theorist

# Credits

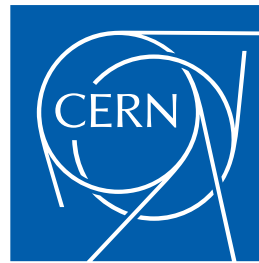
Steve Goldfarb — Host

Ken Read — Q&A from Social Media

Kate Kahle — Producer

Achintya Rao — Director

Thank you for watching!



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