

DESY Summer Students Session

Sept. 17, 2007

# Towards a Global Silicon Vertex at H1

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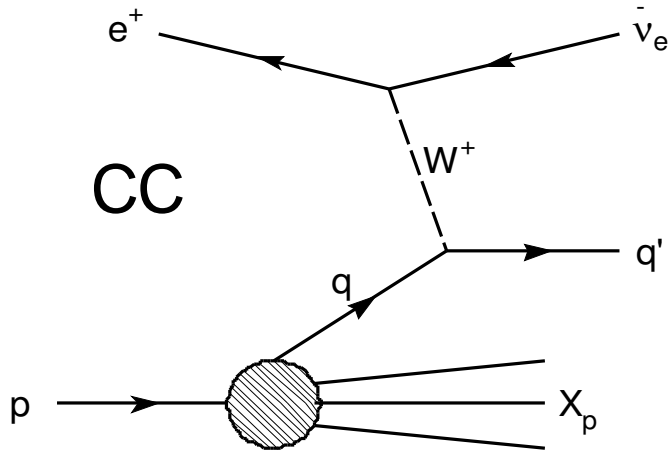
# Outlook

- Introduction (what I did)
- Physics behind the analysis – charged current
- Relevant detector components of H1
- Analysis
- Conclusion

# What did I do all the time?

- ✓ Two methods of track reconstruction given:  
STD (official code) and IMP (new)
- ✓ Two samples given: Mix of events and PSCC
- x Compare: Is IMProved better than StanDard?
- x Can IMP replace STD for next reprocessing of  
HERA II data?
- x Are there complications with special events  
e.g. PSeudo Charged Current?
  - Yes<sup>3</sup>

# Physics – Charged Current CC

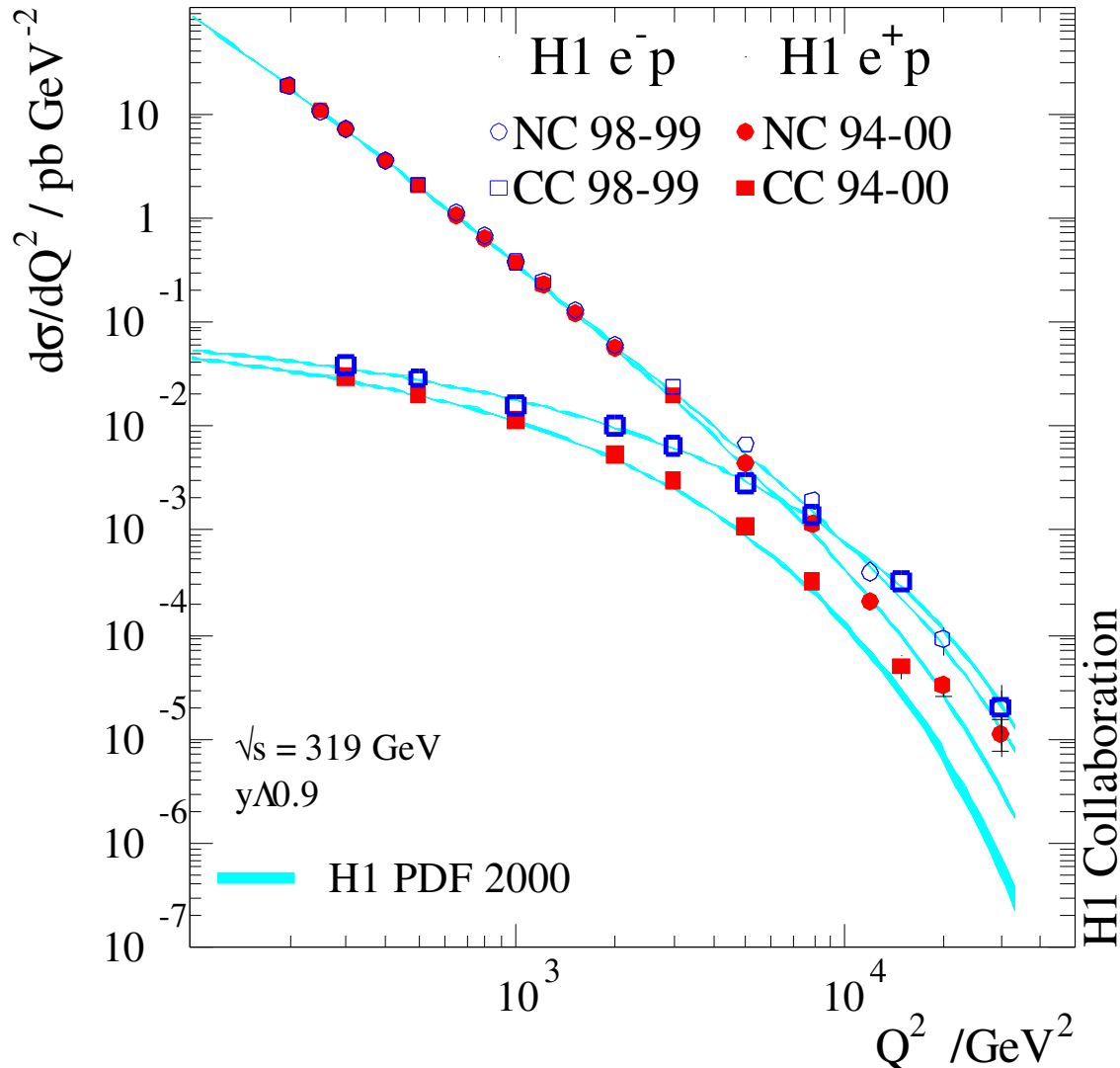


Signature:

- Missing transverse momentum ( $\nu$  escapes)
- High momentum transfer ( $Q^2 > 100 \text{ GeV}^2$ )
- Back to back topology ( $\nu$  opposite direction to q-jet in transverse plane)

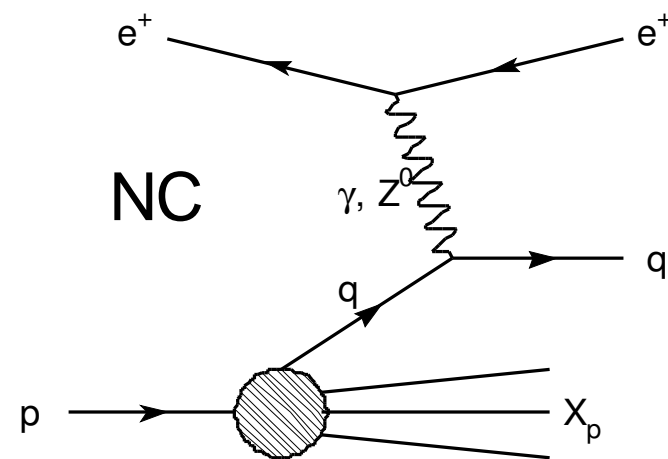
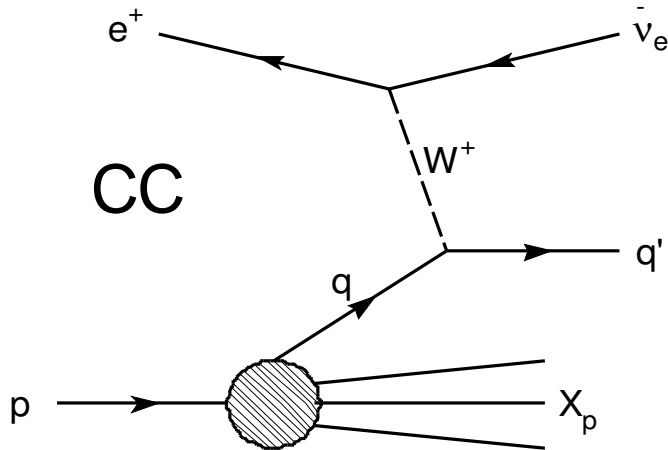
# Physics – CC vs. NC

Neutral and Charged Current



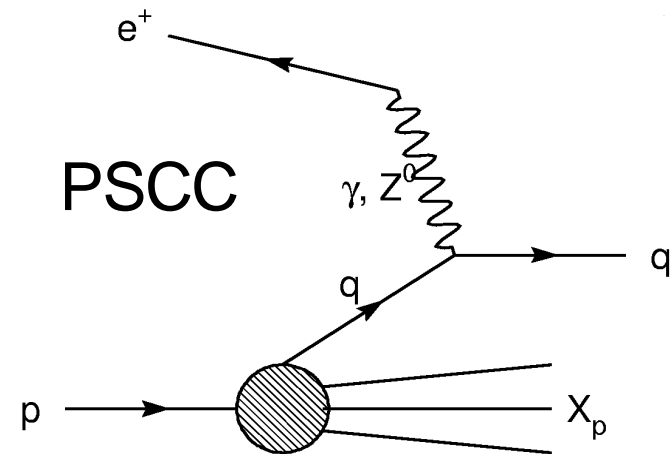
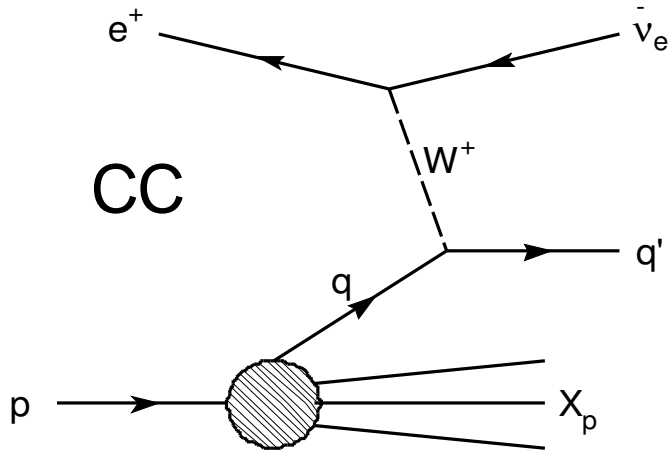
Problem:  
Low statistics  
for charged  
current –  
much more  
neutral  
current  
events.

# Physics – Pseudo Charged Current PSCC



Similar reactions – can NC be used to complement CC e.g. for detector calibration?

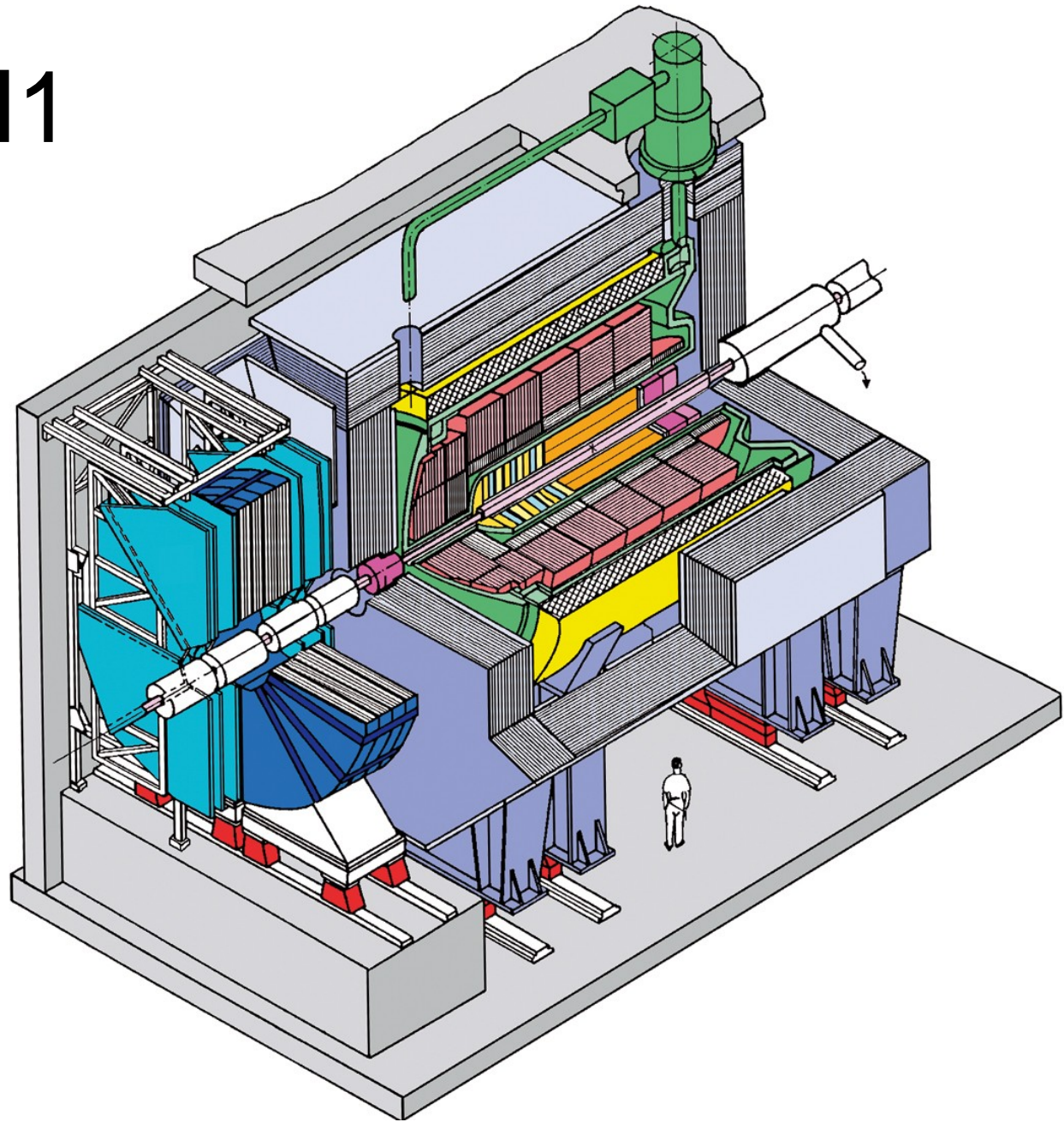
# Physics – CC vs. PSCC



Signature:

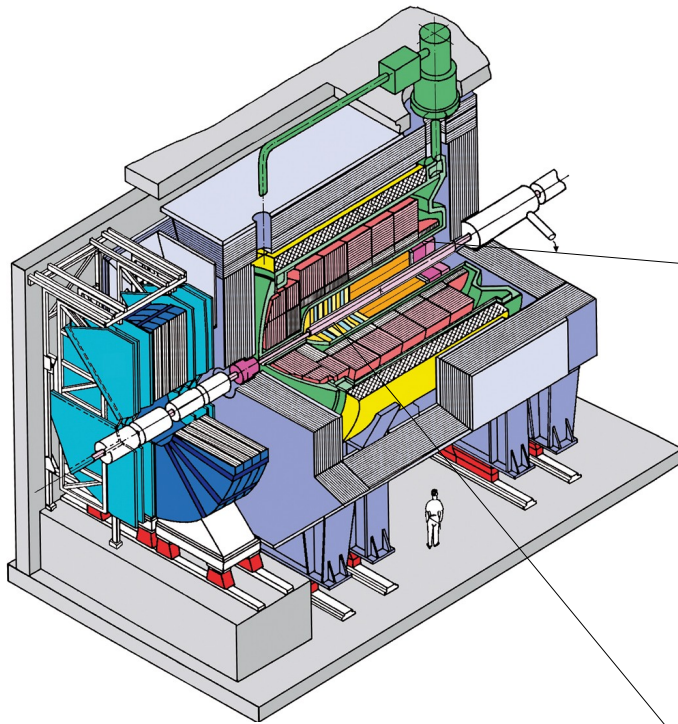
- Missing transverse momentum
- High momentum transfer
- Back to back topology

# Detector H1

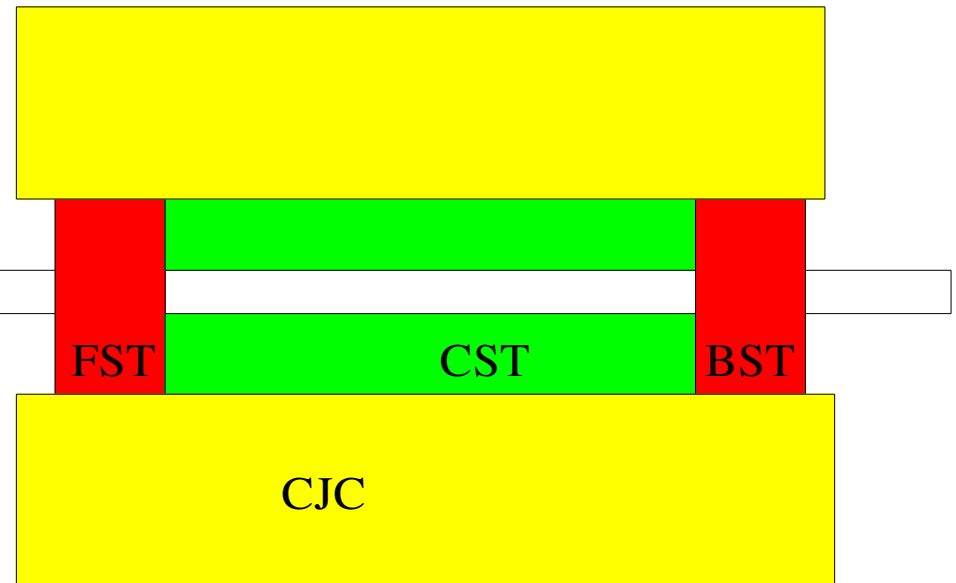




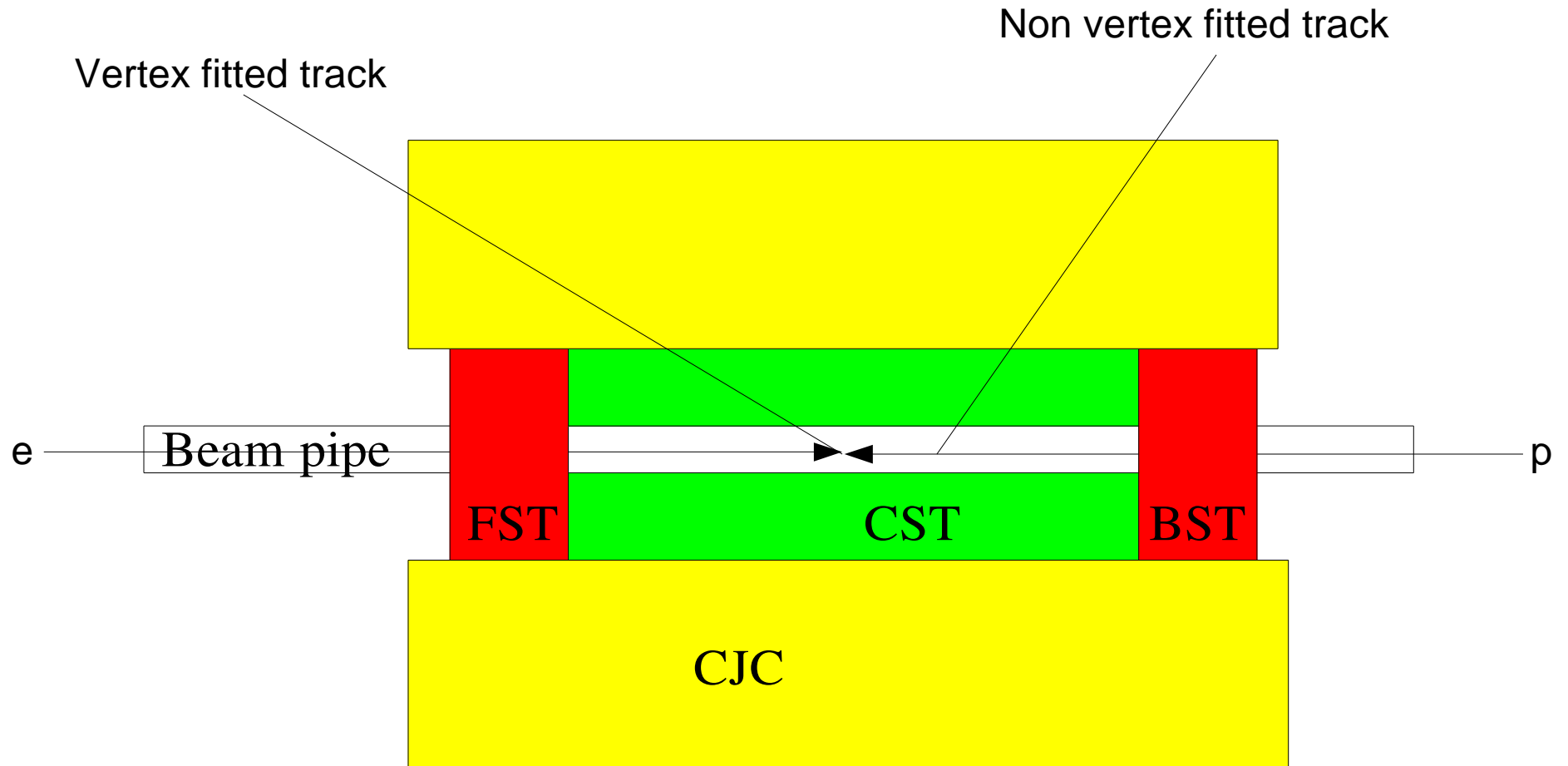
# Detector H1



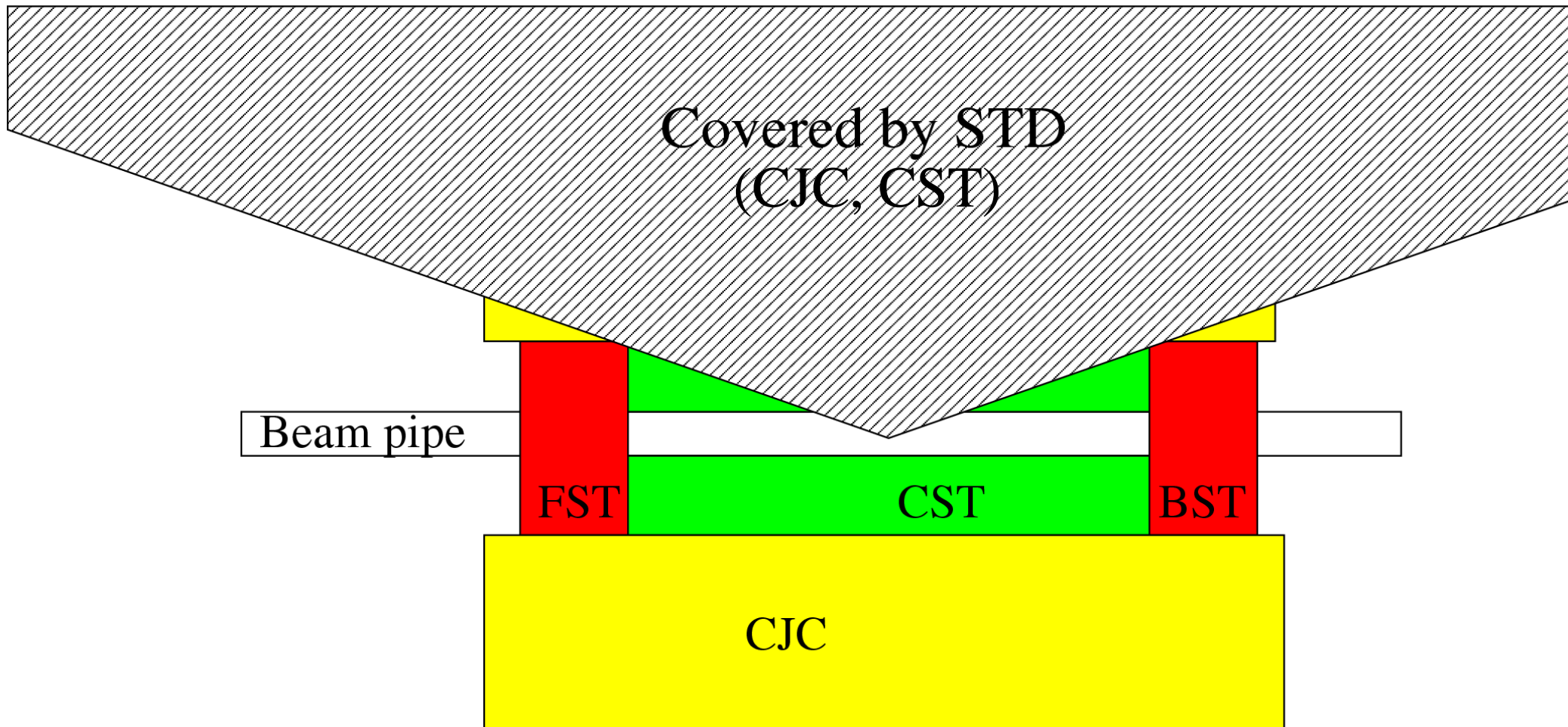
Beam pipe



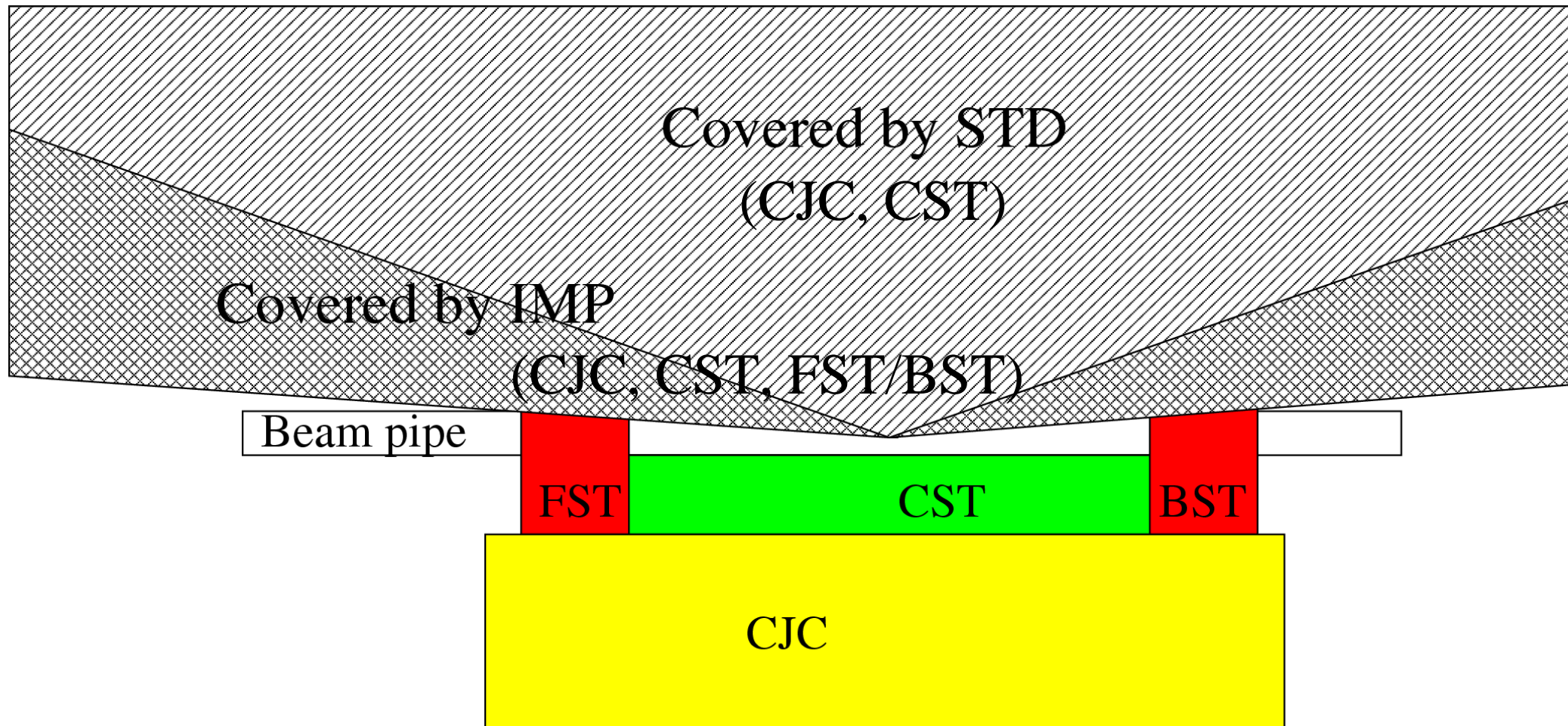
# Tracking detectors of H1



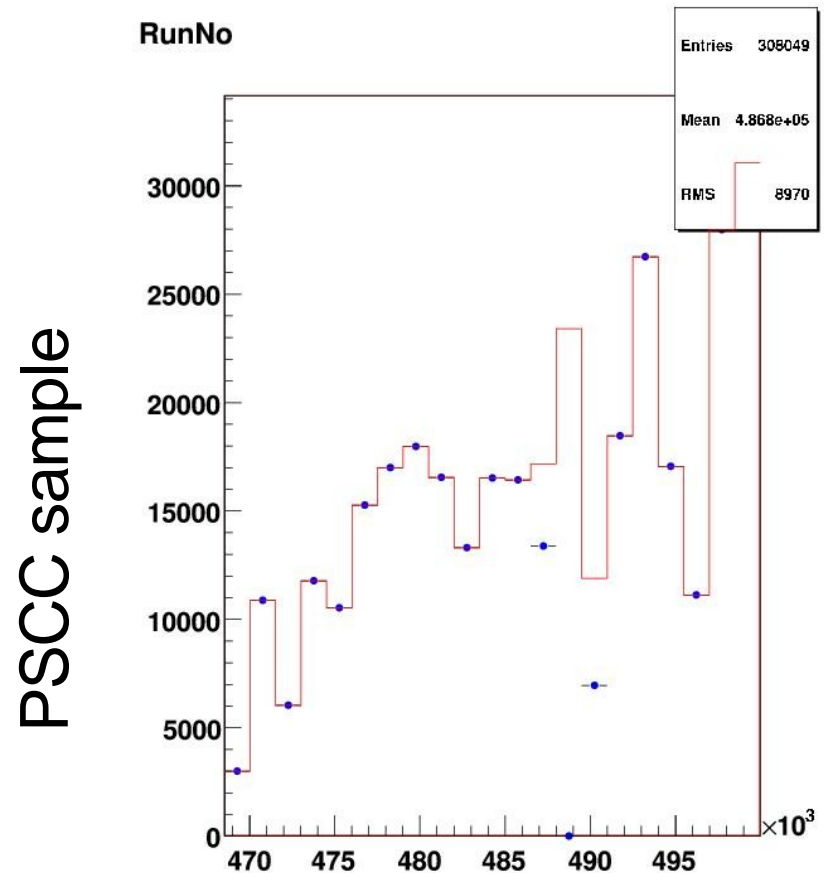
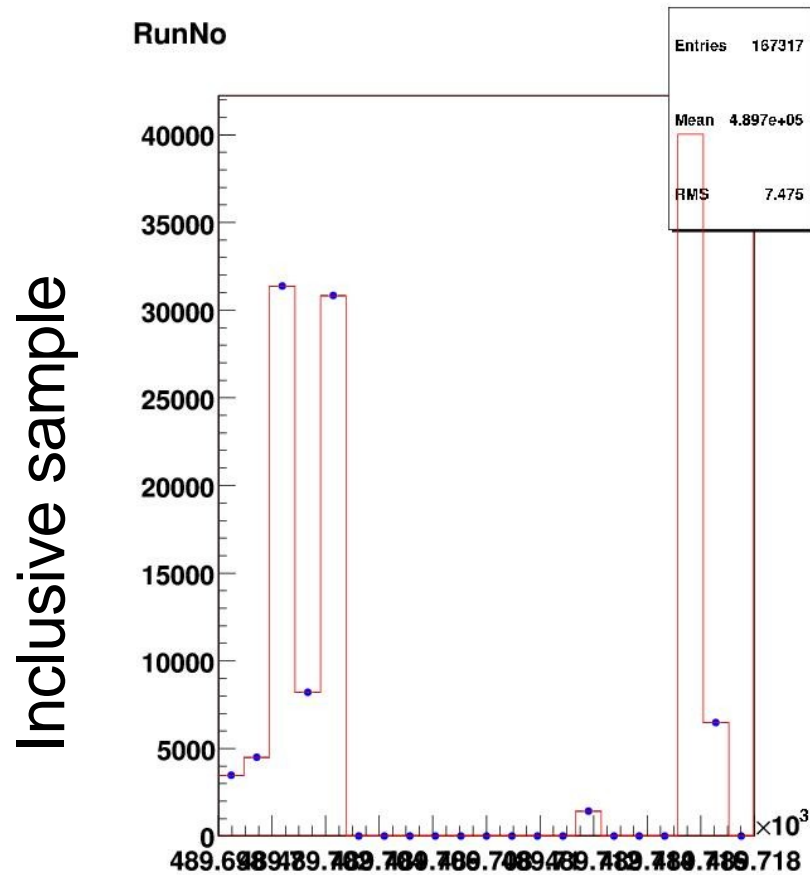
# Tracking detectors of H1



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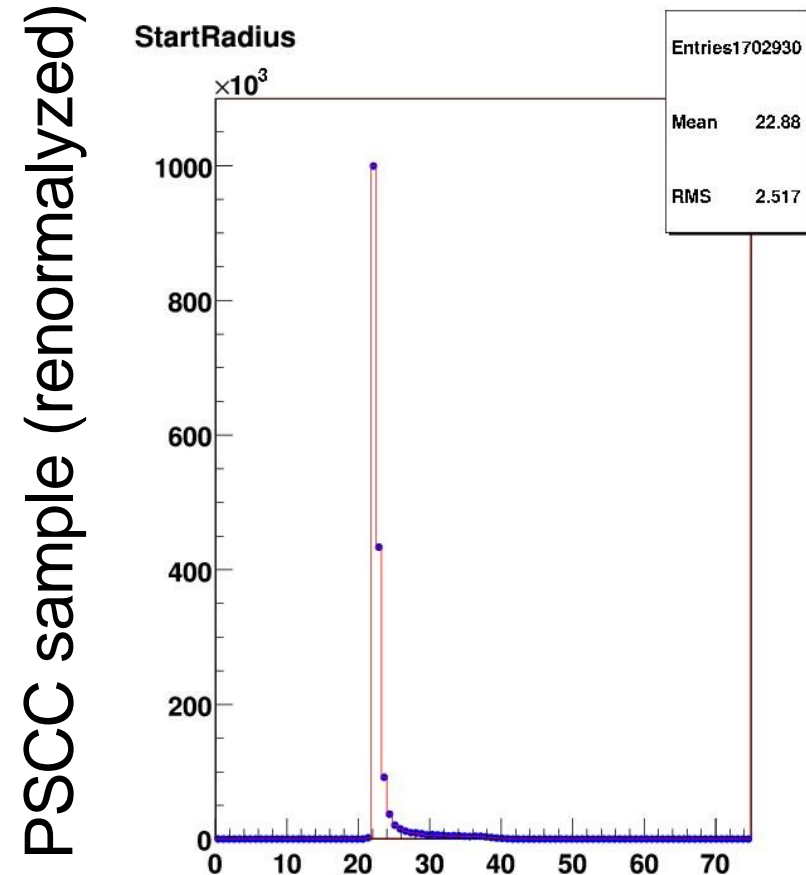
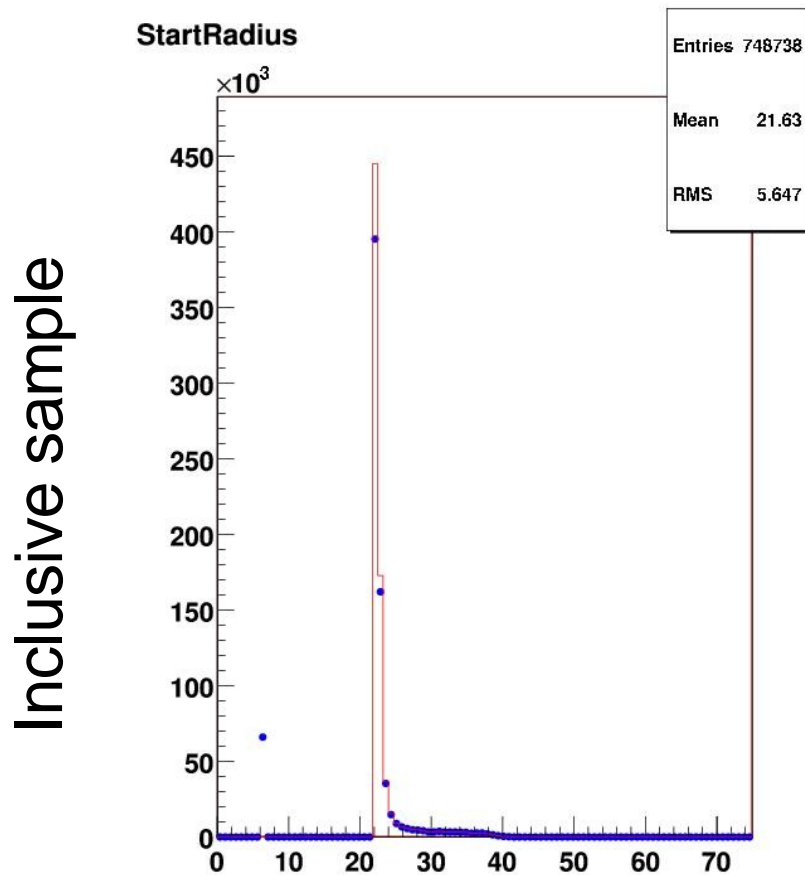


# Analysis – number of selected events



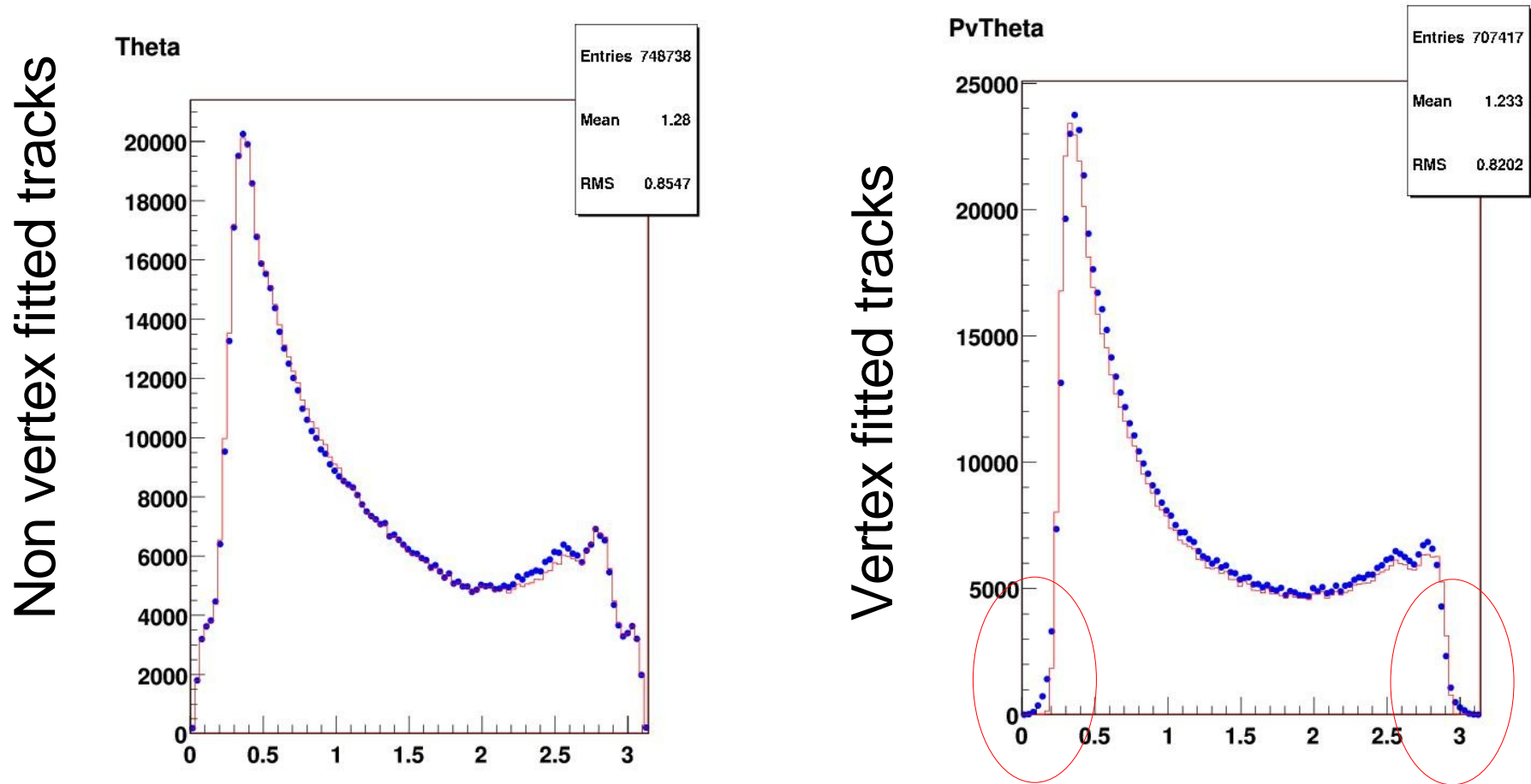
- ✓ Incl. sample: IMP (blue dots) selects as many events as STD (red bars)
- x PSCC: Events are lost due to a cut in preselection

# Analysis – start radius of tracks



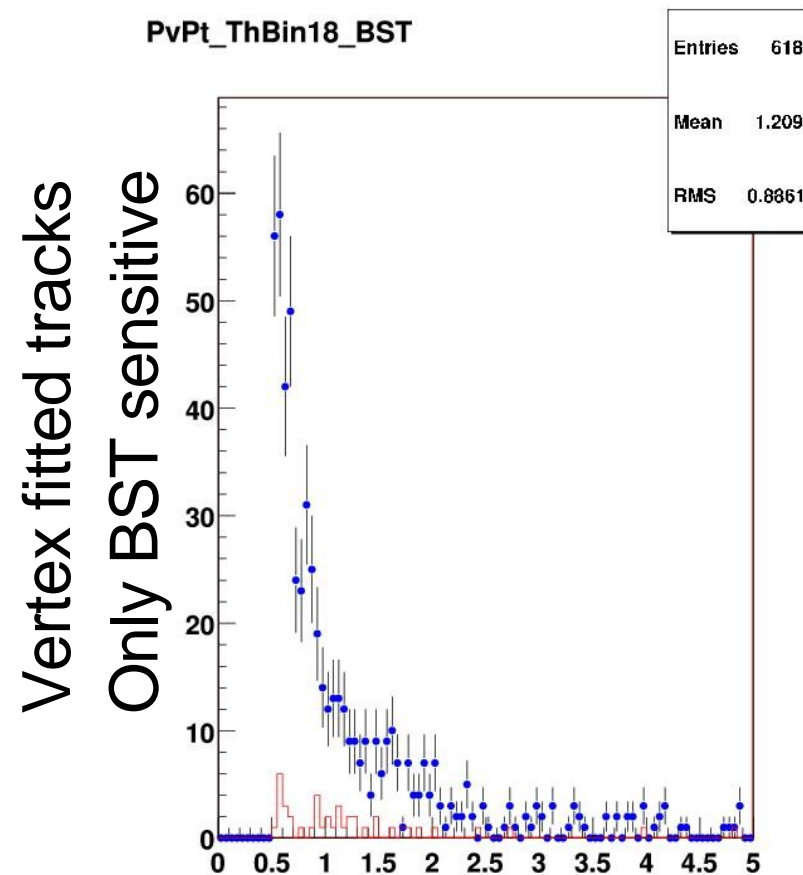
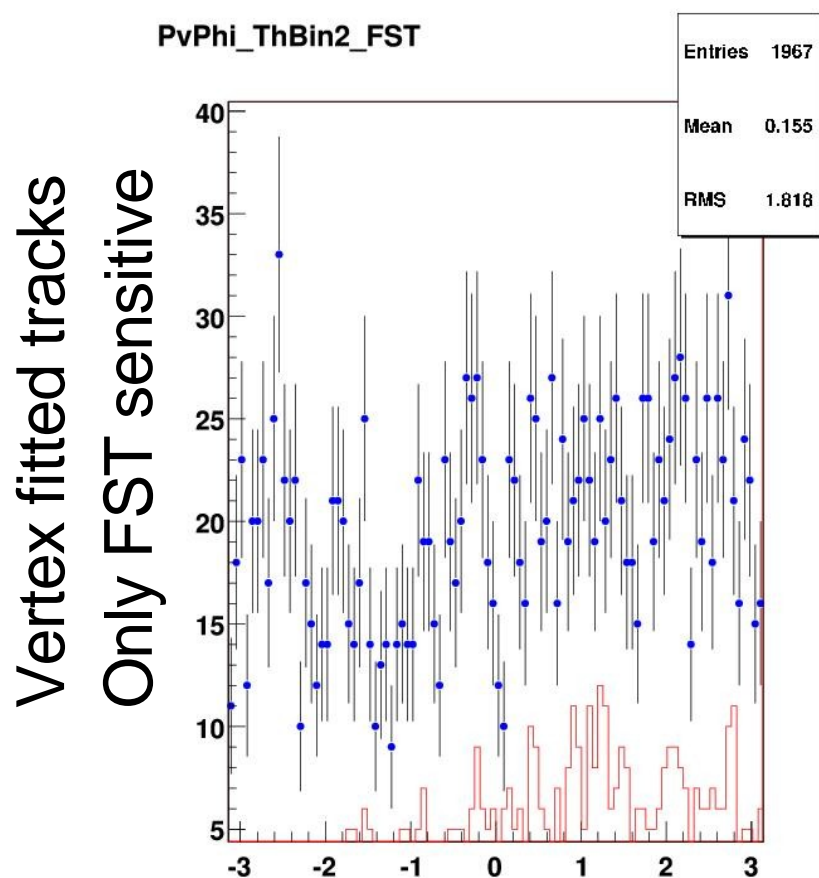
- ✓ Incl. sample: **IMP** selects tracks from FST/BST as it is supposed to do
- x PSCC: No additional tracks found by IMP

# Analysis – polar angle $\vartheta$ distribution of tracks



- ✓ Non vert. fit.: Partially less events because they are new vertex fitted
- ✓ Vert. fit: Many new tracks for low/high  $\vartheta$  + former non vertex fitted tracks

# Analysis – $\varphi$ /transverse momentum where only FST/BST are sensitive



- ✓ Many more vertex fitted tracks for very low and very large  $\vartheta$
- ✓ Distributions of transverse momentum and  $\varphi$  meet expectations



# Conclusion

- Technical implementation of the different codes works fine
- More tracks are found  $\Rightarrow$  better statistics achievable
- Some samples (NC and PSCC) to be studied further
- Goal: Replace STD by IMP in the official H1 software for next reprocessing of HERA II data

# The end

Thank you for the attention.

Questions and critical remarks to be fired at me?