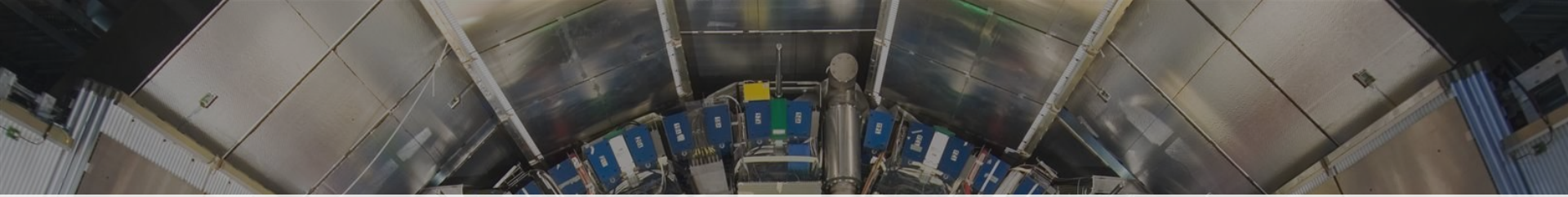

Timing calibration using single pion events

Physics Upgrade meeting
2023, November 30
https://indico.slac.stanford.edu/event/8571/

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Ariel Schwartzman
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Feedback from the Upgrade Physics meeting

- Our sample is not uniform in pion pT (especially up to 10 GeV). So our result could be driven from higher pT pions and truth time resolution for lower pT pion could be worse
  - Our study was redone with fine truth pion pT granularity

    [3, 6, 9, 12, 15, 18, 20]

    * 1~3 GeV pions were excluded in this study

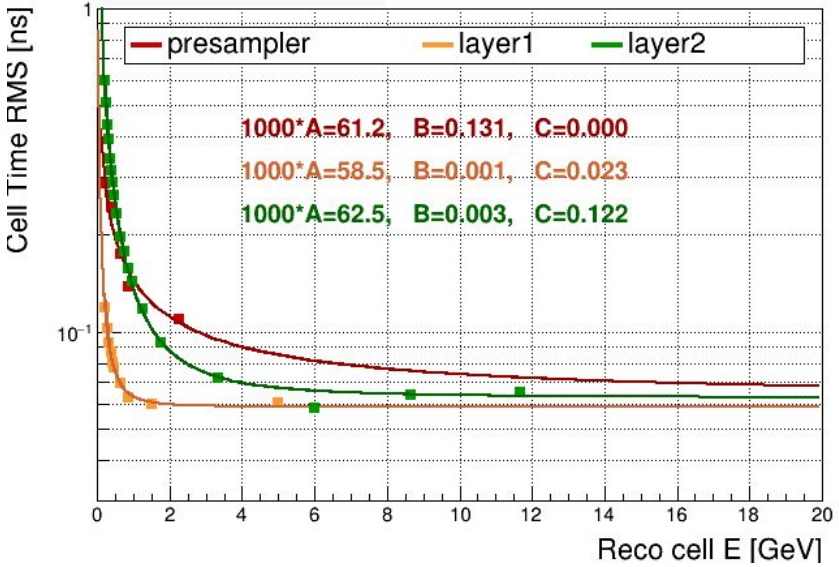
	# pion	
truth pino pT range	Baseline Selection	with 1GeV Cell
1 ~ 3	27166	453
3 ~ 6	22112	4912
6 ~ 9	13175	8387
9 ~ 12	9332	8163
12 ~ 15	7293	6875
15 ~ 18	5975	5788
18 ~ 20	3422	3342

- Need to check the agreement with Data.
  - We probably can benefit from Columbia team :)

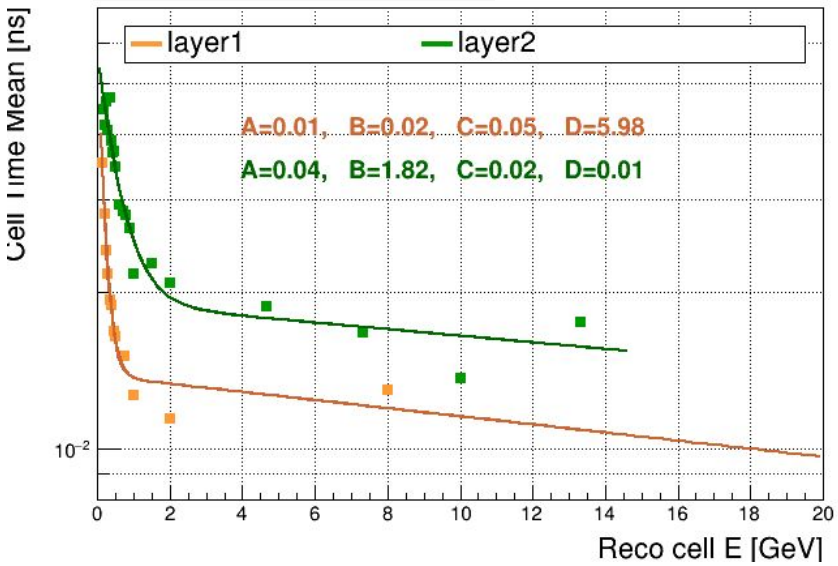
Neutral pion

Cell time resolution & mean (1~20 GeV pions, *what we showed*)

$$\sqrt{A^2 + \frac{B^2}{E} + \frac{C^2}{E^2}}$$



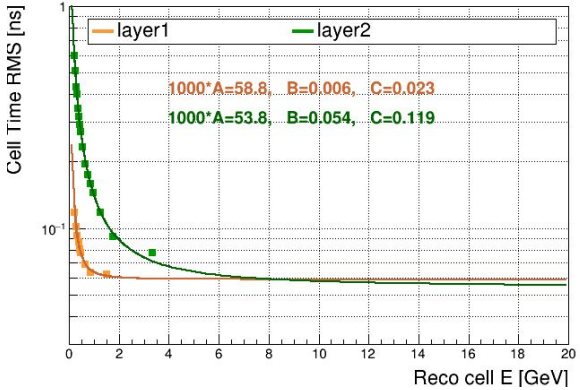
$$A \cdot e^{-B \cdot E} + C \cdot e^{-D \cdot E}$$



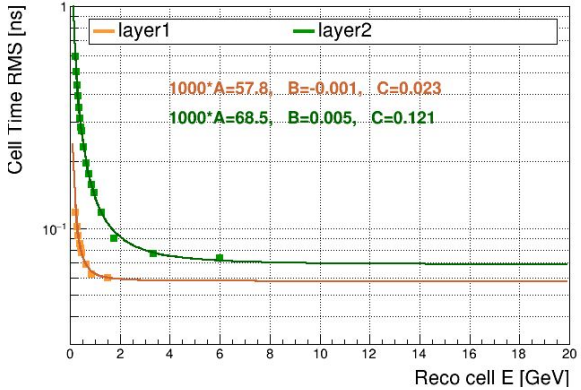
Neutral pion

Cell time resolution & mean in different pion pT regions

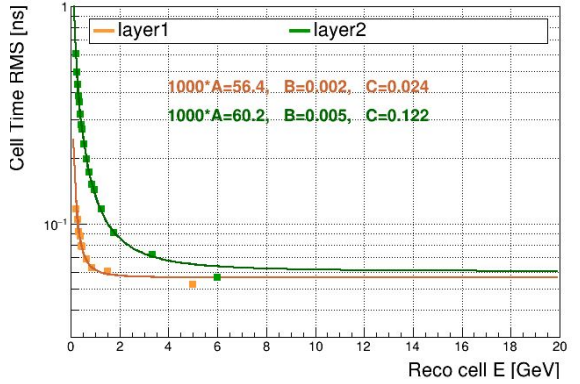
3 GeV < Truth Pion pT < 6 GeV



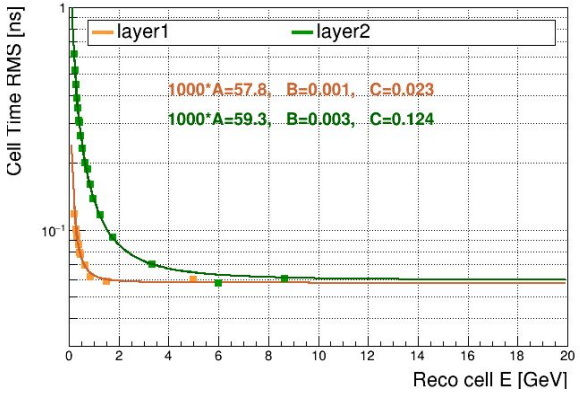
6 GeV < Truth Pion pT < 9 GeV



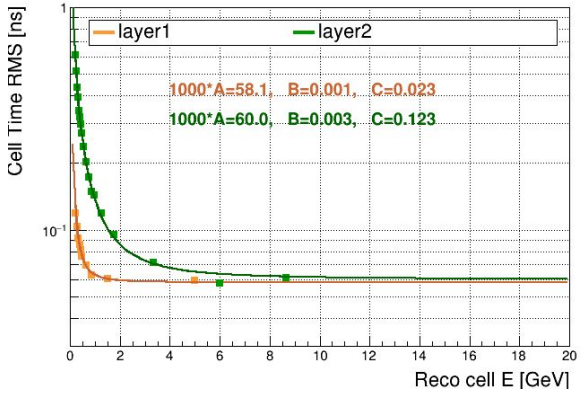
9 GeV < Truth Pion pT < 12 GeV



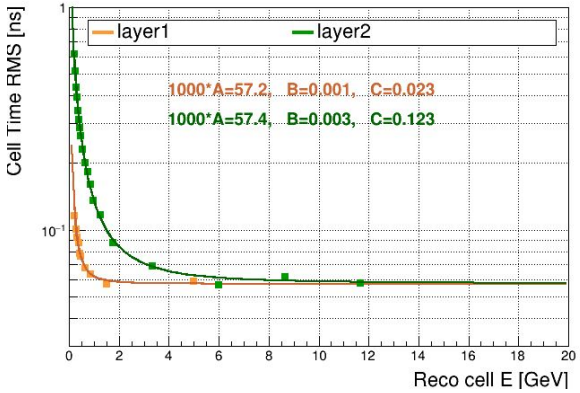
12 GeV < Truth Pion pT < 15 GeV



15 GeV < Truth Pion pT < 18 GeV

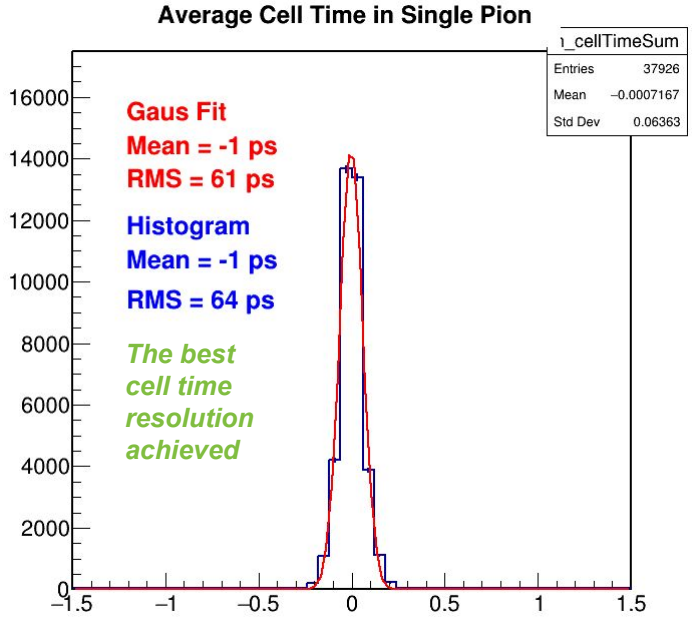


18 GeV < Truth Pion pT < 20 GeV

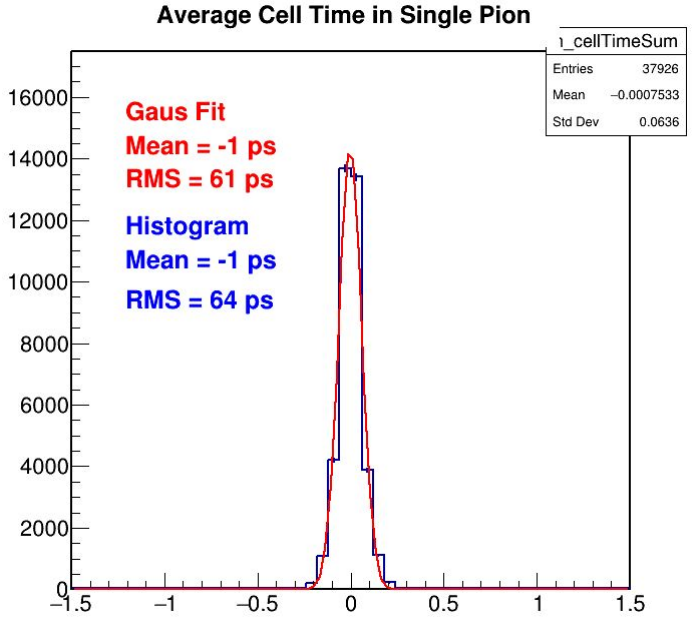


Neutral pion

Averaged cell time per pion 1/RMS^2 weighted



Fit inclusively
1 ~ 20 GeV all together (Ref.)



Fit in finer pT bins

- There is negligible effect of finer truth pion pT binning
- i.e. our results were not driven by high pT pions

Backup