

Status Report

Shota Izumiyama
27 Sep. 2019
mPMT-Japan meeting

Simulation condition (remind)

- Generated electron events by WCSim
- Detector: Hyper-K with 20" PMTs and mPMTs
 - Photo coverage: 20inch PMT = 20 %, mPMT = 10 %
- Particle gun:
 - Particle generator: gps
 - 10,000 events of 10 MeV e-
 - Uniform in detector
 -
- Reconstruction: Benjamin-san's code
 - Not Bonsai

New

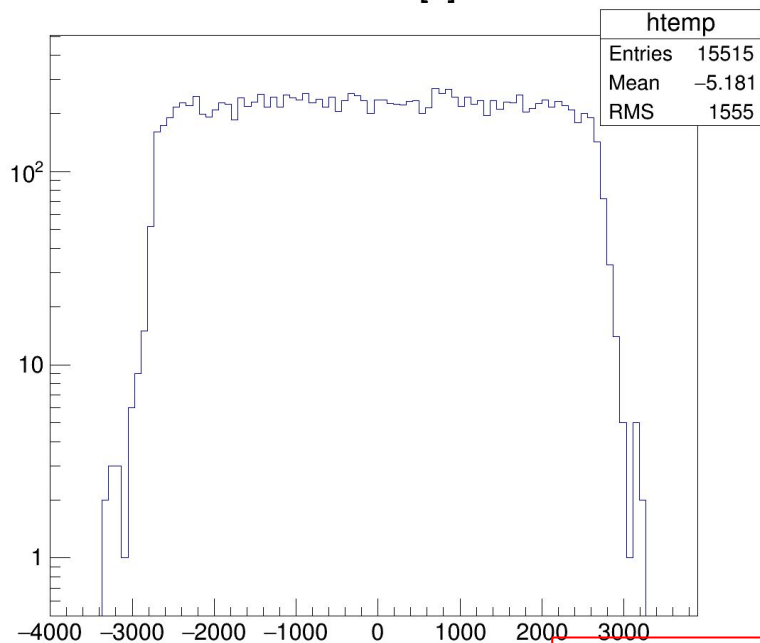
- Disabled masking mPMT

```
32
33 // Configuration of maskPMT
34 const bool maskPMT=false; //false; //true;
35 const int pmtTypeMasked=1;
36 const double maskedProbability=0.4;
37
```

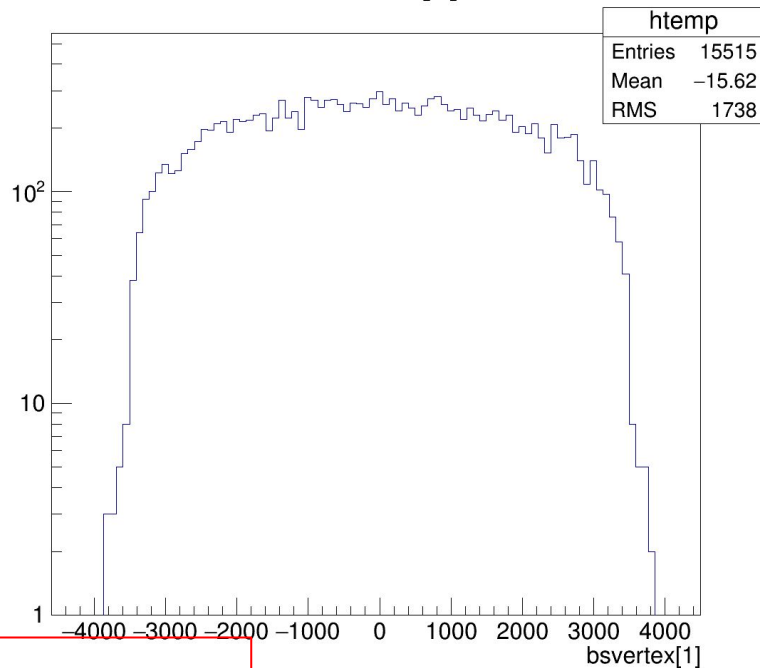
- Calculate vertex resolution with 0.5 cm bin width
 - → 88 cm
- I show some plot of reconstructed events
 - Vertex: bsvertex[4] (reconstructed), mcvertex[4] (true)
 - vertex[0]: z, vertex[1]: x, vertex[2]: y, vertex[3]: time
 - Unit: cm, ns

Reconstructed result

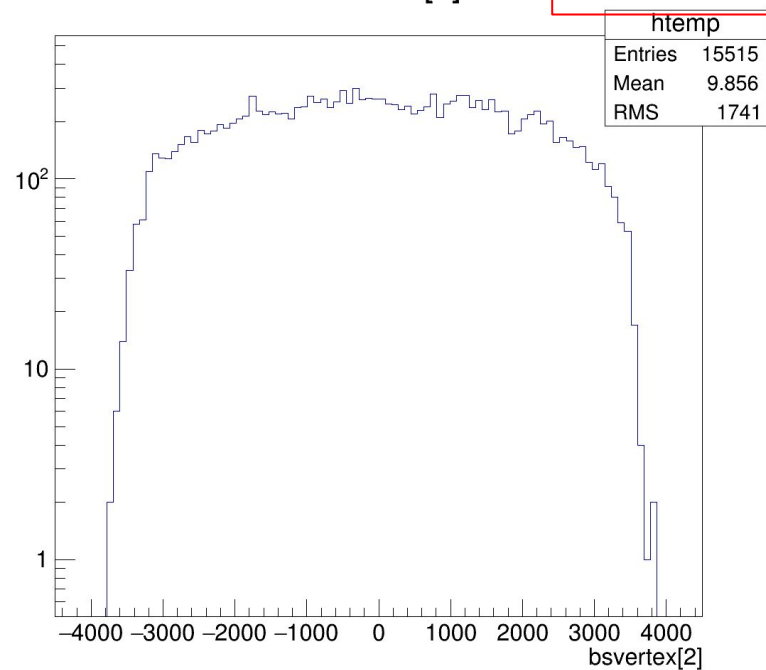
bsvertex[0]



bsvertex[1]

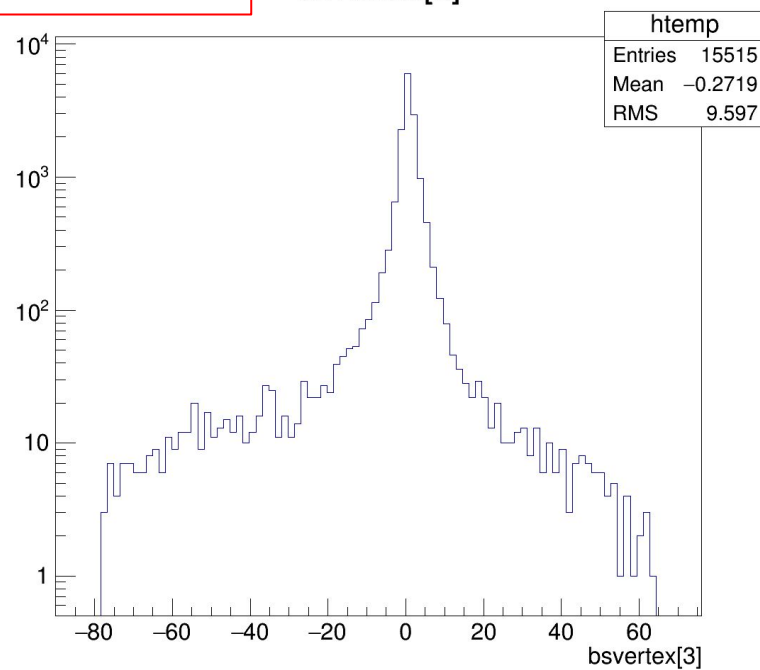


bsvertex[2]

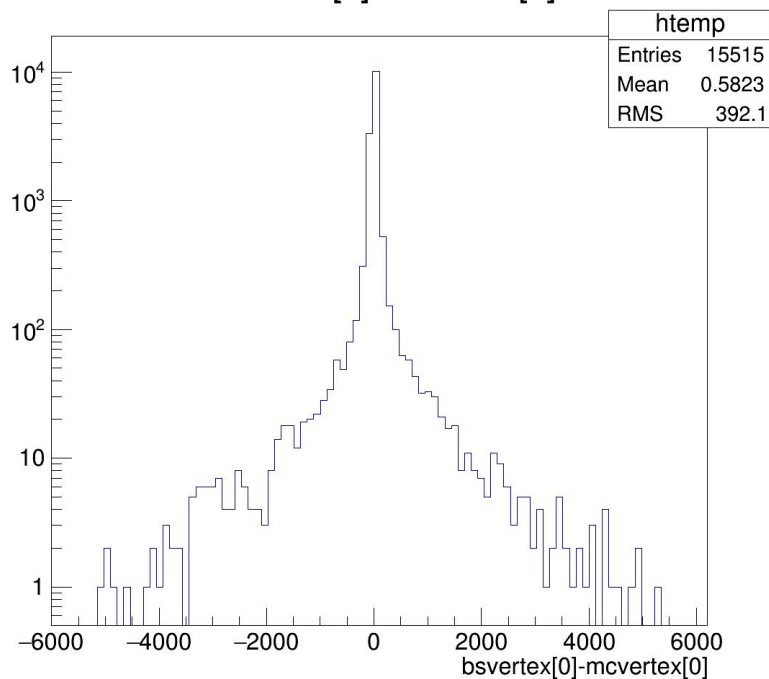


bsvertex[0]
Vertex position

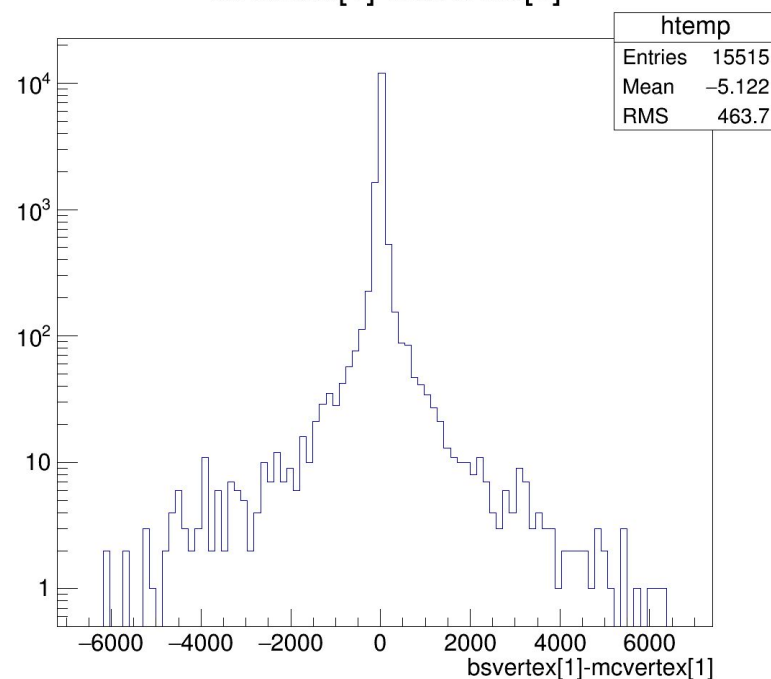
bsvertex[3]



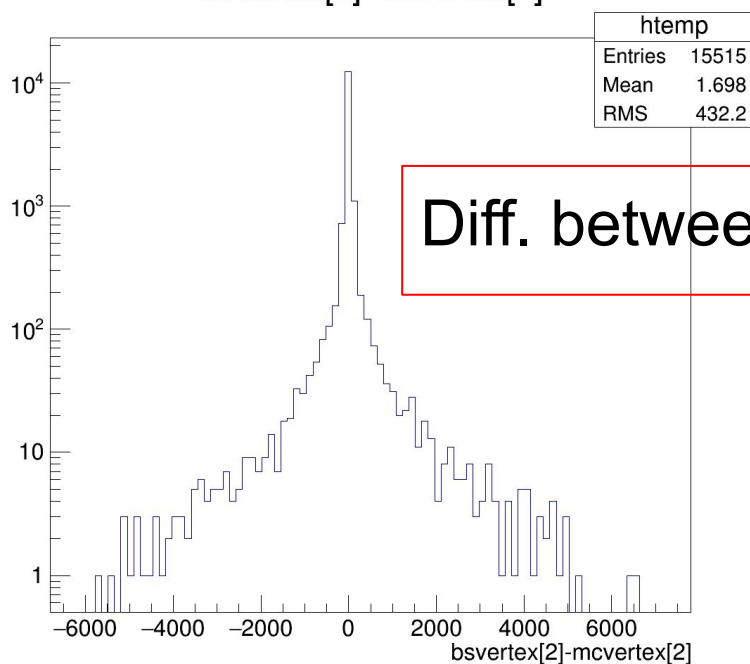
bsvertex[0]-mcvertex[0]



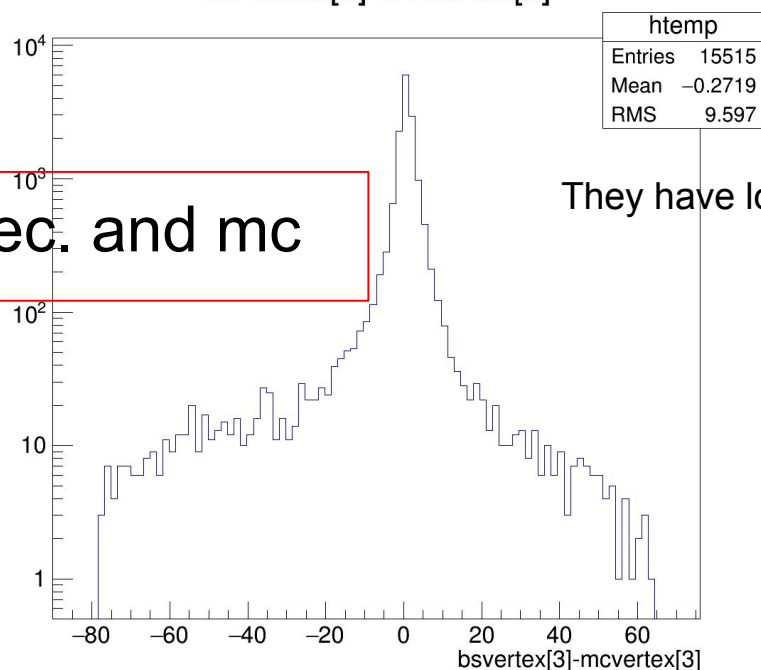
bsvertex[1]-mcvertex[1]



bsvertex[2]-mcvertex[2]



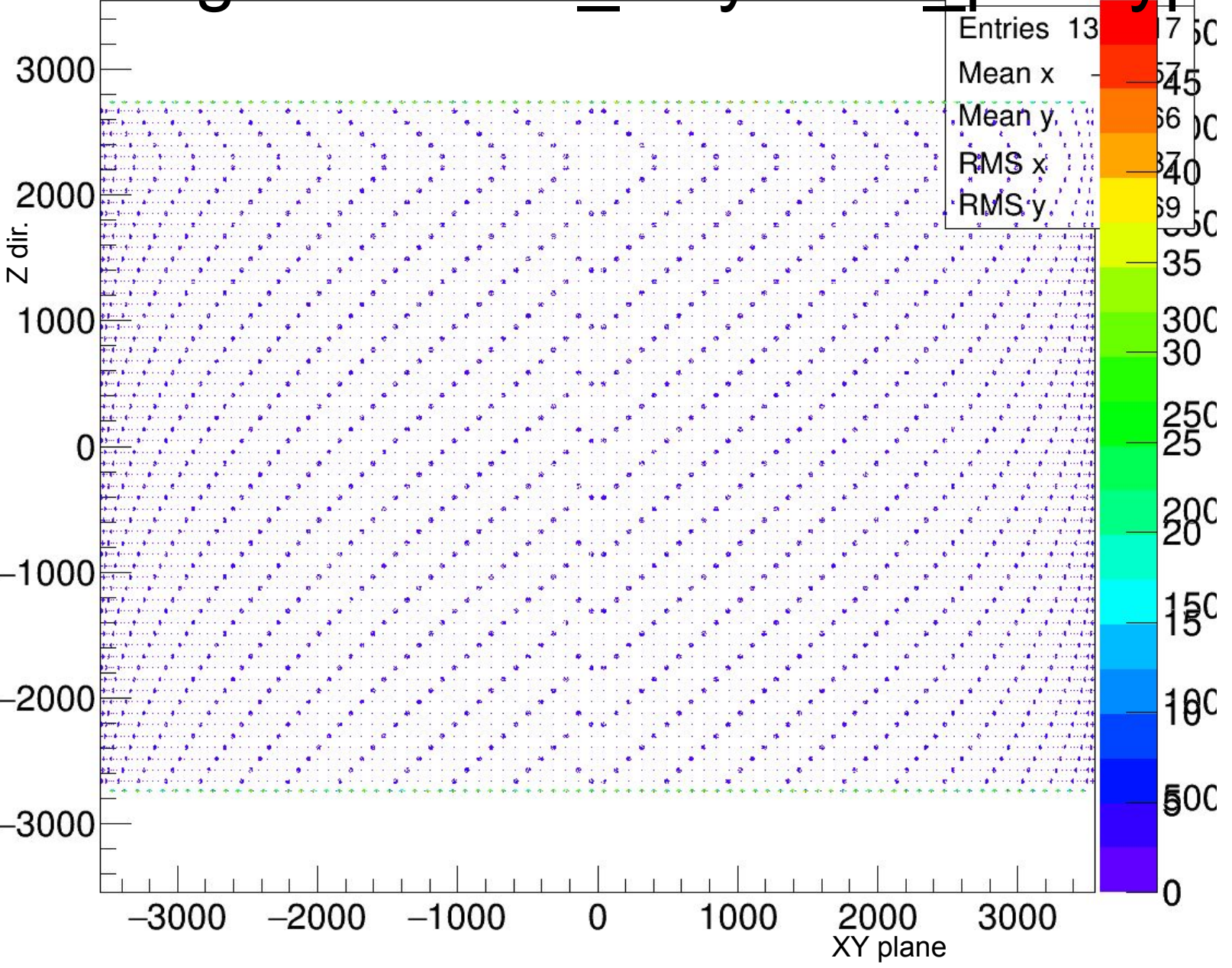
bsvertex[3]-mcvertex[3]



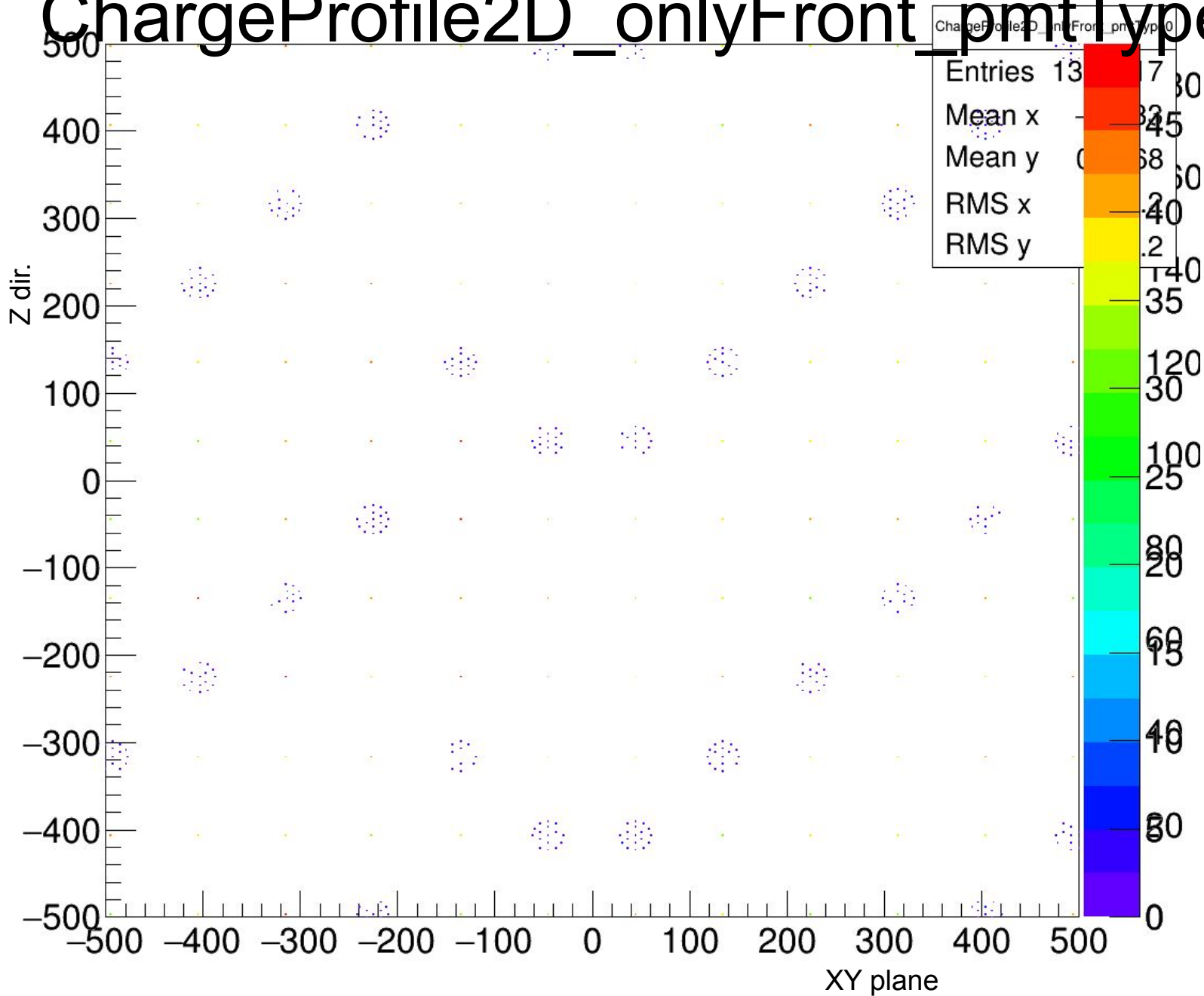
Diff. between rec. and mc

They have long tail still.

ChargeProfile2D_onlyFront_pmtType0&1⁷



ChargeProfile2D_onlyFront_pmtType0&1⁸



Distance from mcvertex to rec. vertex

Red: w/o masking

Blue: w/ masking (40%)

There are still long tail

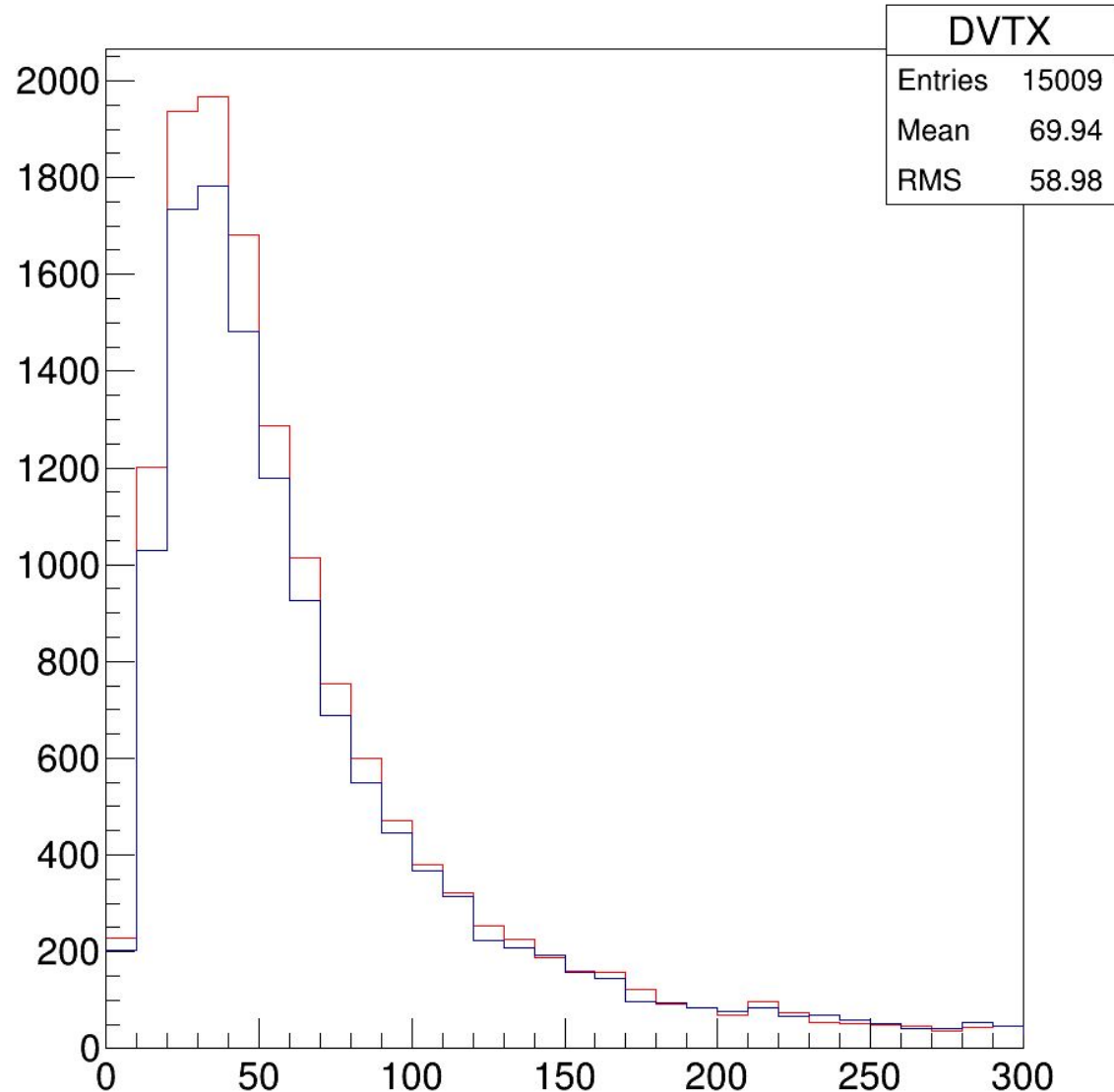
Vertex res ~ 88 cm
(calculated with 0.5 cm
bin width)

Vertex resolution is defined as distance including 68% of total events.

```

"vertexRes =
hdvtxcumu->GetBinLowEdge(hdvtxcumu->
FindFirstBinAbove(hdvtx->GetEntries()*0.682));"
// where "hdvtxcumu" is cumulative
histogram of "hdvtx", histogram of distance
from mc vertex to rec. vertex.
  
```

Distance from mc to rec.



Distance from mcvertex to rec. vertex

Red: w/o masking

Blue: w/ masking (40%)

There are still long tail

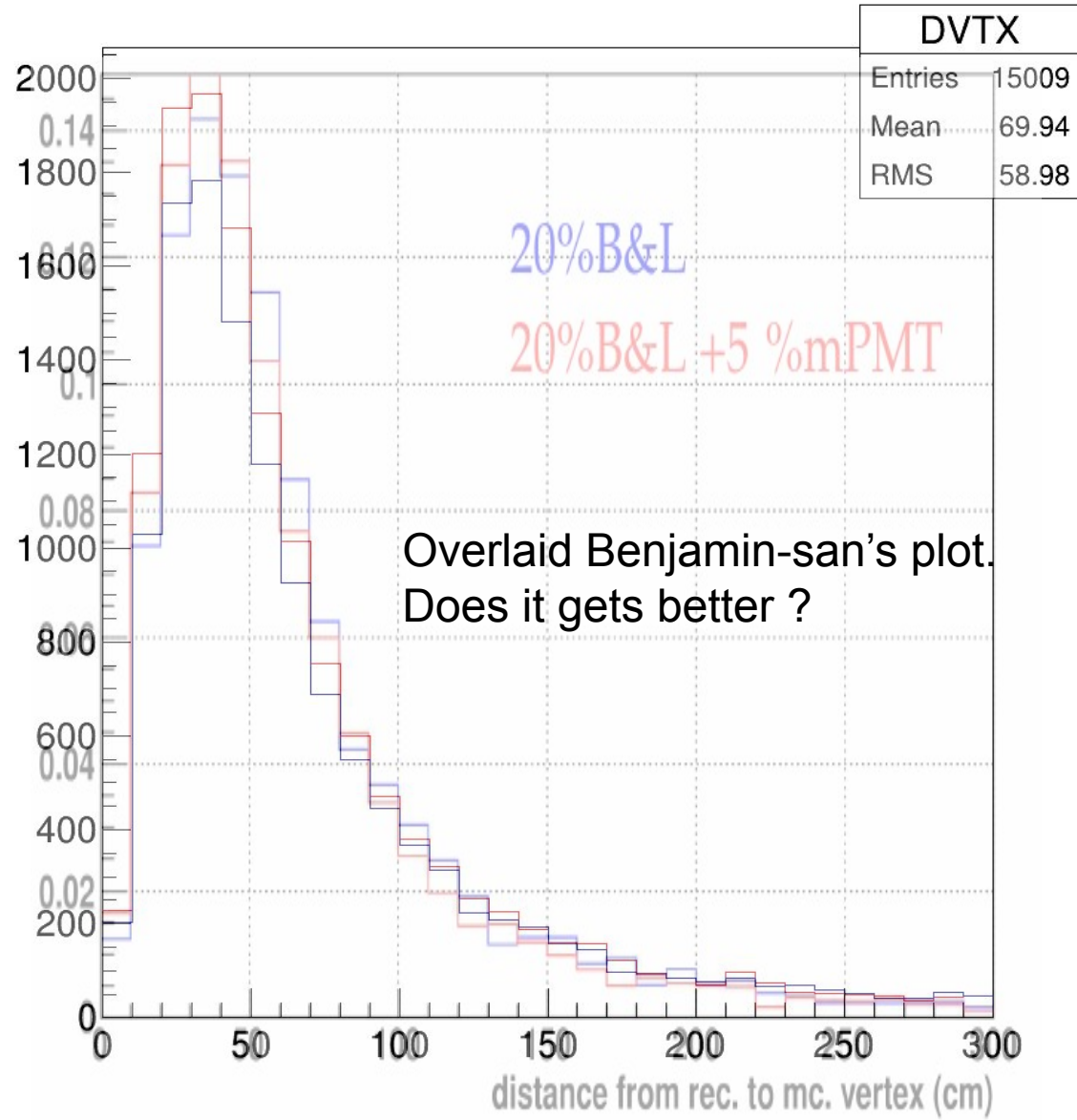
Vertex res ~ 88 cm
(calculated with 0.5 cm
bin width)

Vertex resolution is defined as distance including 68% of total events.

```

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hdvtxcumu->GetBinLowEdge(hdvtxcumu->
FindFirstBinAbove(hdvtx->GetEntries()*0.682));"
// where "hdvtxcumu" is cumulative
histogram of "hdvtx", histogram of distance
from mc vertex to rec. vertex.
  
```

Distance from mc to rec.



Distance from mc to rec. (cont.)

Red: w/o masking

Blue: w/ masking (40%)

There are still long tail

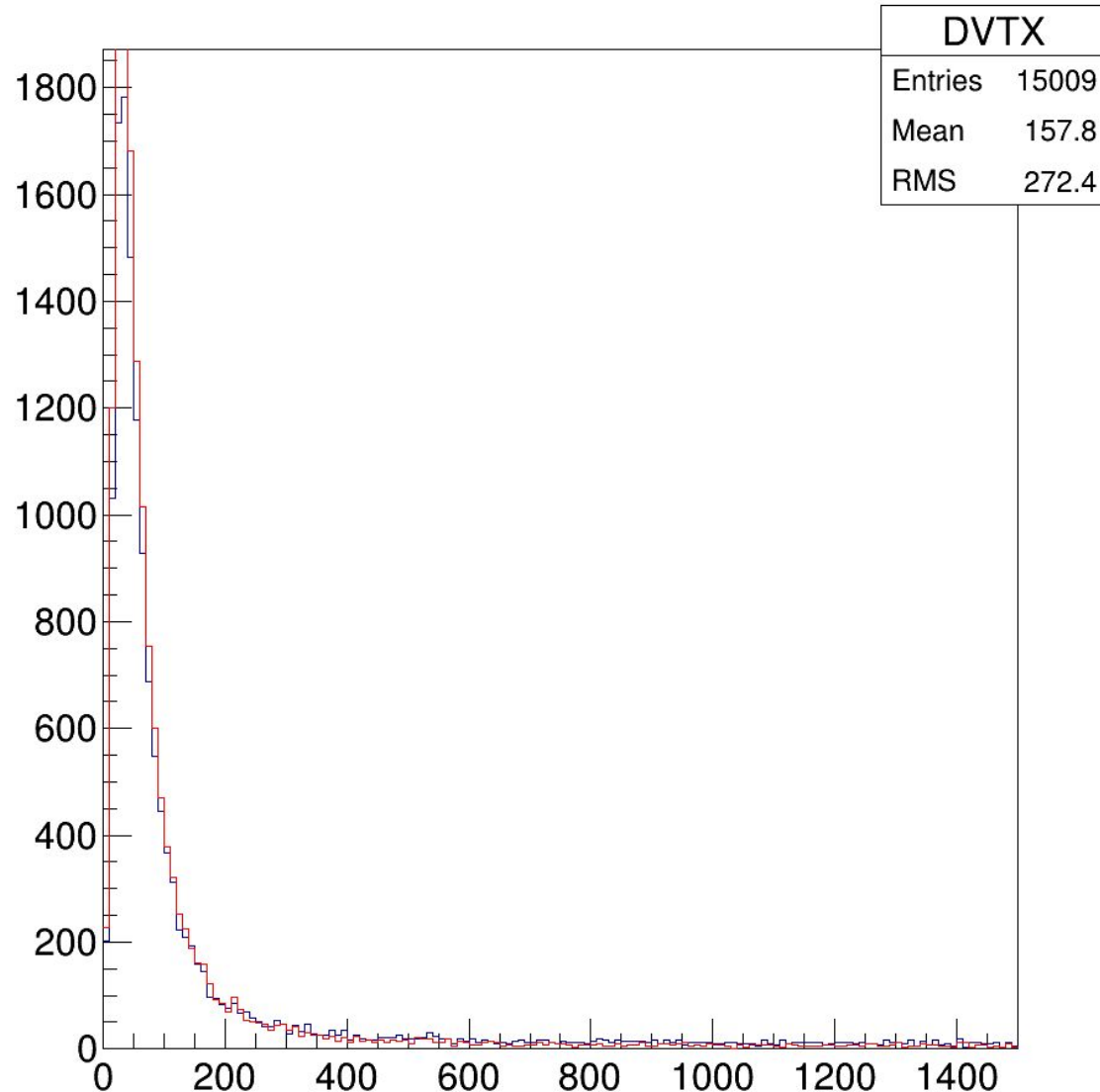
Vertex res ~ 88 cm
(calculated with 0.5 cm
bin width)

Vertex resolution is defined as distance including 68% of total events.

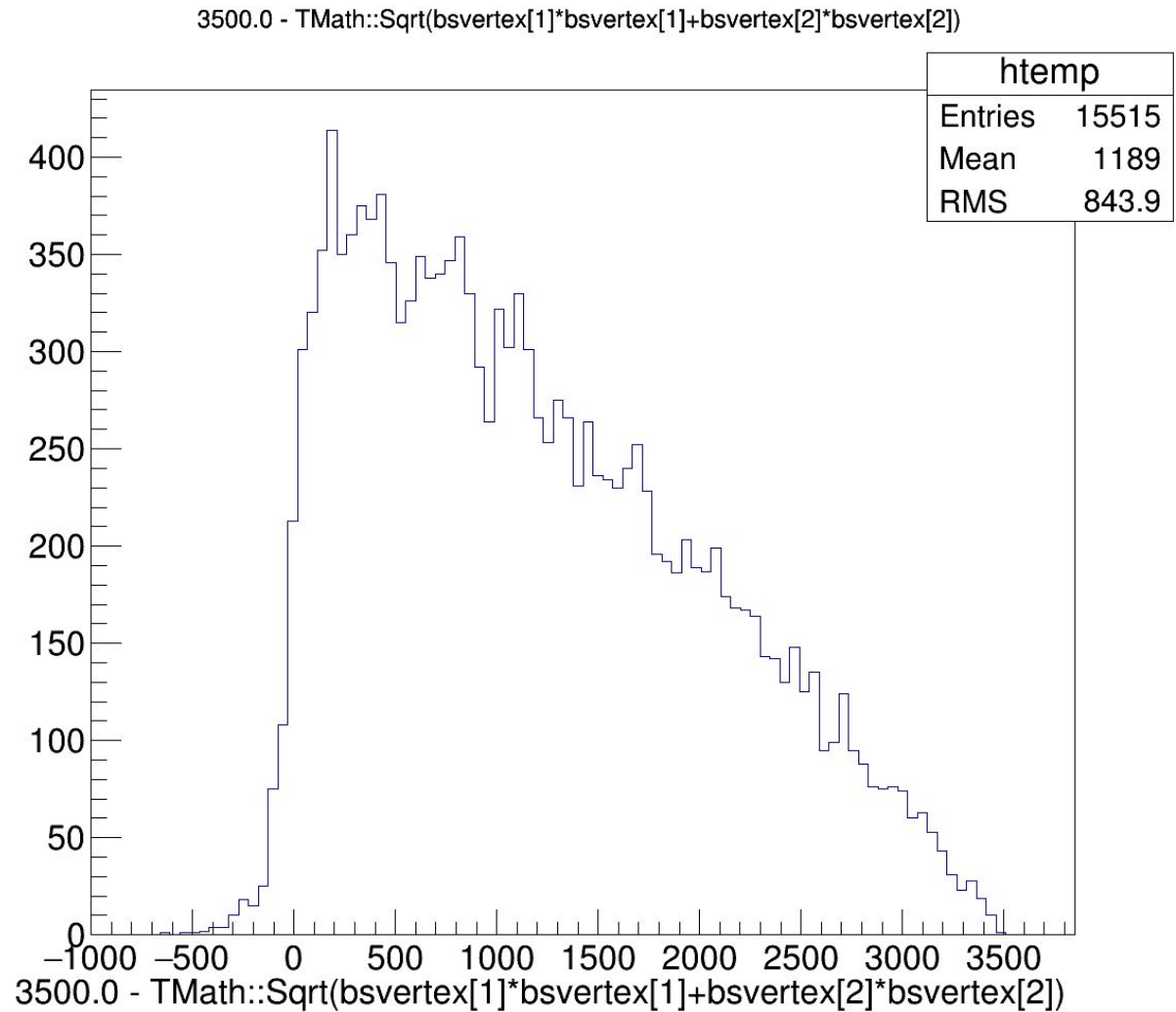
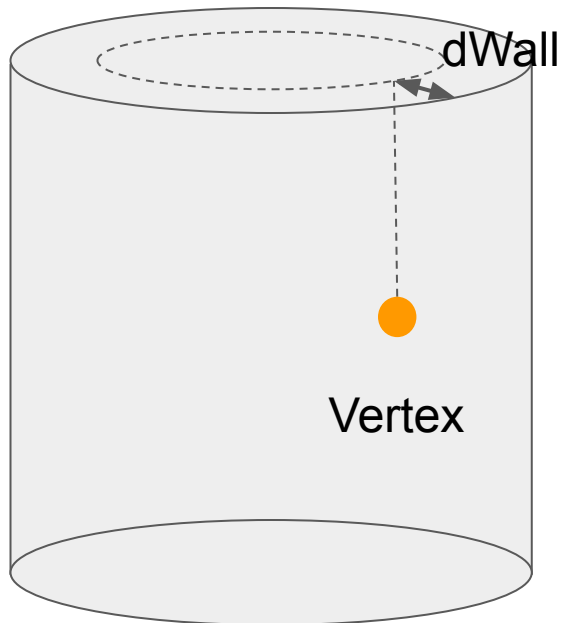
```

"vertexRes =
hdvtxcumu->GetBinLowEdge(hdvtxcumu->
FindFirstBinAbove(hdvtx->GetEntries()*0.682));"
// where "hdvtxcumu" is cumulative
histogram of "hdvtx", histogram of distance
from mc vertex to rec. vertex.
  
```

Distance from mc to rec.

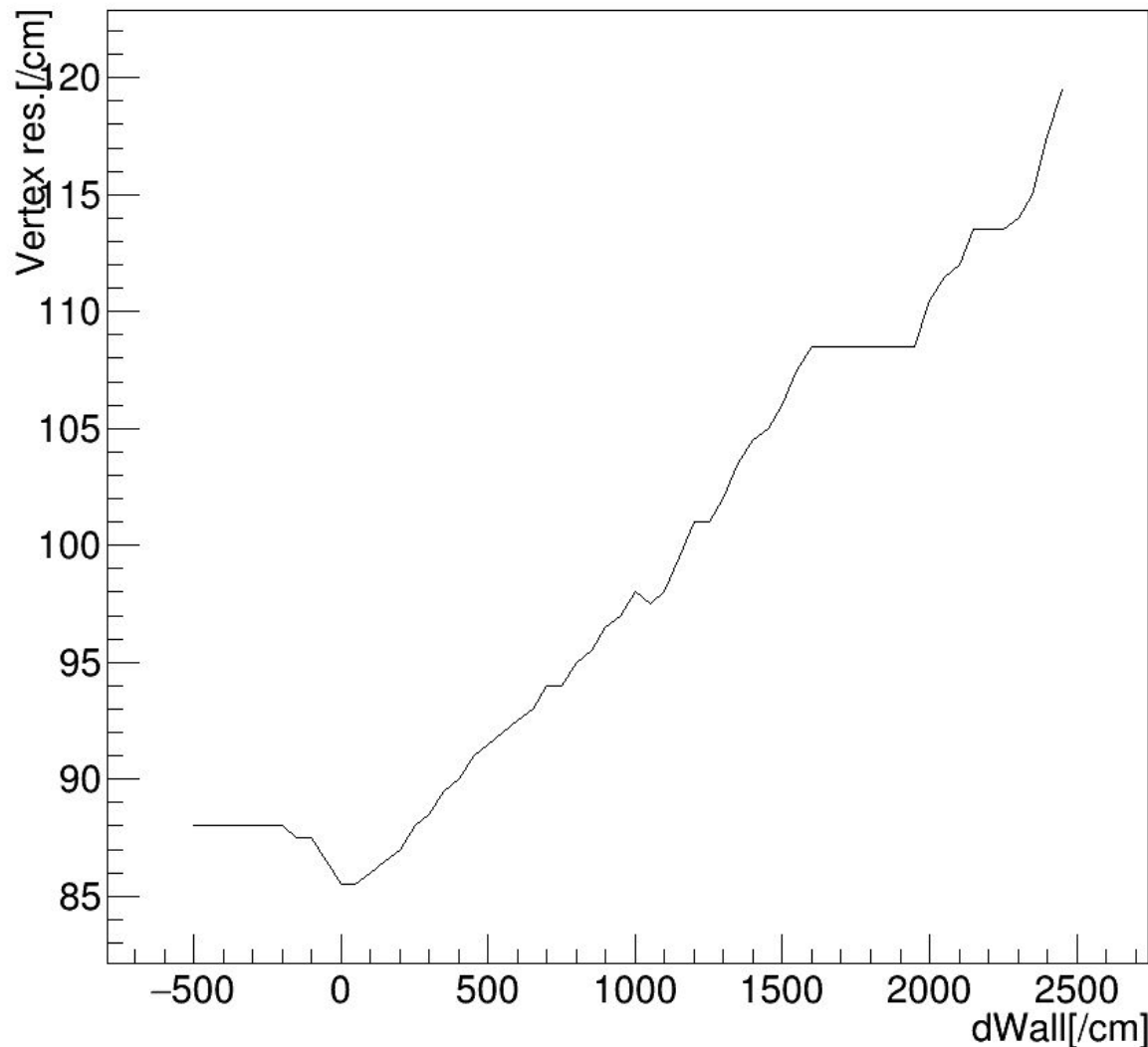


dWall distribution

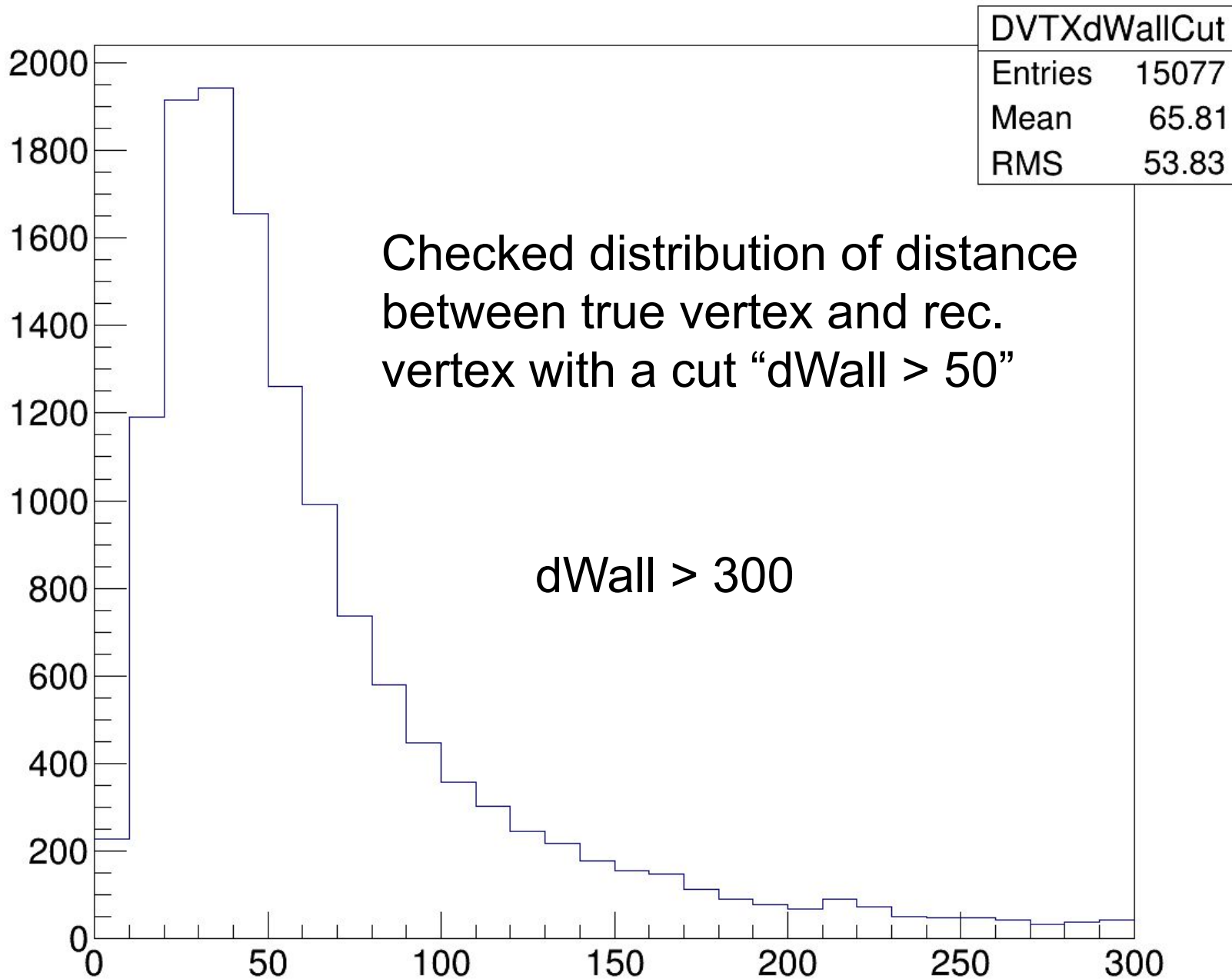


dWall vs vertex resolution

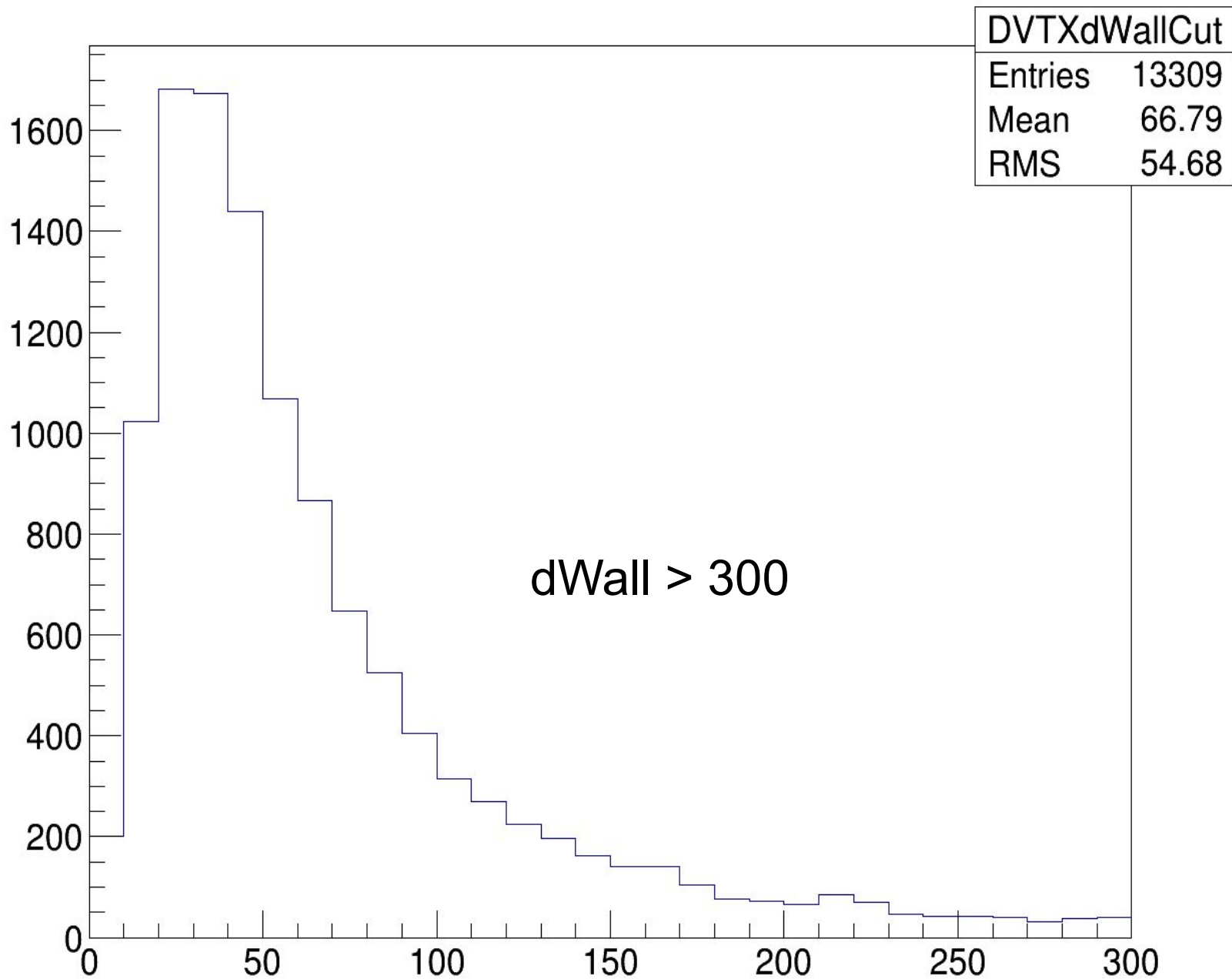
I calculated vertex resolution with only events reconstructed in $d\text{Wall} > d\text{Wall_threshold}$.



Distance from mc to rec.



Distance from mc to rec.

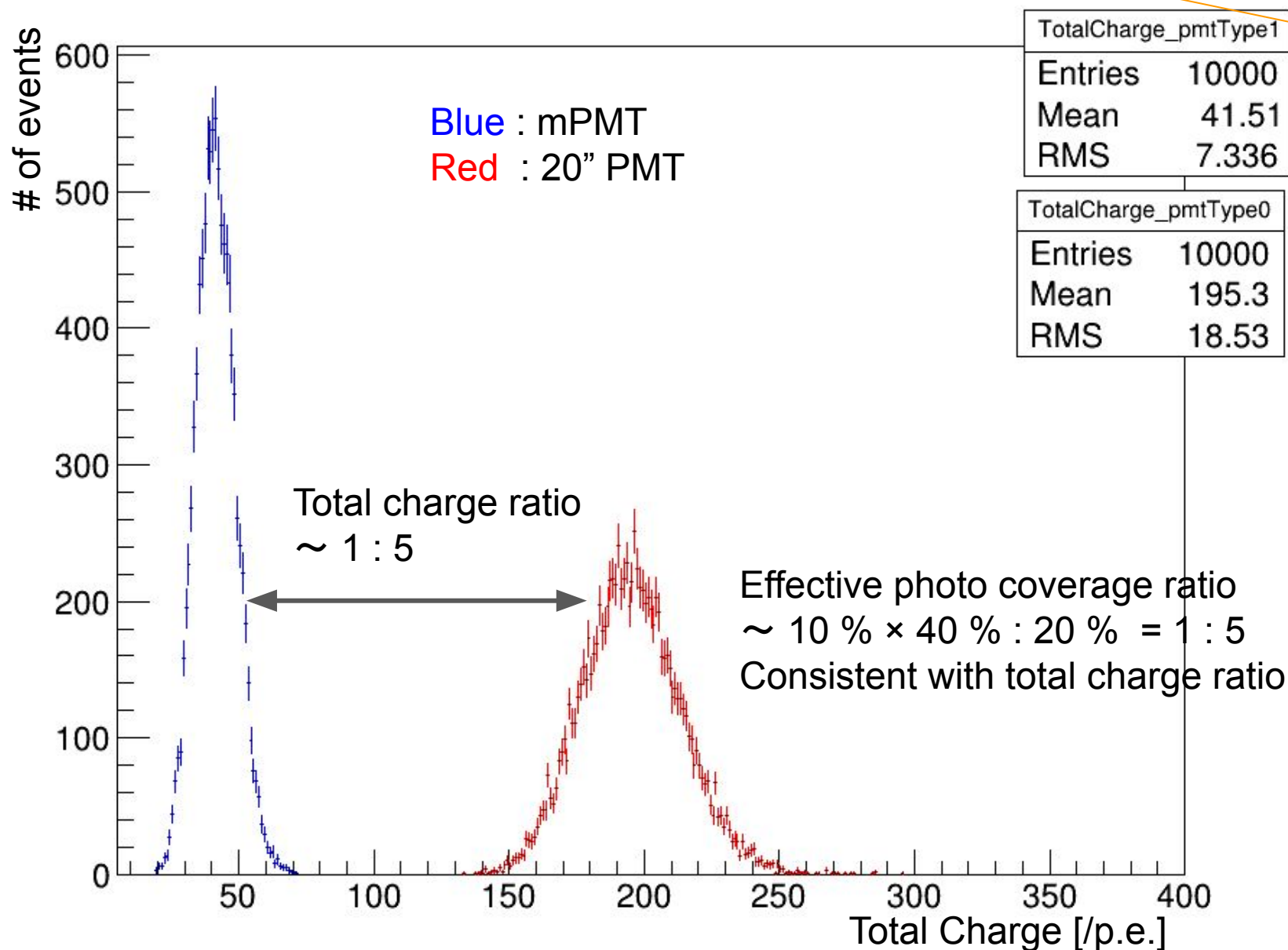


Backup

Total Charge

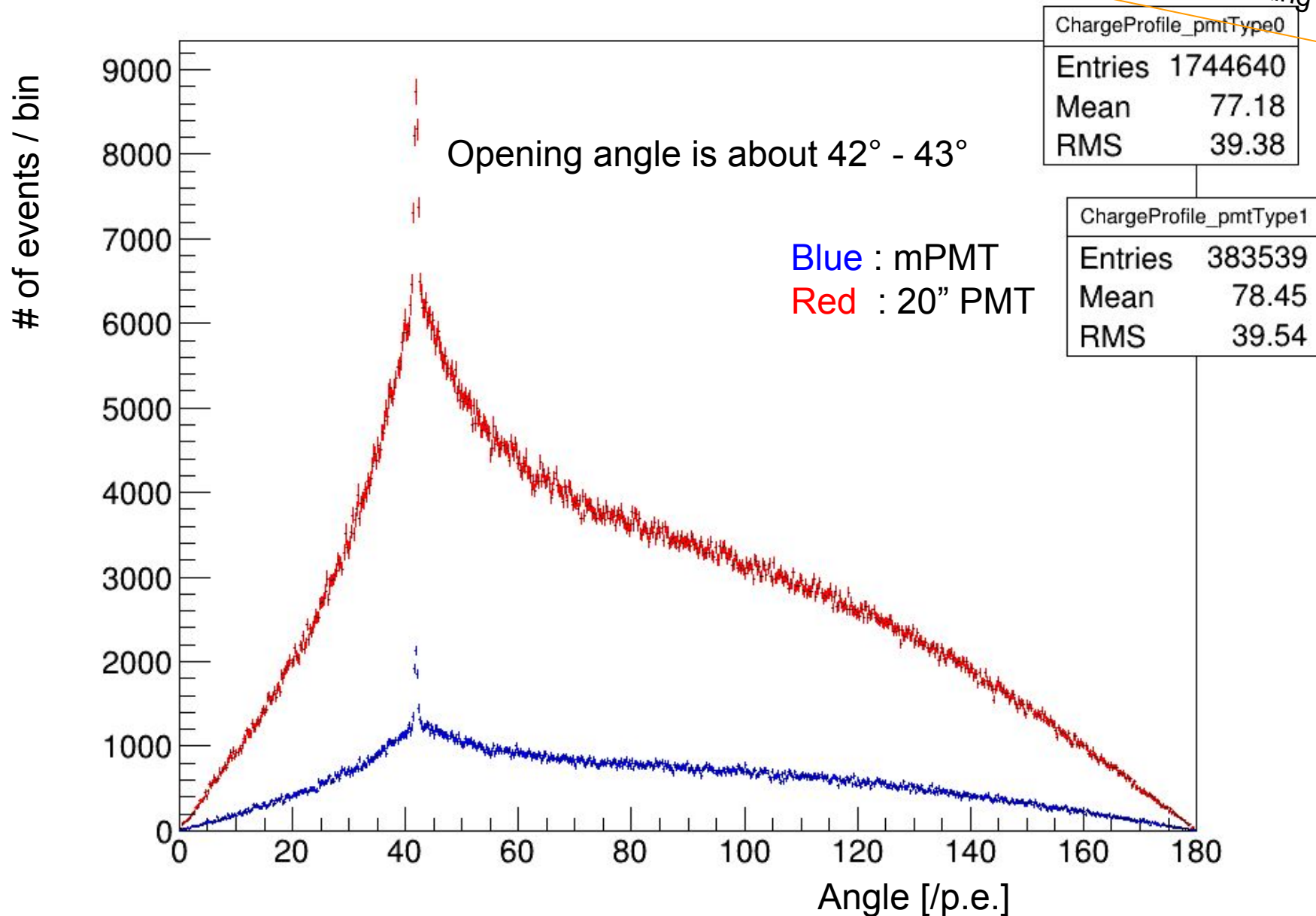
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from 30 Aug. 2019 mPMT-Japan meeting



Charge Profiles

from 30 Aug. 2019 mPMT-Japan meeting



Time distribution (TOF substructured)

from 30 Aug. 2019 mPMT-Japan meeting

