

Status Report

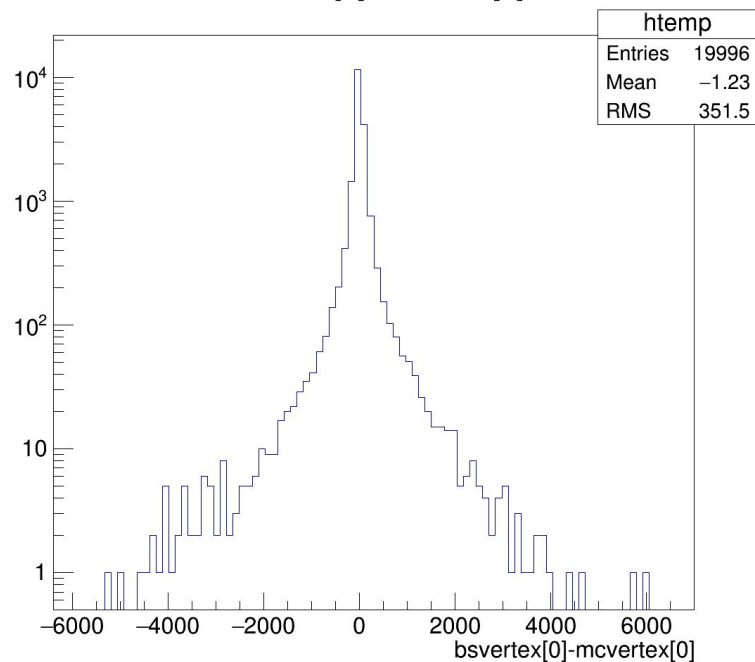
Shota Izumiyama
10 Oct. 2019
mPMT-Japan meeting

New

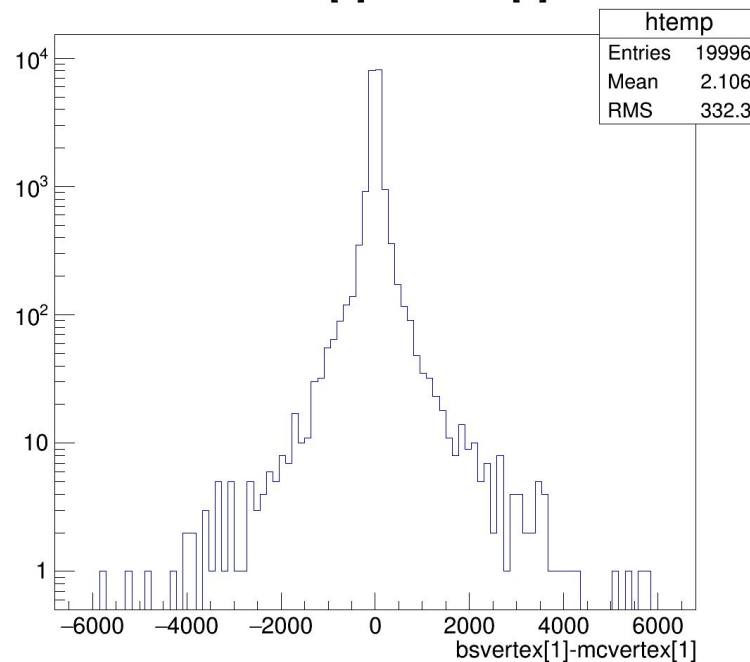
- Changed “stepSize” around line 1970 in FitVertexLE.c
 - This “stepSize” is used for first vertex search.
 - 300 → 600 [cm]
 - Total reconstructed events: 15515 → 19996 [events]
 - Due to loose selection
 - 4 events are rejected at the constraint of stepSize
- Checked dWall dependencies of vertex resolution
 - Calculated vertex resolution with selected dWall region (e.g. $200 < \text{dWall} \leq 400, \dots$)
- Checked dWall with mc value
- Memory leak
 - Reconstruction codes have memory leak
 - I am fixing it.

stepSize 300 $\rightarrow$ 600 cm

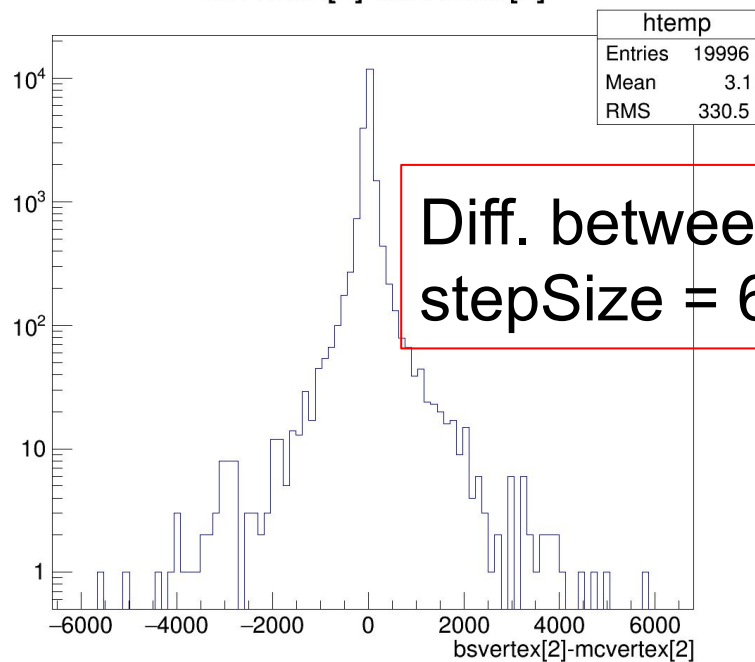
bsvertex[0]-mcvertex[0]



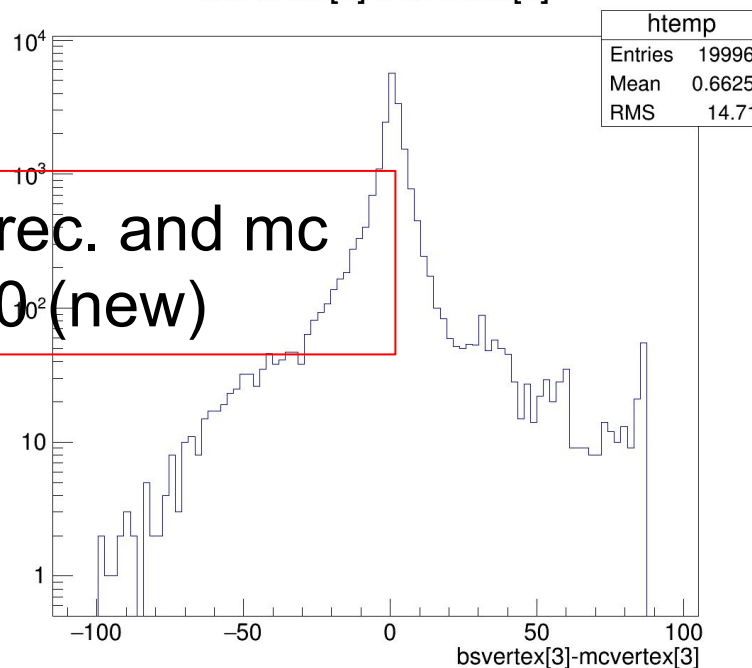
bsvertex[1]-mcvertex[1]



bsvertex[2]-mcvertex[2]

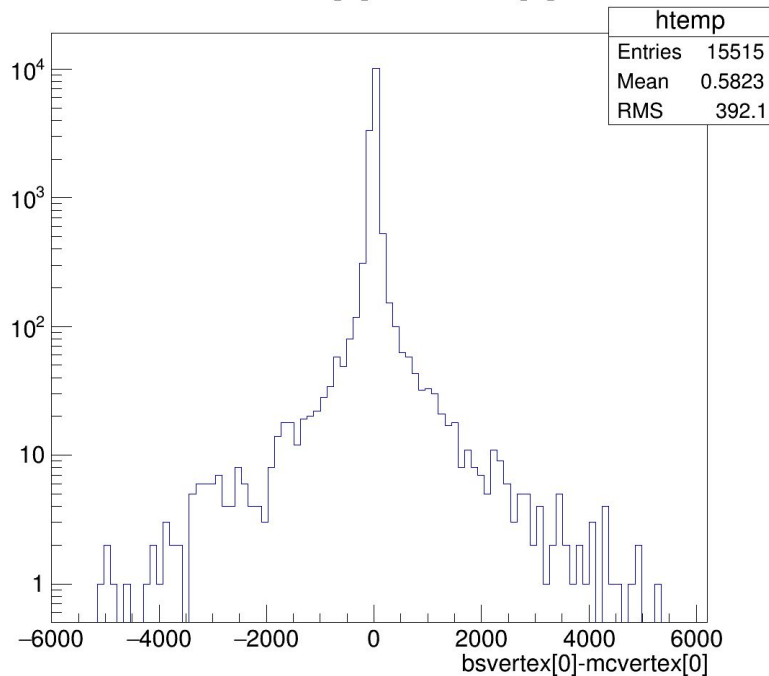


bsvertex[3]-mcvertex[3]

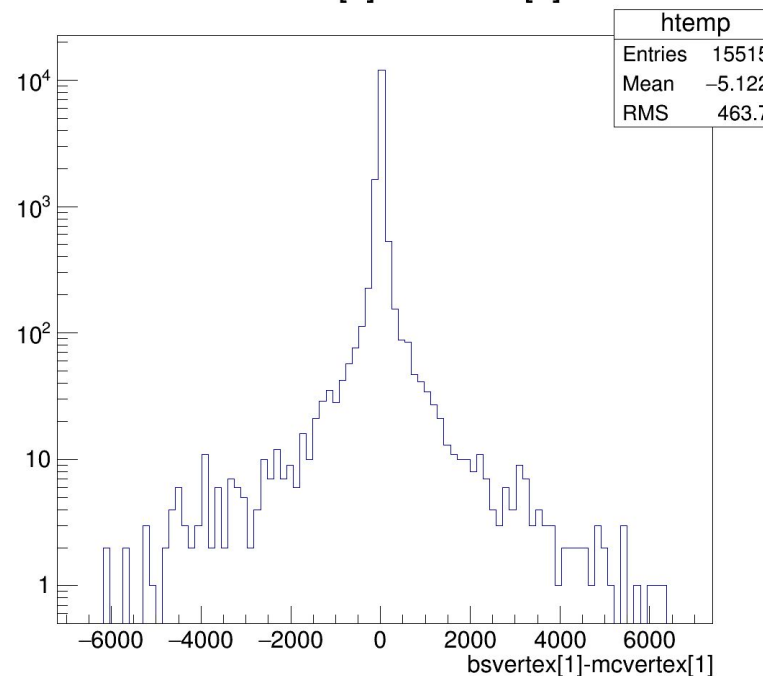


Diff. between rec. and mc
stepSize = 600 (new)

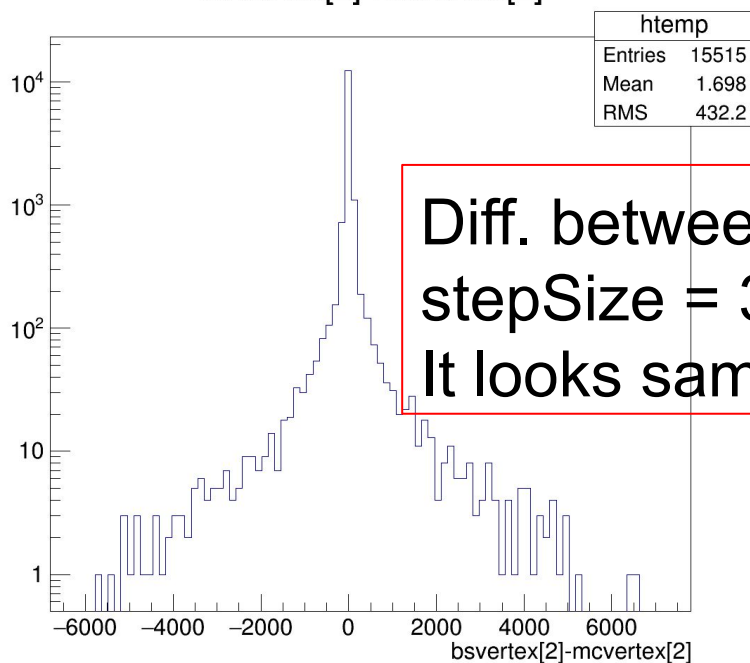
bsvertex[0]-mcvertex[0]



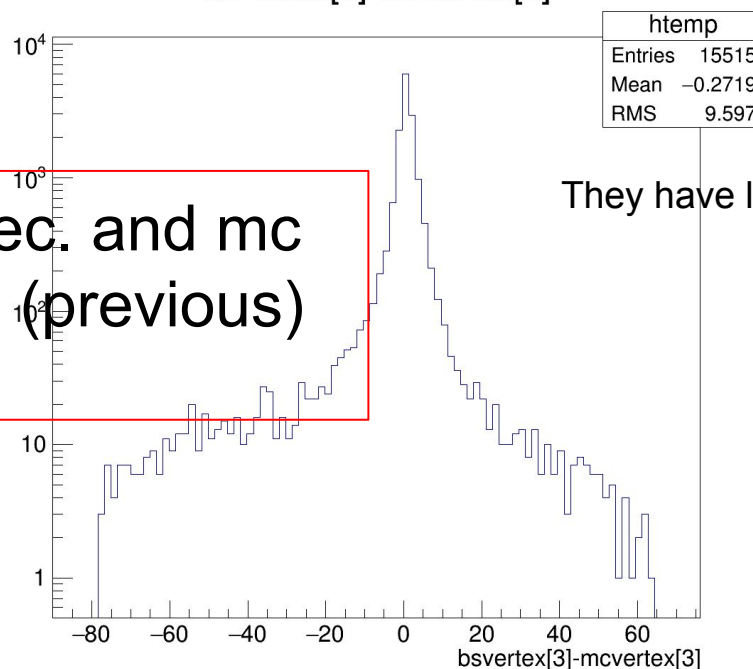
bsvertex[1]-mcvertex[1]



bsvertex[2]-mcvertex[2]



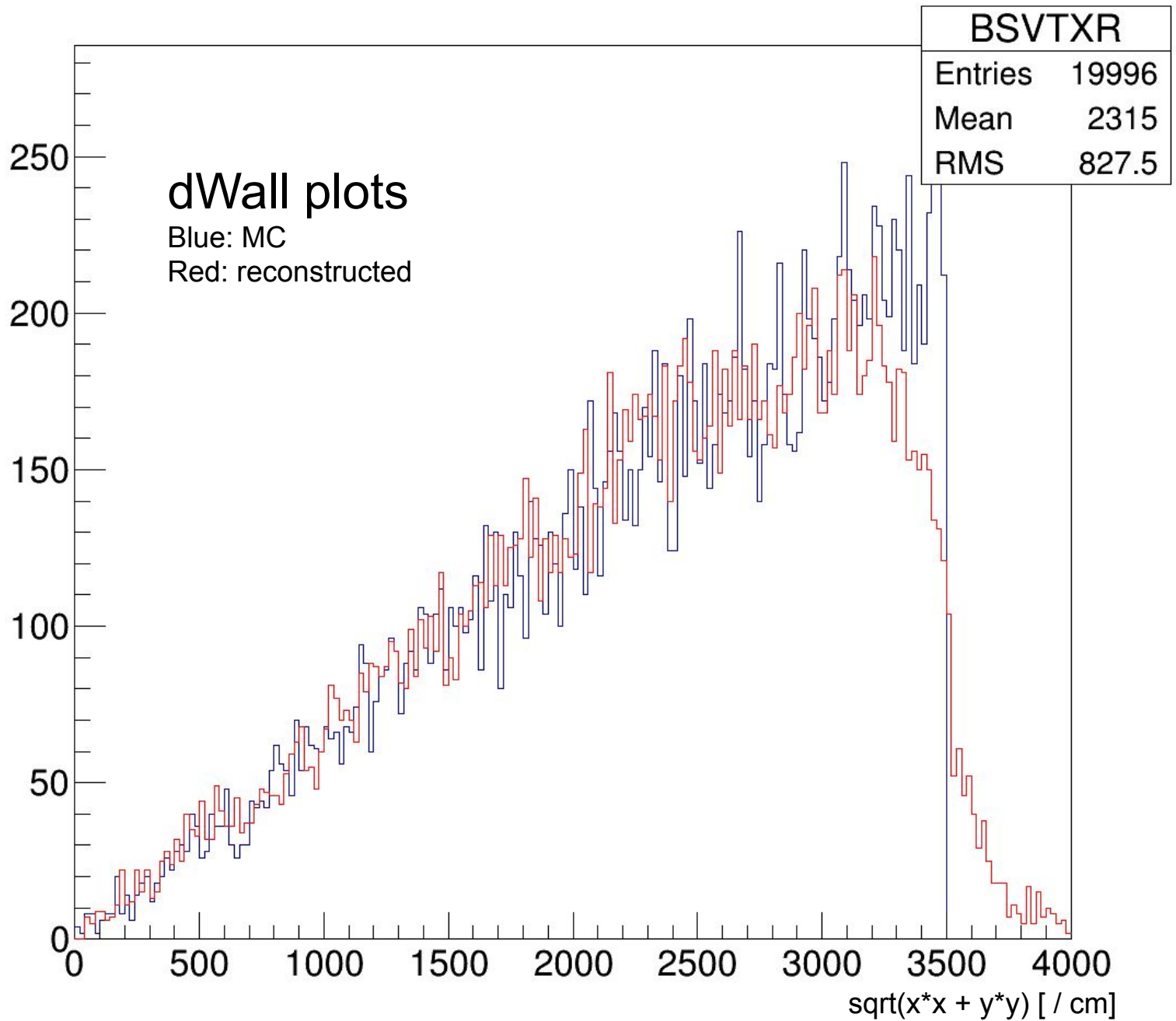
bsvertex[3]-mcvertex[3]



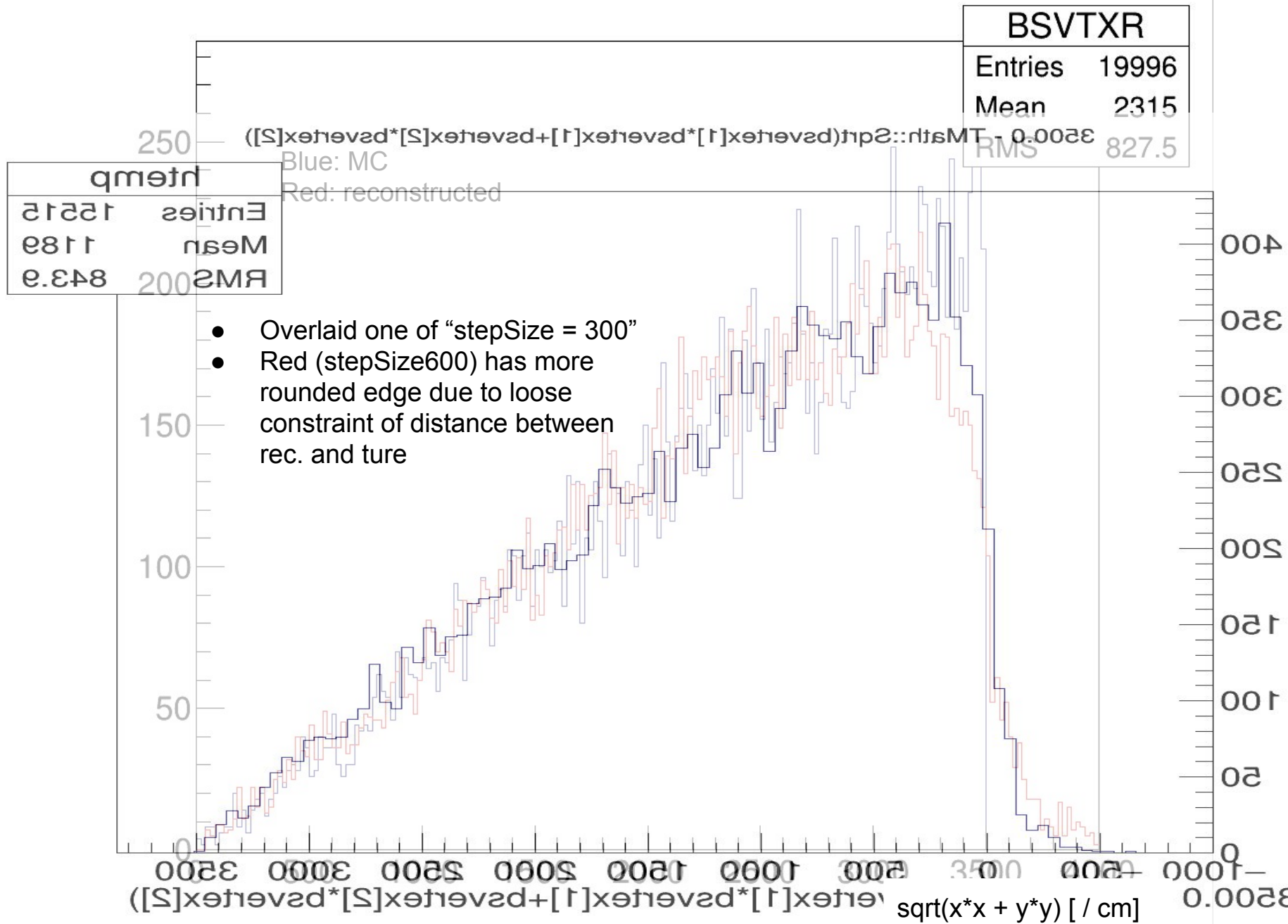
Diff. between rec. and mc
stepSize = 300 (previous)
It looks same

They have long tail still.

Event VTX-XY



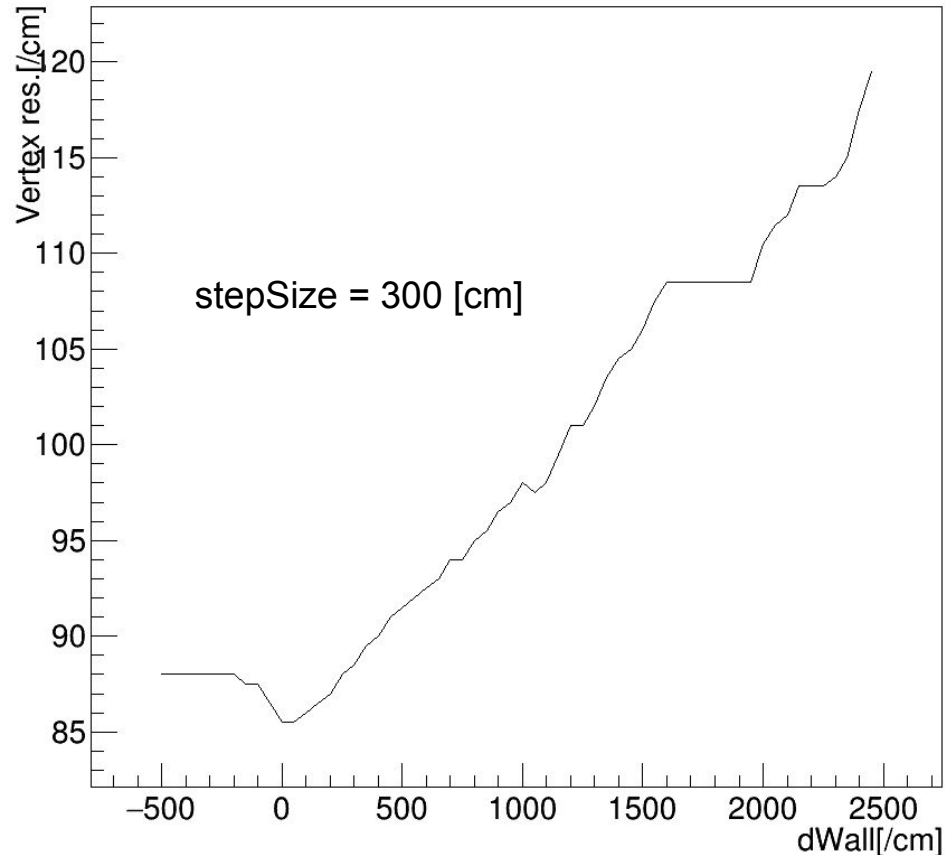
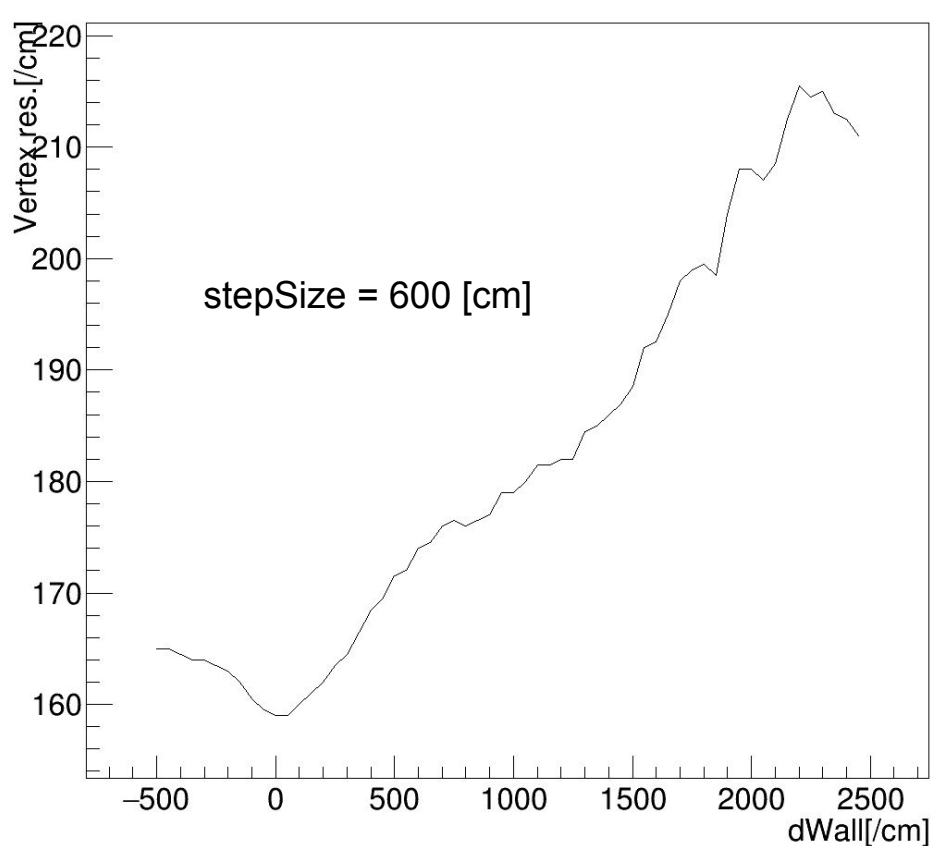
Event VTX-XY



Vertex resolution ($d_{Wall} > d_{Wall_threshold}$)⁸

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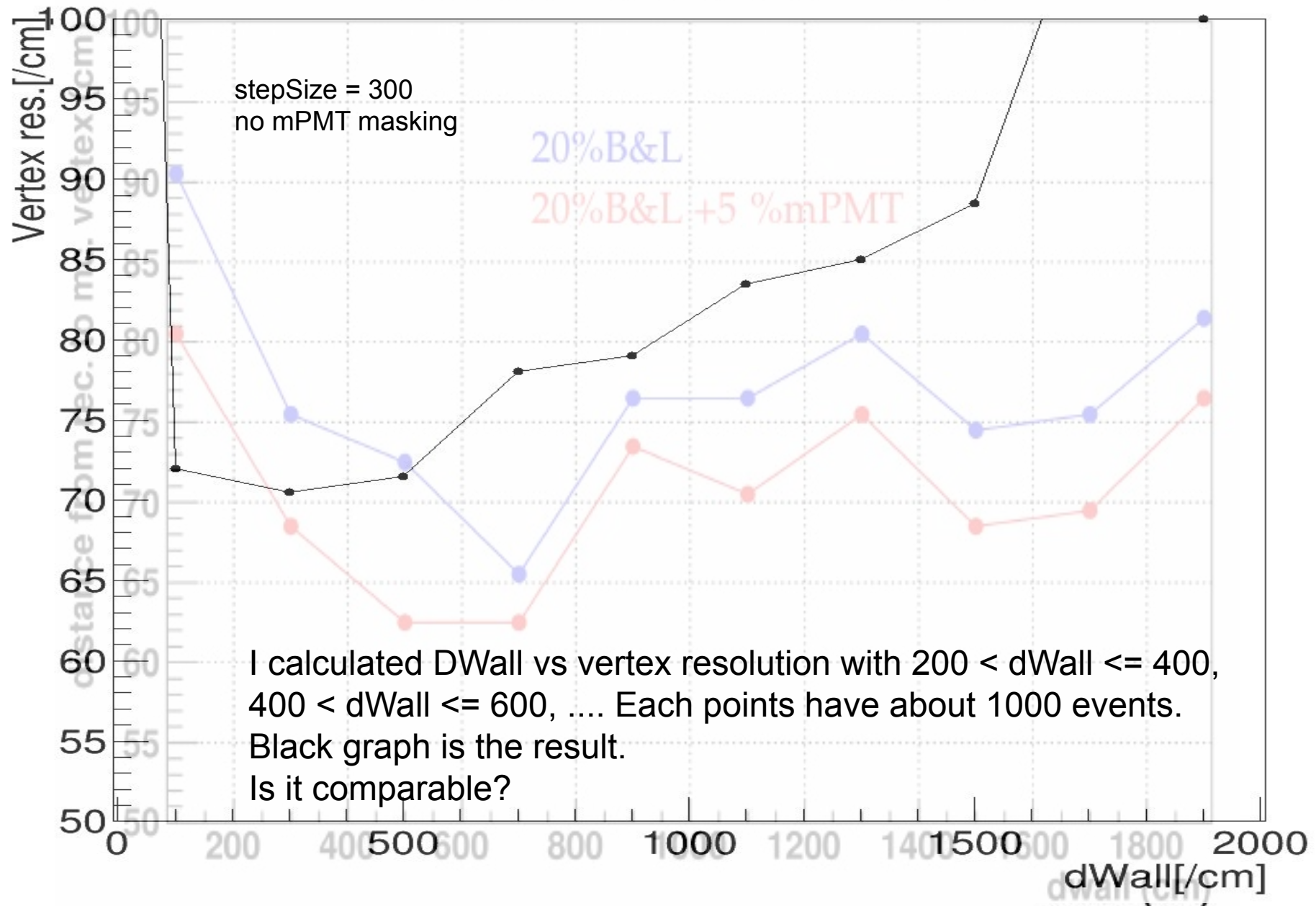
	Left	Right
stepSize	600 cm	300 cm
Vertex res. (at 150 cm)	162 cm	87 cm

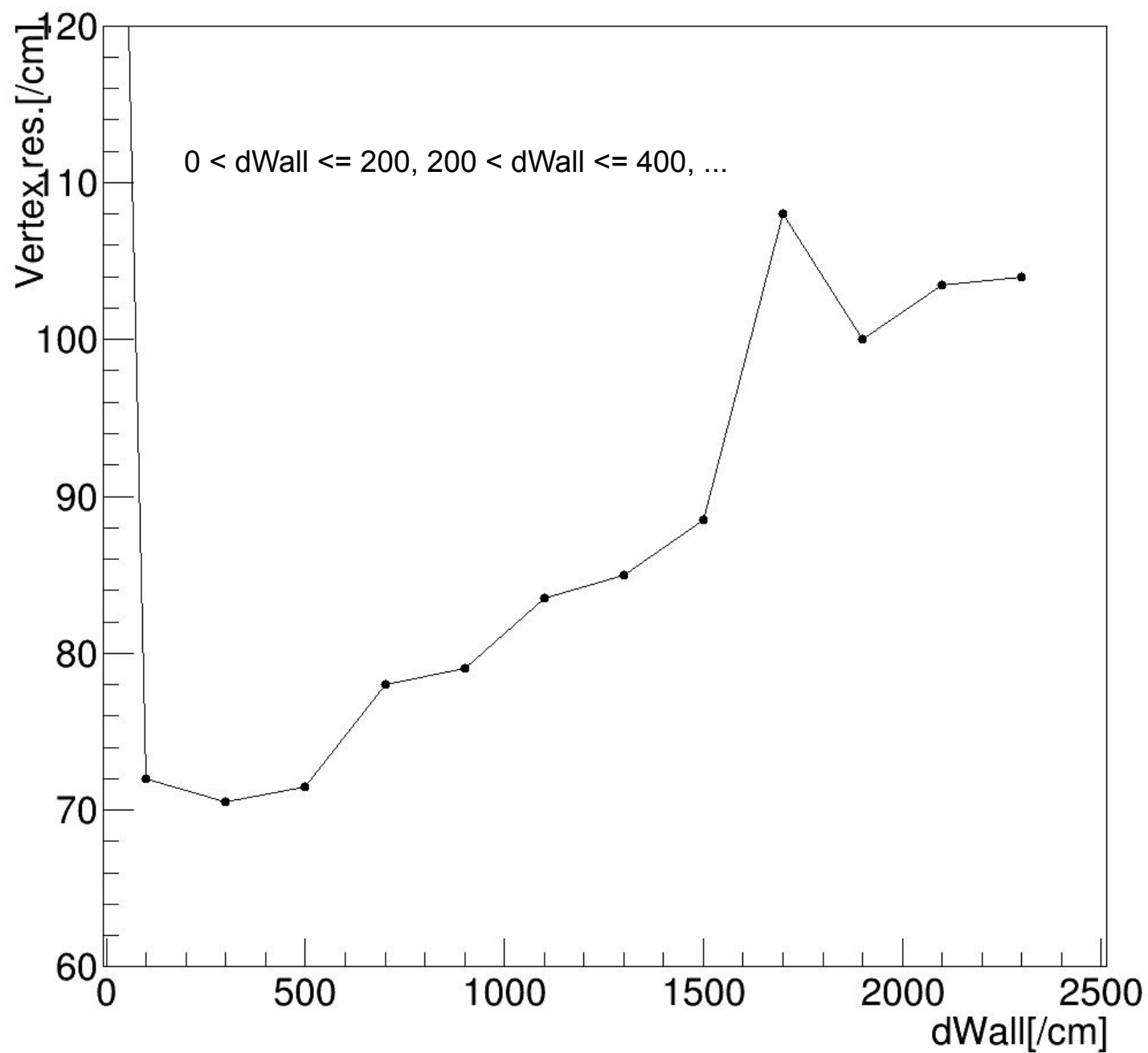


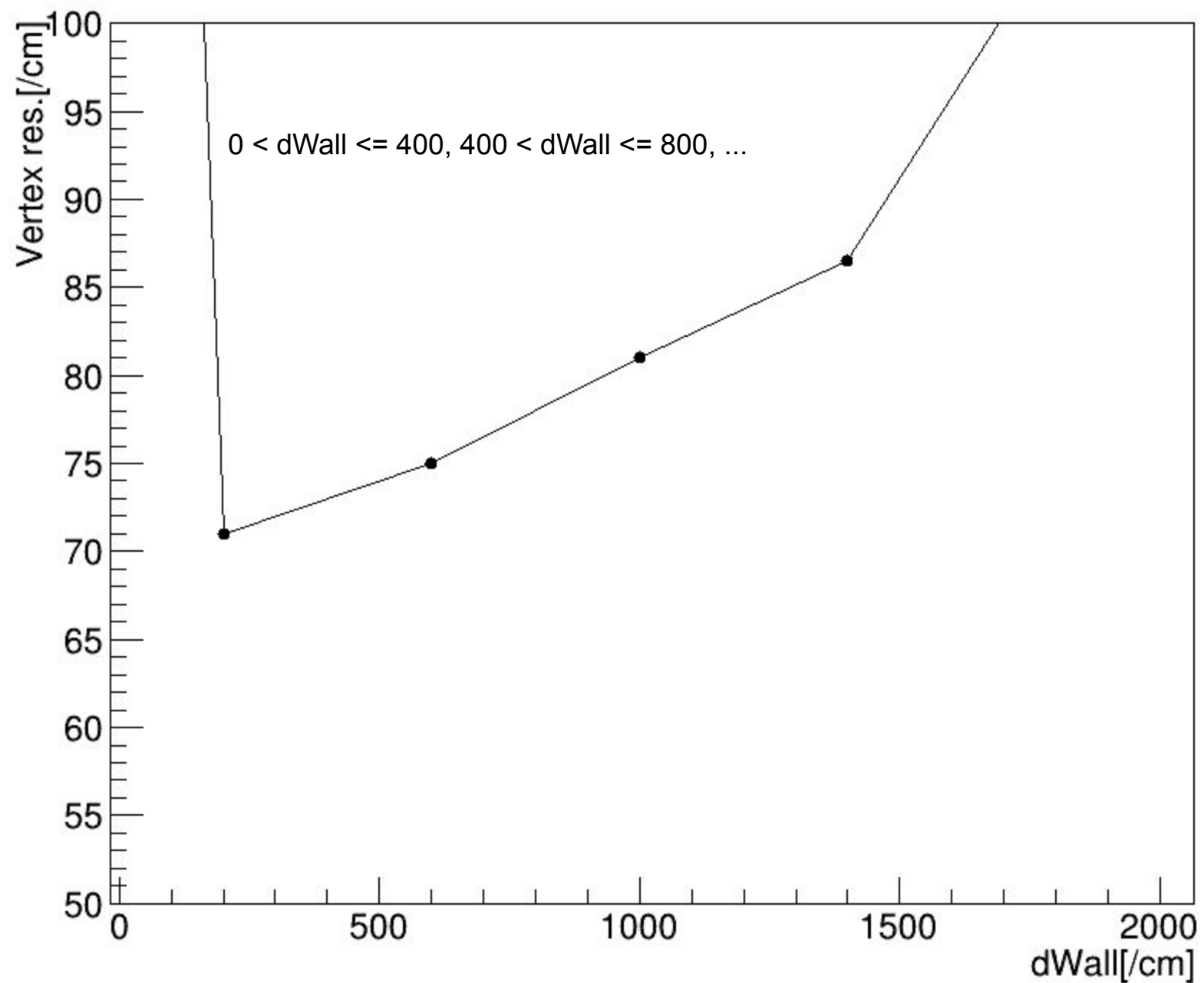
dWall vs vertex resolution

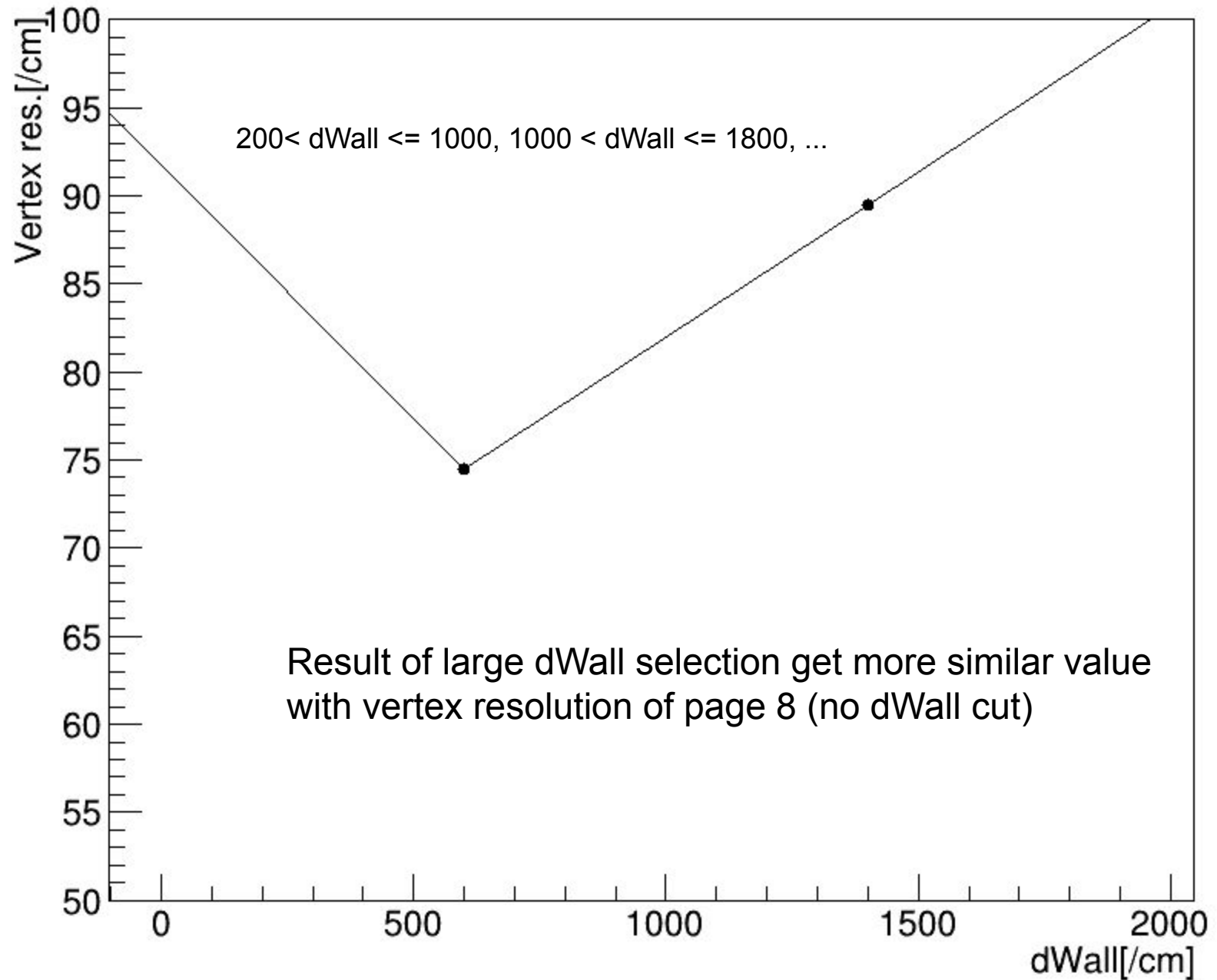
DWallXVResExclusive

10

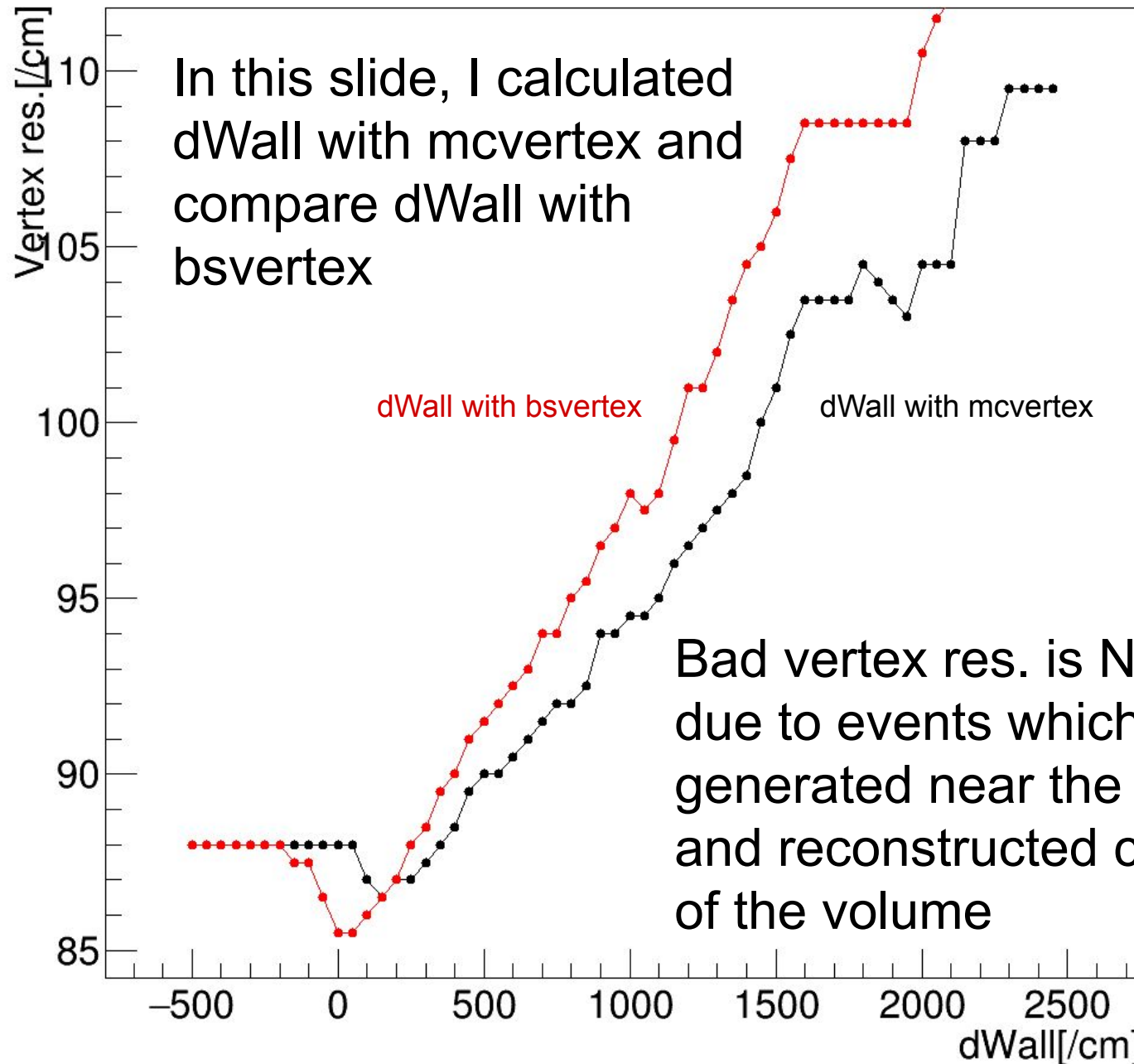








dWall calculated
with mc. vertex



Memory leak

- FitVertexLE has large memory leak:
 - It uses about 120 GB or more for reconstructing ~ 19,000 events where sukap00x has 125 GB memory.
 - I ran FitVertexLE with stepSize=200, but it is killed due to allocated large memory
- Checked memory leak with valgrind, which is tool for memory debugging
 - pmt = GetPMT(): this put error message but I did not find reason
 - WCSim codes seem to have memory leak
 - No “delete” for “reconstructedVertexPosition” etc which are allocated by “searchVertex(...)”.
- I added “delete” for “reconstructedVertexPosition” etc.
 - 35% of sukap memory for 7,000 events: almost same with before
- And result of reconstruction differed and more validation is needed

Summary

- Increasing stepSize makes worse vertex resolution
 - stepSize constraint works in the reconstruction
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- Bad vertex resolution comes from events reconstructed in inner volume