

TOF Geometry

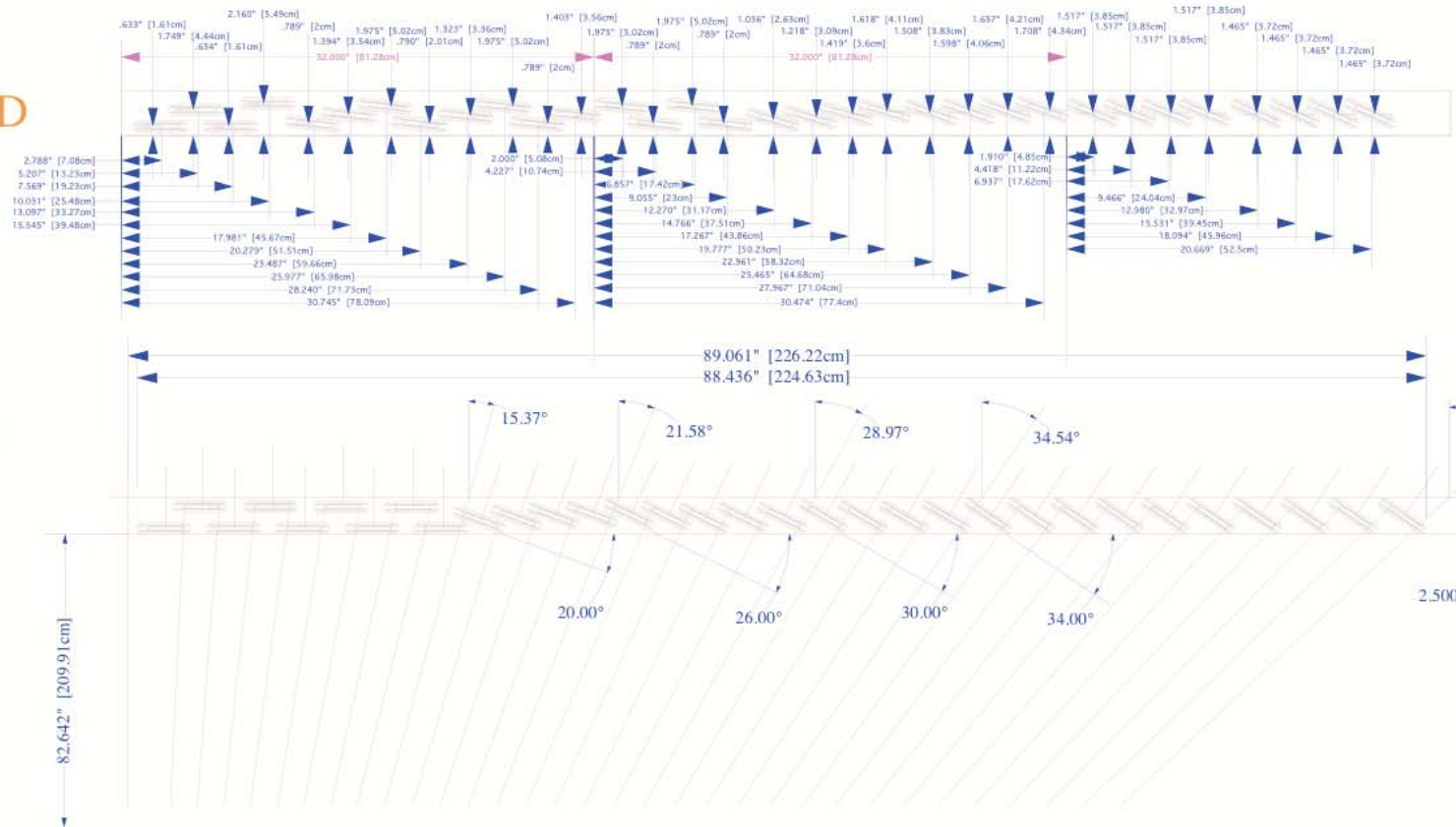
W.J. Llope
TOF Software Review
Nov. 2008, BNL

- the “jigsaw puzzle”
- simple acceptance simulation
- final tray-local geometry
- installed tray locations
- many ~20mil effects from manufacturing tolerances
- upVPD-local geometry
- geant simulations
- positioning
- summary

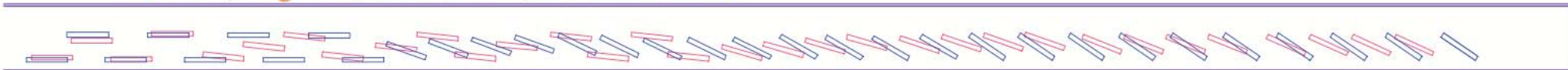
MRPC Acceptance Simulation

- MRPCs positioned w.r.t. $Z=0$ in the very small space available
- when $Z_{\text{vtx}} \neq 0 \rightarrow$ gaps (overlaps) in the MRPC acceptance on the same(opposite) side of STAR
- new GEANT simulation to quantify these effects...

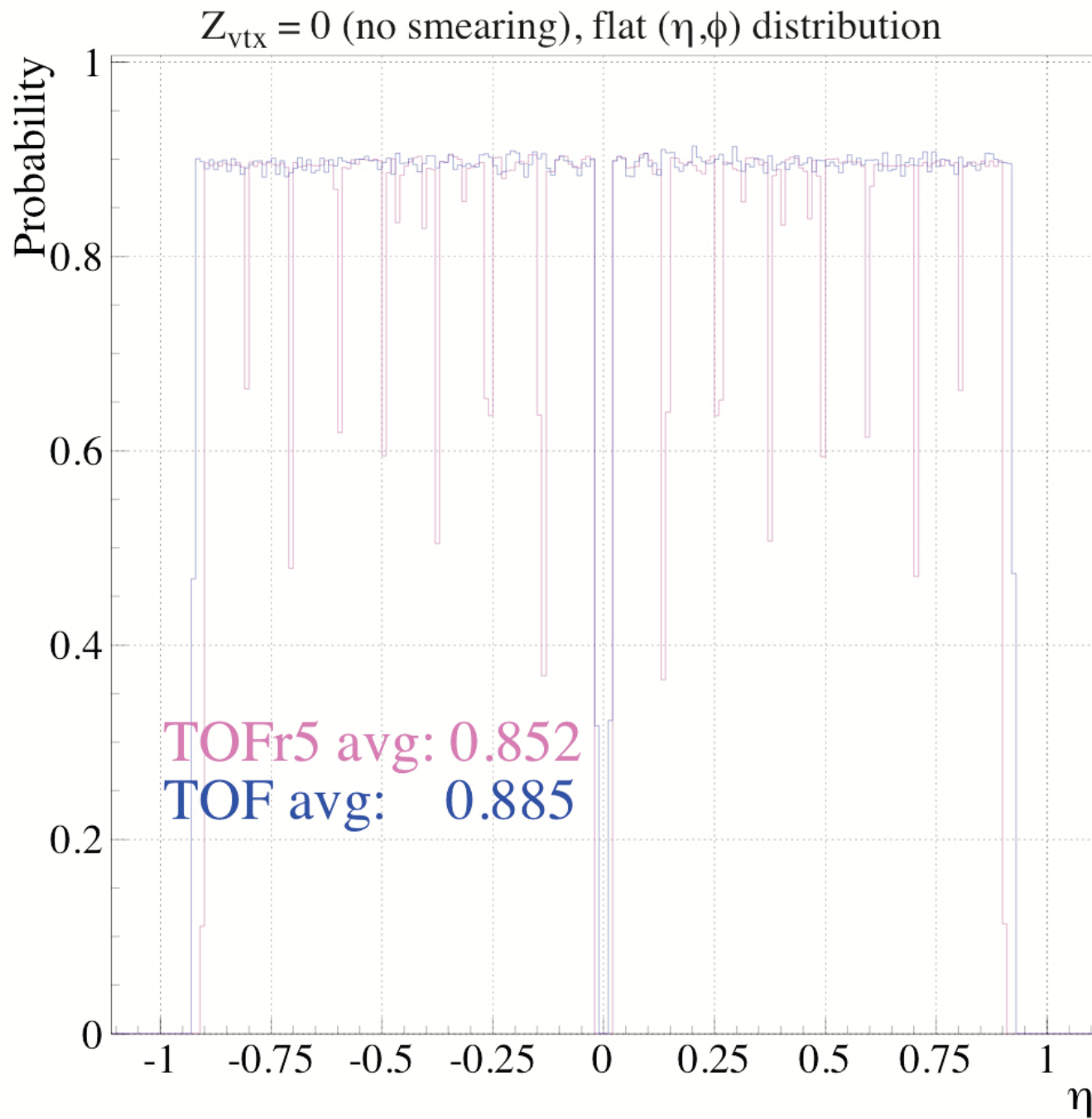
TOFr5 in CADD



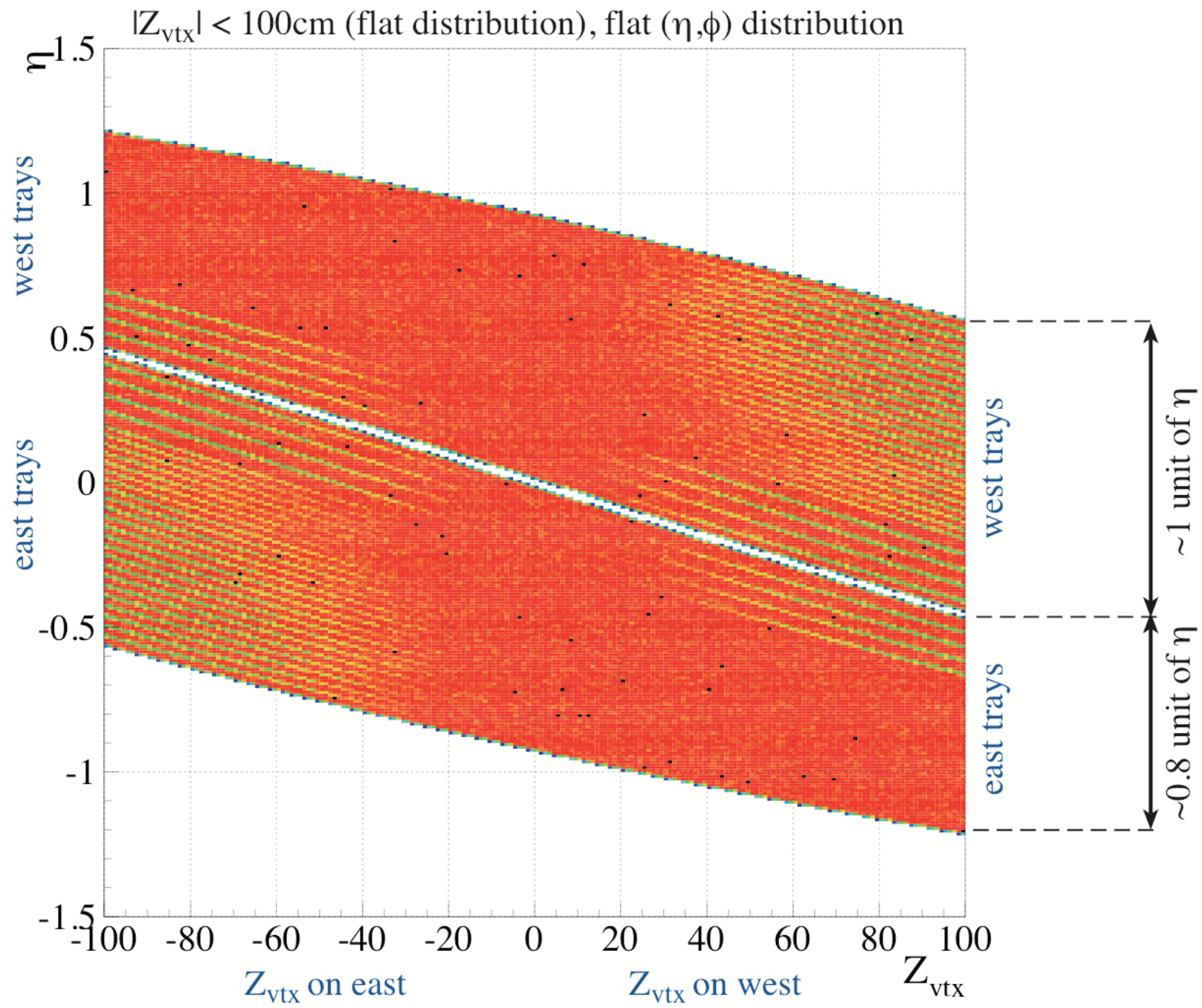
TOFr5 (magenta) and TOF (blue) in GEANT



throw 10 GeV/c muons at the detectors through vacuum, with controlled Z_{vtx} smearing then count 0, 1, & 2 hit events as a function of $(Z_{\text{vtx}}, \eta, \phi)$...

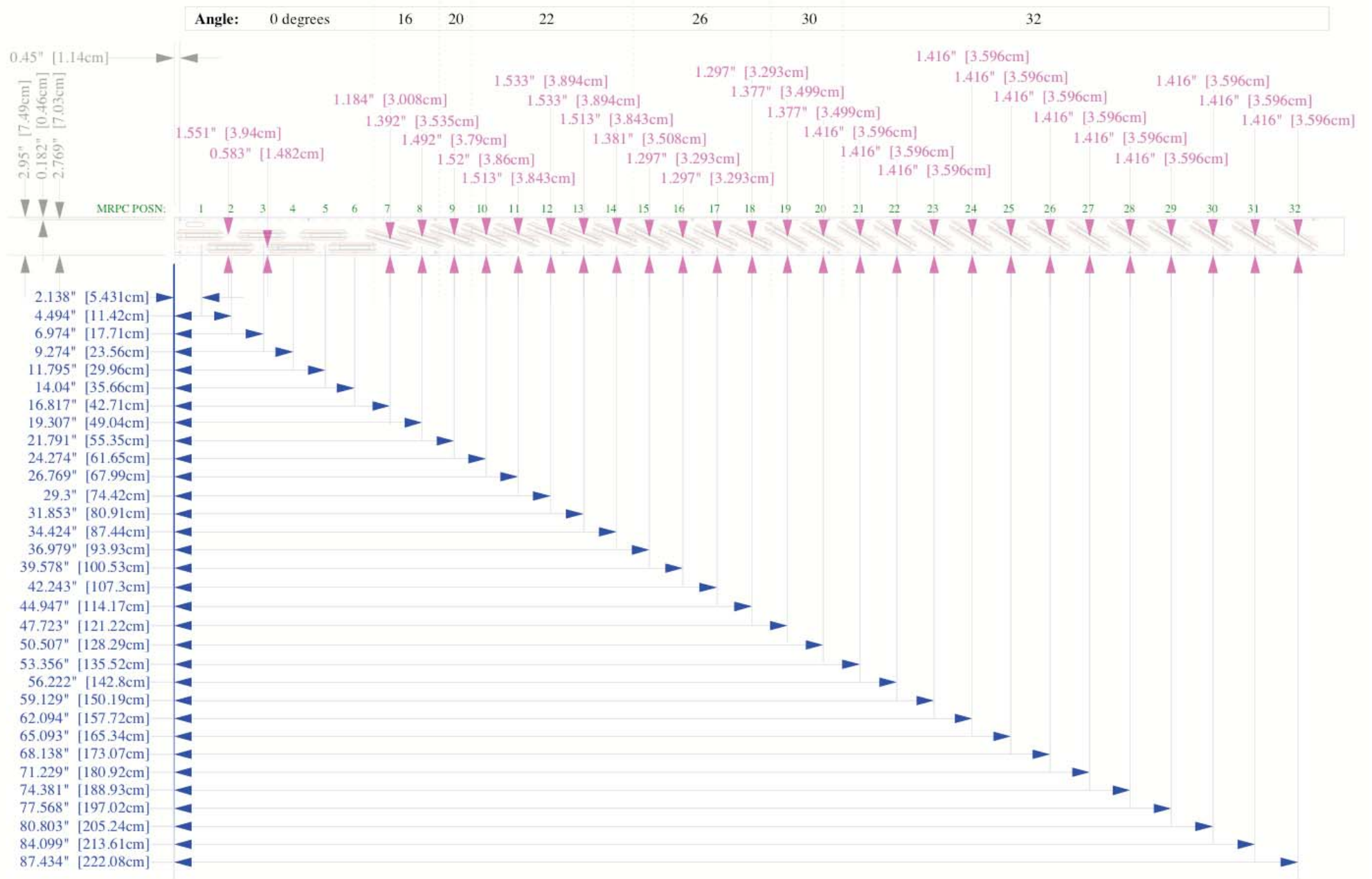


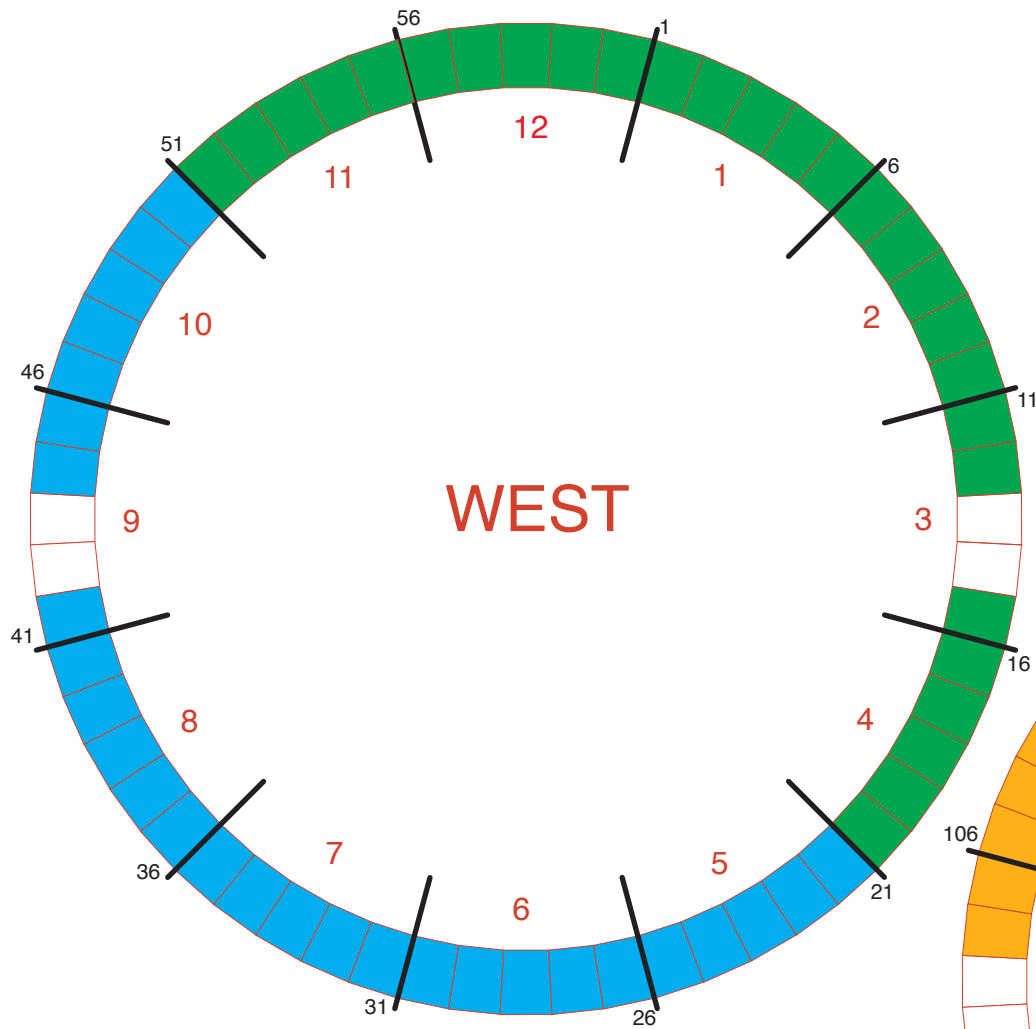
Compared to TOFr5, TOF has a better acceptance over a wider η -range!



gaps and overlaps become significant for $|Z_{\text{vtx}}| > \sim 30\text{cm}$

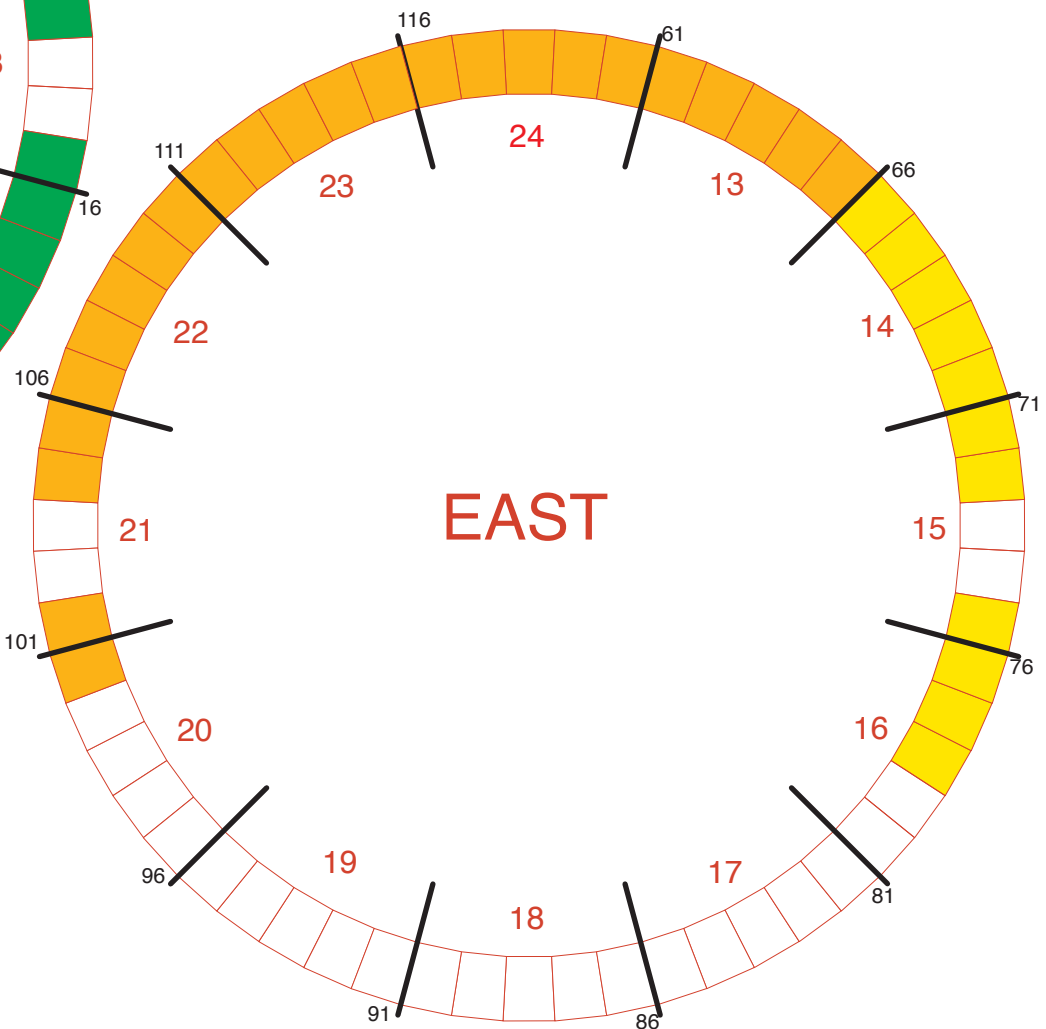
Final tray-local MRPC positioning





- Batch 1 (28 trays)
- Batch 2 (28 trays)
- Batch 2 remainder + Run-8 trays (11 trays)
- Batch 3 (projected, assuming 24 trays)

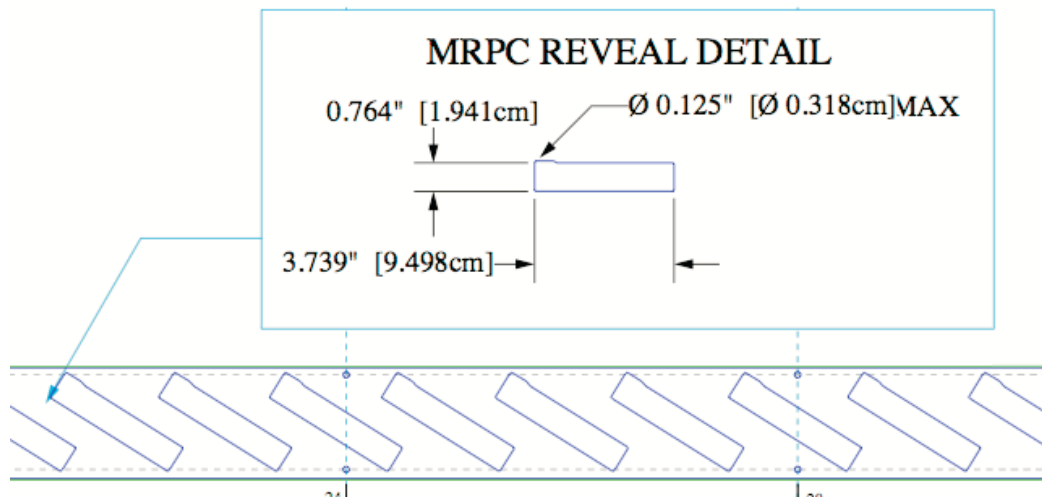
67 trays installed presently
91 trays installed (projected)



MRPC-global position is set from
MRPC-local positions plus
a tray-dependent Z offset
extracted from experimental data

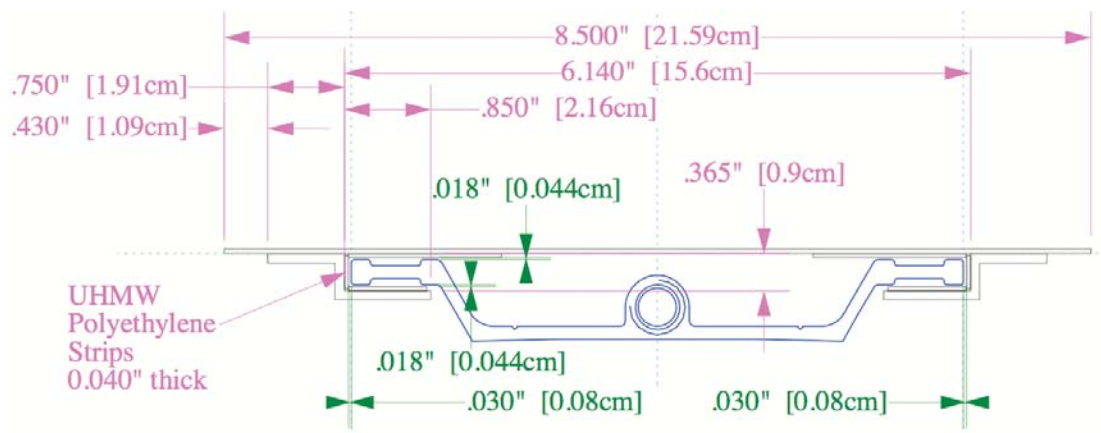
“Small” effects from manufacturing tolerances

MRPCs held w.r.t. trays by “Inner sides” (Y-Z)
and interior of bottom assy (X)



oversized by ~20mils in Y & Z
hor gap +/- 20mils nominal in X

vertical and horizontal gaps in tray feet:
→ ϕ -dependence of tray posn on TPC rail



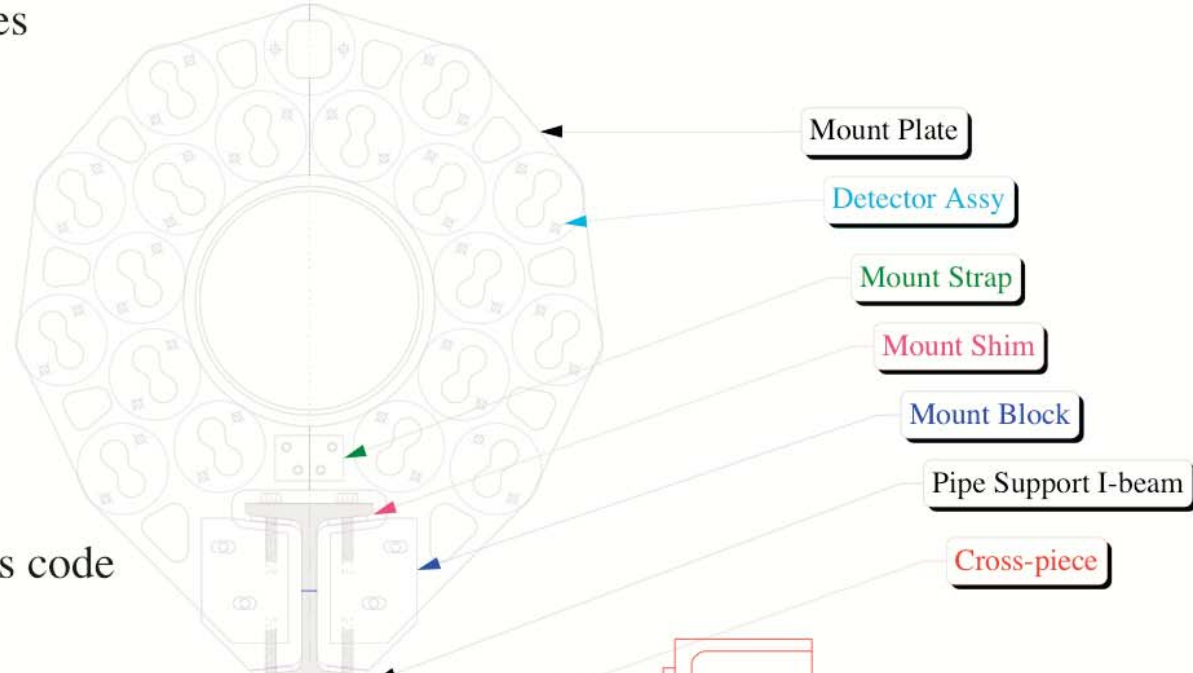
ignored in all previous runs (small acceptance)
may be possible to “see” with full system....


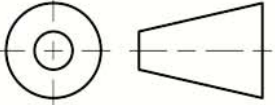
Run-6 prototype

19 detectors/side
 mesh dynode PMTs from TOFP
 no magnetic shields or forces
 smaller radial extent
 ~2/3 the weight of pVPD
 same Z-location

need to update slow controls code
 Les controls demand file

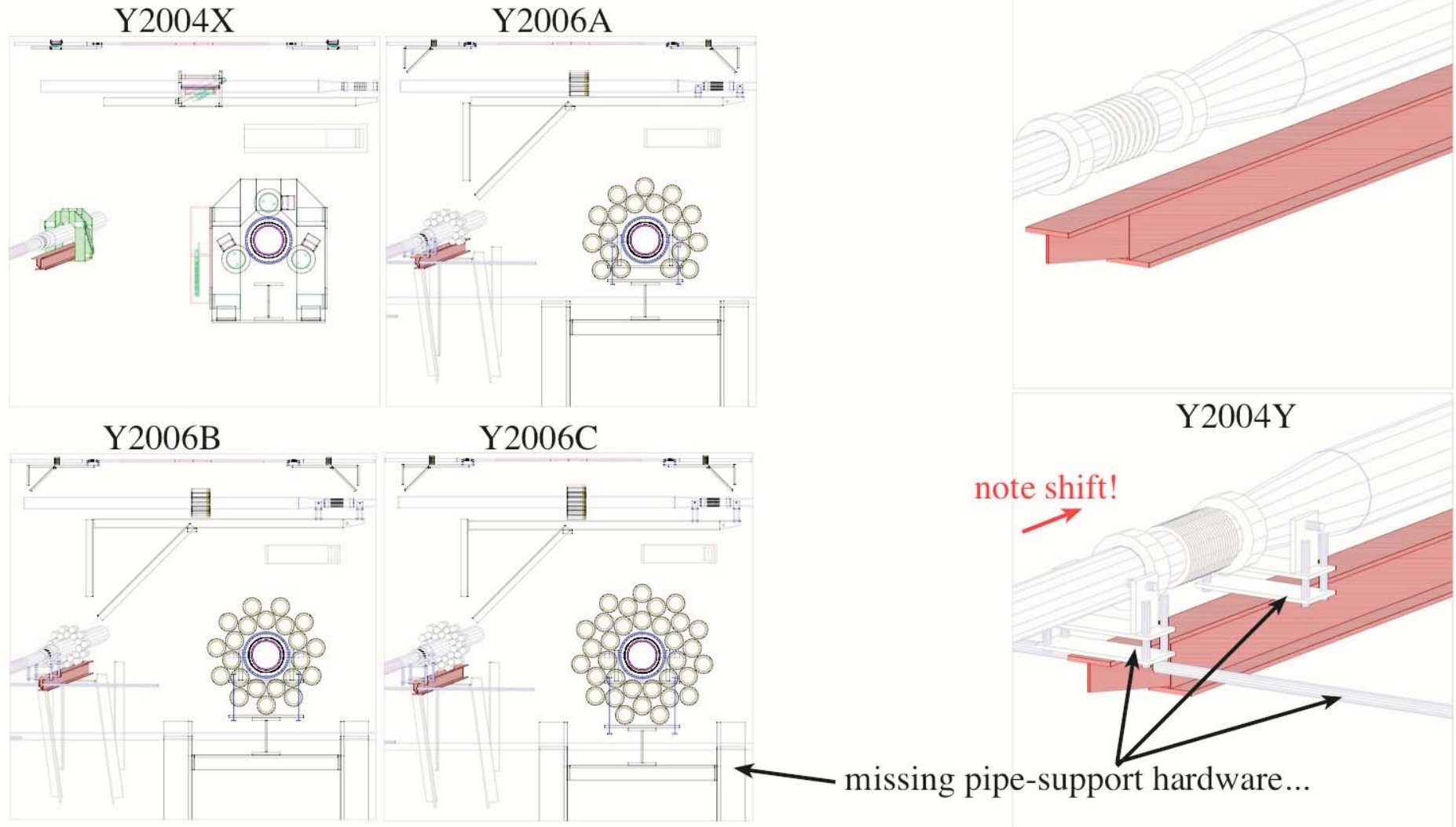
REVISION HISTORY			
REV	DESCRIPTION	DATE	APPROVED
1	first version	12/29/2005	WJL



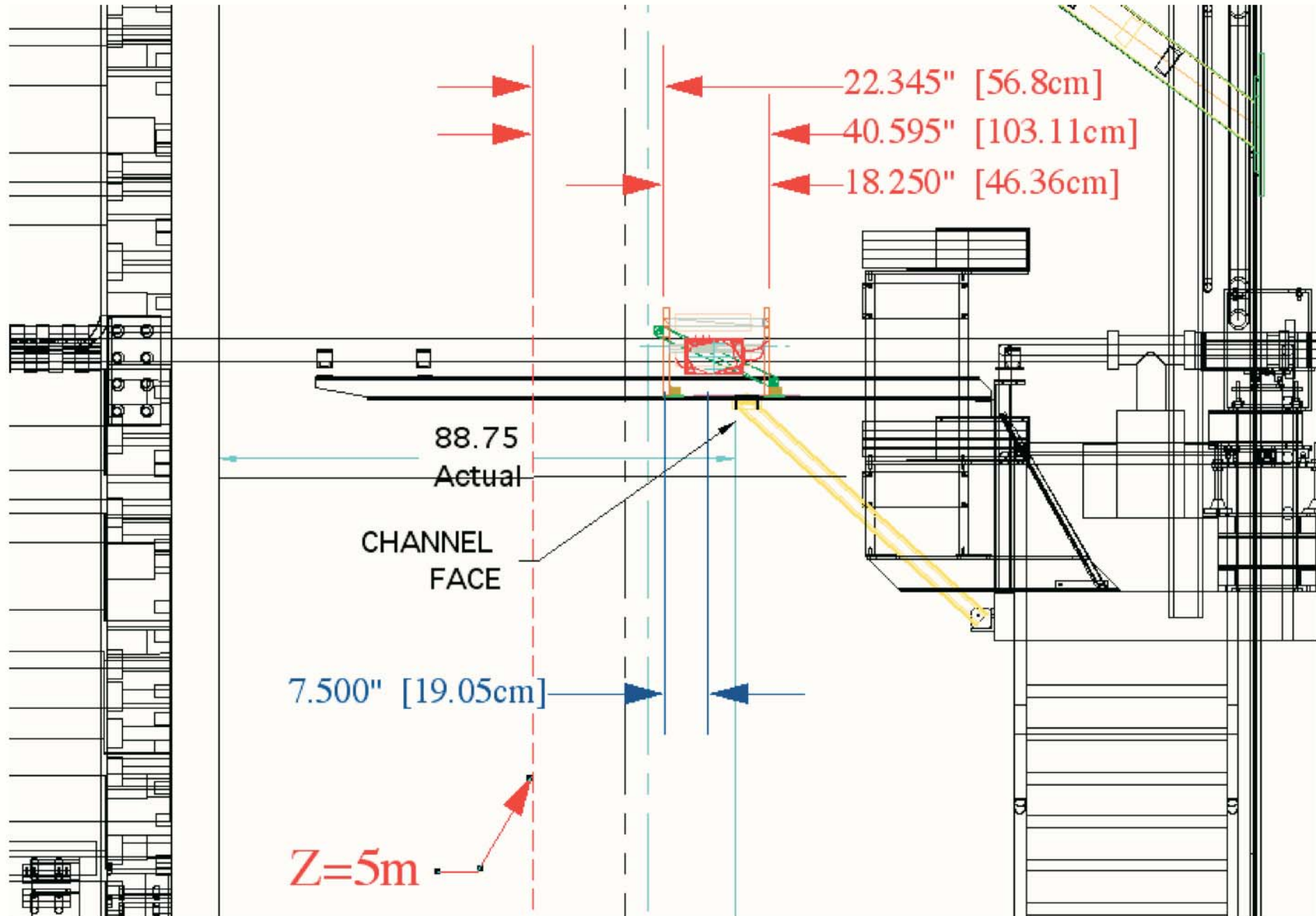
UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES TOL ON ANGLE $\pm .01^\circ$ 2 PL $\pm .01$ 3 PL $\pm .002$ INTERPRET DIM AND TOL PER ASME Y14.5M-1994	DESIGNED BY W.J. Llope				
	DRAWN BY W.J. Llope				
THIRD ANGLE PROJECTION	CHECKED BY J. Hoffmann	TITLE STAR TOF SYSTEM Start Detector Mount Assembly, Front View			
	APPROVED BY W.J. Llope				
	OTHER APPROVALS TBD	SIZE A	CAGE CODE N/A	DRAWING NO. TBD	REV 1
	CAD FILE NAME TOF_107_A_1_MountAssyFront	SCALE 1:4		EST. WGT	SHEET 1 OF 1

Simulations of the Upgraded pVPD (Geometry)

- Strict comparison btw starsim geometry and CADD files from STSG (discrepancies found!)
- First definition of many pipe & I-beam support structure pieces missing from starsim geometry
- Definition of several possible geometries for upVPD
- Performance of the different designs in p+p and Au+Au evts



Z-location for upVPD is the same as for present pVPD
smaller Z-extent and weight now though



Conclusions

MRPC-local and upVPD local- and global- geometry is final

MRPC-global positioning set using experimental data

→ 120 tray-Z values

expect offsets on the order of +/- 1/4" or better.

small effects from manufacturing tolerances typically neglected
might be visible in large datasets w/ the full system
and result in certain small optimizations to the geometry.

67 trays are already installed.

expect installation of approximately 24 more in December

→ ~91 trays for Run-9

~3/4 of the full-system

when finalized, [btofgeo.g](#) will be updated w/ the Run-9 geometry...
[vpddgeo.g](#) is already final....