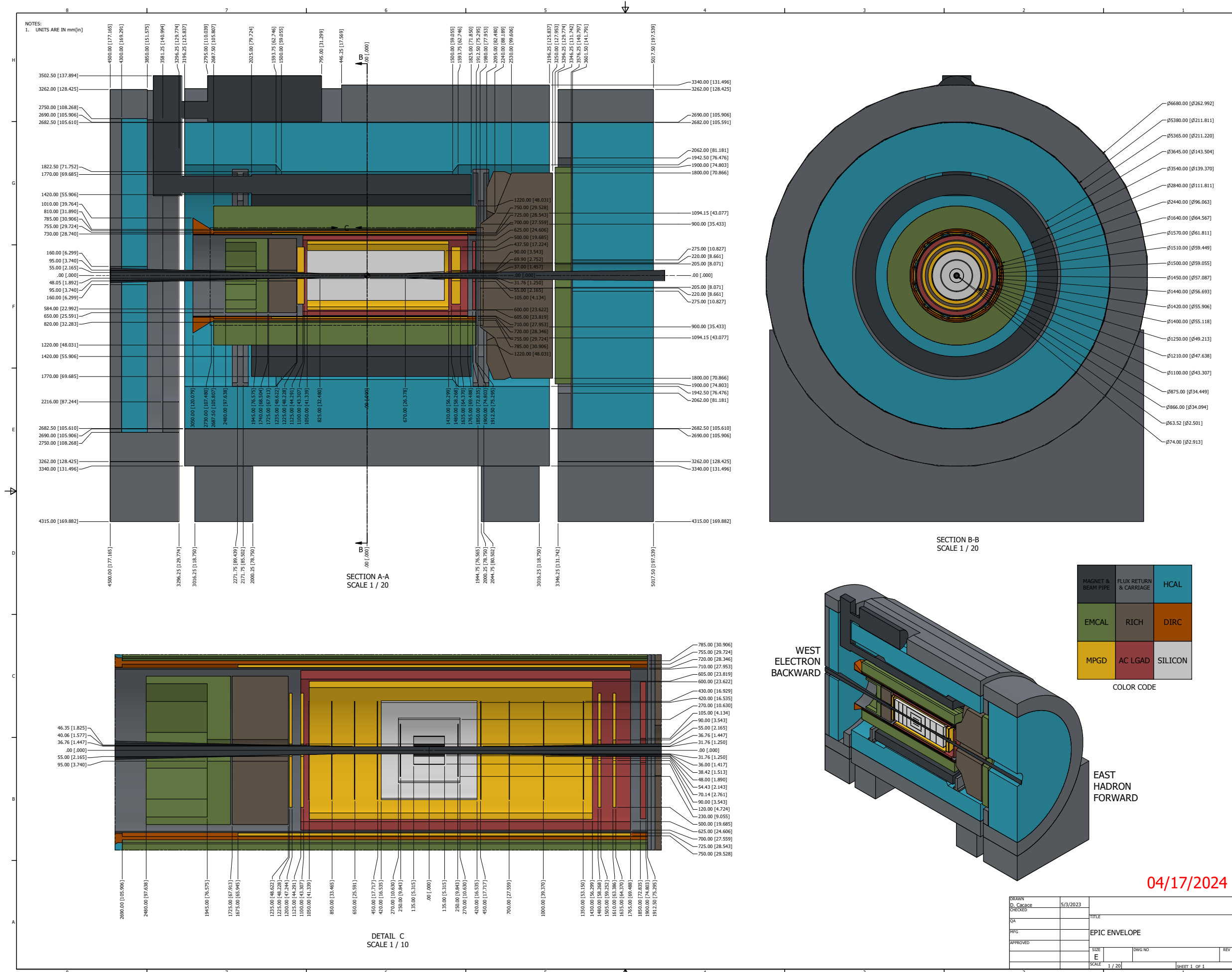


Discussion – Positioning of MPGD and ToF in the Forward Direction

Ernst Sichtermann (LBNL)

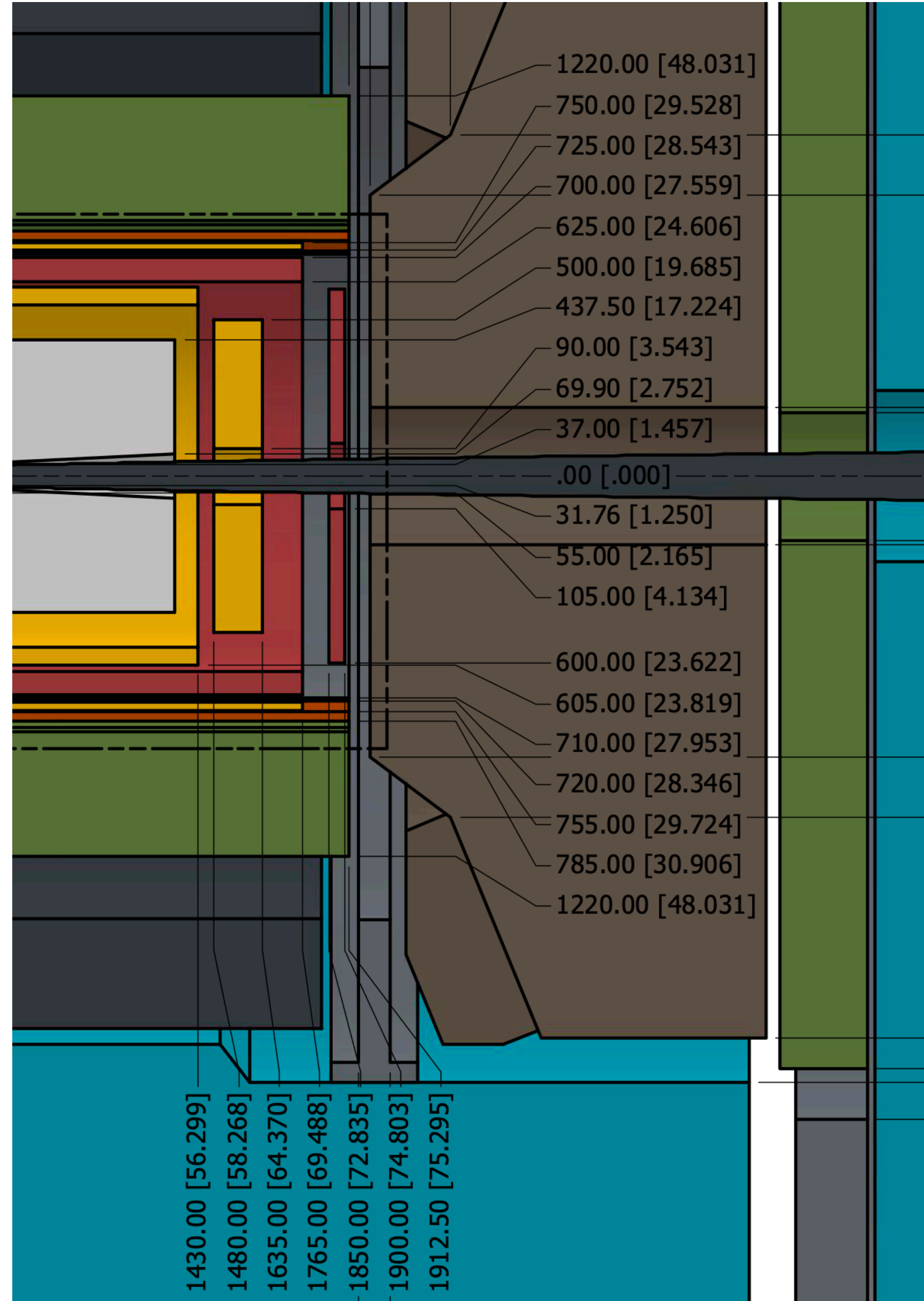
Elke brought up past April 25 as part of AOB that the positioning of the MPGD disks (and also TOF) in the forward region is/was a choice and is not strongly constrained in z. Looking ahead to TDR, we should investigate the trade-offs from repositioning. If the current positions are optimal, it would be good to show this. And, if not, there is improvement to be had.

April 17, 2024 envelopes:



Of course, this is not readable — download at <https://indico.bnl.gov/event/23130/>

Let's zoom a bit:



And consider <https://eic.jlab.org/Geometry/Detector/Detector-20240426175116.html>

Inner Tracker (Si Disks)		6.10.03	242.5	3.676	43	15	-106.25	136.25	0.75	403	MAPS	Weight: calculated as sum of sub-components
	HD Disk 1		2.5	3.676	23	25	23.75	26.25	0.00	9	Silicon	Offset: measured from center.
	HD Disk 2		2.5	3.676	43	45	43.75	46.25	0.01	34	Silicon	Offset: measured from center.
	HD Disk 3		2.5	3.842	43	70	68.75	71.25	0.01	34	Silicon	Offset: measured from center.
	HD Disk 4		2.5	5.443	43	100	98.75	101.25	0.01	33	Silicon	Offset: measured from center.
	HD Disk 5		2.5	7.014	43	135	133.75	136.25	0.01	33	Silicon	Offset: measured from center.

HD MPGD 2			2.5	9	50	161	161	163.5	0.02	3.80412603		Weight: based on parametric estimate from SBS Gem Offset: measured from face nearest to interaction point
HD MPGD 1			2.5	9	50	148	148	150.5	0.02	3.80412603		Weight: based on parametric estimate from SBS Gem Offset: measured from face nearest to interaction point

HD Time of Flight/Tracker		6.10.03	5	10.5	60	185	185	190	0.05	11	AC/LGAD	Offset: measured from face nearest to interaction point Weight: based on parametric estimate from SBS Gem
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Dual RICH		6.10.04	127	22.0	180	325	198	325	10.62	1,973	Aerogel/Gas	Offset: measured from face farthest from the interaction point Volume: calculated as sum of the sub-sections Weight: based on parametric estimate from CLAS LTCC The inner radius of the detector and aerogel sections reflects that the detector is anticipated to be made as one module, which must fit over the forward (HD) flange. If constructed from wedges, the detector envelope could extend inward to a radius of 14 cm.
	Detector Section		94	22.0	180	231	231	325	9.43			Offset: measured from face nearest to interaction point
	Aerogel Section		33	22.0	109.413	198	198	231	1.19			Offset: measured from face nearest to interaction point. Aerogel section includes the forward window.

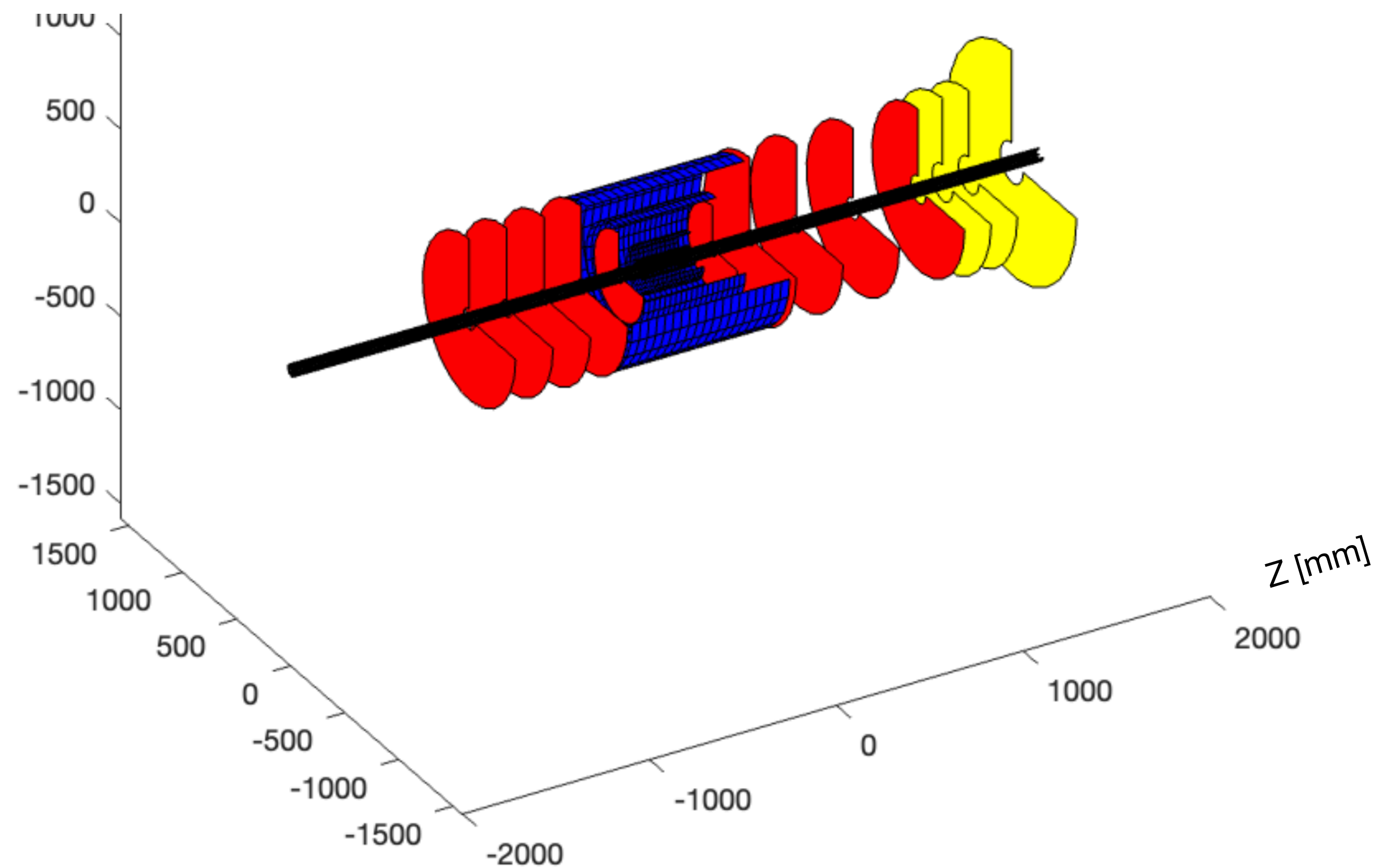
So it appears there is about 10cm to consider overall.

To try help the discussion along, I performed a few fast simulations

The usual: 1.7 T constant field, digitization, energy-preserving part of multiple scattering.

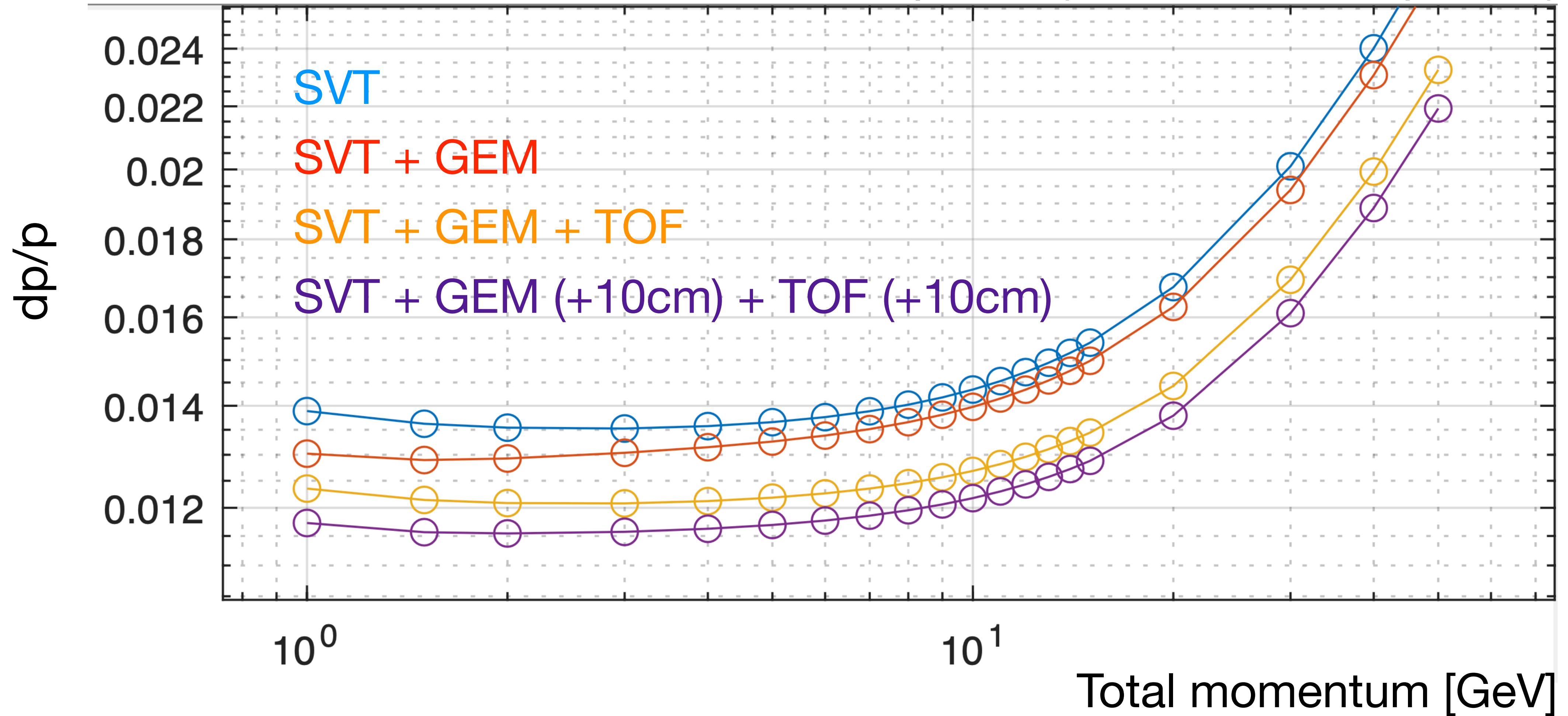
Default: MPGD disks: $X/X_0 = 1\%$, $z = 148, 162$ cm, resolution $\sim 150\mu\text{m}$.

TOF disk: $X/X_0 = 5\%$, $z = 185$ cm, resolution $\sim 30\mu\text{m}$.



To try help the discussion get started / along, I performed a few fast simulations:

$\eta = 2.5$ (all disks in acceptance)



Gain associated with ~10cm extension is at the ~10% level.

It is, of course, more involved — B is not constant (note recent update), other angles exist, as do acceptance edges, dp/p is one quantity, etc. etc.