Yields update

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Last time Review

Yields Drift Table

Production Settings	Total Momentum Settings	Momentum Settings which have yields drifts	Total Runs	Drift Runs	Comment
2.2GeV, 2.5T Tran	37	7	259	21	a. Drift Settings defined: yields spread>3.5% b. At least 7% (76 runs) have drift (total 1137 runs) c. 32% (360 runs) are in the momentum setting which have drift runs.
1.7GeV, 2.5T Tran	20	4	213	18	
1.1GeV, 2.5T Tran	36	4	344	13	
2.2GeV, 5T Tran	20	1	90	7	
2.2GeV, 5T Long	15	4	179	6	
3.3GeV, 2.5T Tran	7	3	52	11	

Note: here assume drift runs : smaller run group in that momentum setting
if target different, different momentum setting

Last time Review

Summary Table

Production Settings	Total Momentum Settings	Momentum Settings which have yields drifts	Settings Resolved Spread Within 5%	Settings Still Question?	Comment
2.2GeV, 2.5T Tran	37	7	2	5	a. Drift Settings defined: yields spread>3.5% b. About 60% drift setting resolved with yields spread within 5%
1.7GeV, 2.5T Tran	20	4	2	2	
1.1GeV, 2.5T Tran	36	4	4	0	
2.2GeV, 5T Tran	20	1	1	0	
2.2GeV, 5T Long	15	4	3	1	
3.3GeV, 2.5T Tran	7	3	2	1	

Last time Review

Yields – E2.2GeV, 5T Long

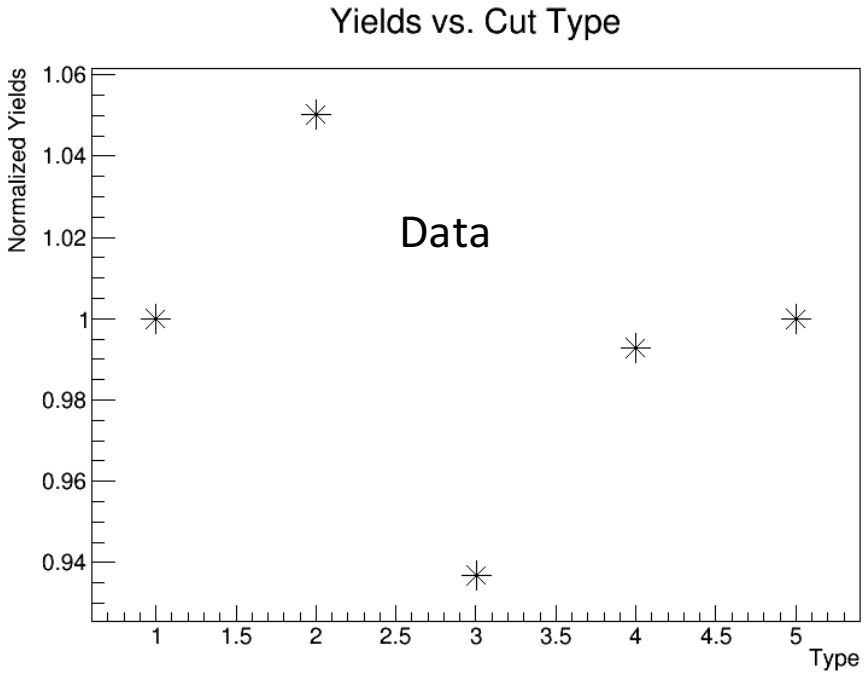
- ✓ Study beam offset effects
- ✓ Yields Table for raster cut circle at different center (x,y) in mm

Raster size	Center (0, 0)	Center (2, 0)	Center (0,2)	Center (-2,0)	Center (0,-2)	Yields Spread among These five circles
No cut	1	1	1	1	1	0
10mm	0.999	1.037	1.008	0.977	1.006	6%
9mm	1.003	1.06	1.011	0.964	1.016	9.6%
8mm	1.024	1.077	1.015	0.954	1.024	12%
7mm	1.039	1.093	1.022	0.971	1.034	11.7%
6mm	1.05	1.103	1.043	0.984	1.044	11.4%
5mm	1.061	1.11	1.057	0.994	1.052	11%
4mm	1.07	1.111	1.064	1.04	1.006	10.1%
3mm	1.074	1.093	1.052	0.999	1.053	9.8%
2mm	1.061	1.106	1.078	1.005	1.066	9.5%

Summary: 1mm shift in x changes yields 3%, 4mm in y almost no change in yields

Yields – E2.2GeV, 5T Long

- ✓ Study beam offset effects---check with simulation
- ✓ Simulated Yields compare with Raster cut at 6mm



Simulation

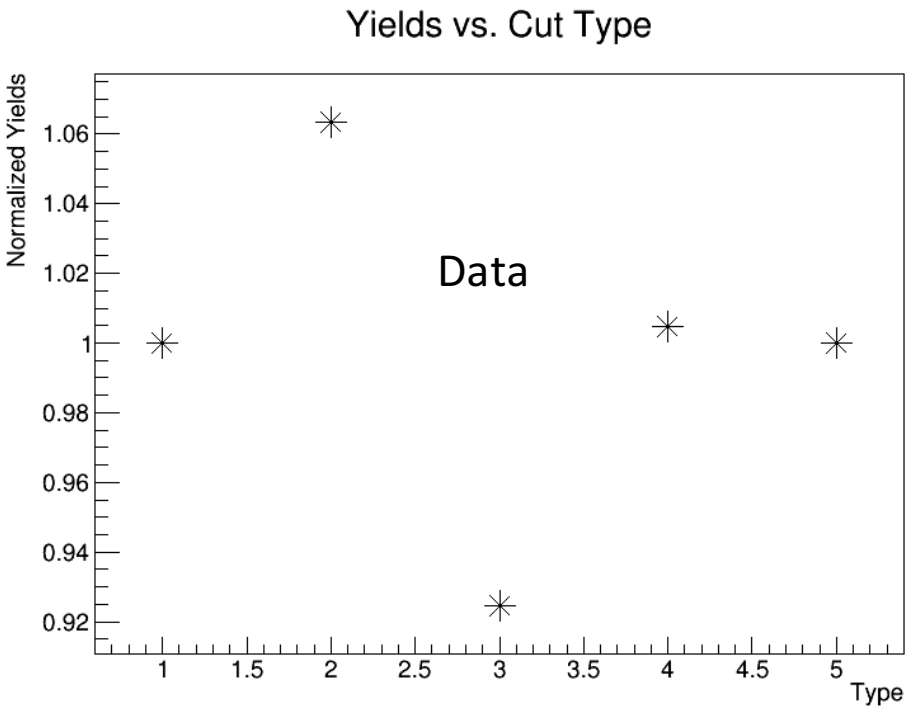
2.049GeV, Run 5729	
Cut Type	Simulation Yields
1	1.0
2	1.064
3	0.928

Data Yields

Type 1: beam center (0,0)mm Type 2: beam center (2,0)mm
Type 3: beam center (-2,0)mm Type 4: beam center (0,2)mm
Type 5: beam center (0,-2)

Check Another Setting – E2.2GeV, 2.5T Tran

- ✓ Study beam offset effects---check with simulation
- ✓ Simulated Yields compare with Raster cut at 6mm



Simulation

1.247GeV, Run 3599	
Cut Type	Simulation Yields
1	1.0
2	1.064
3	0.924

Data Yields

Type 1: beam center (0,0)mm Type 2: beam center (2,0)mm
Type 3: beam center (-2,0)mm Type 4: beam center (0,2)mm
Type 5: beam center (0,-2)

Note: Checked 6 momentum settings
For 2.2GeV, 2.5T, the ratio vary within 1.5%

Packing Fraction Runs Yields – E2.2GeV, 5T Tran

Run #	beam energy	material ID	Momentum	Horizontal X (mm)	Ph=dx/dz (mrad)	Vertical Y (mm)	Th=dy/dz (mrad)	Slow Raster X (mm)	Slow Raster Y (mm)	Fast Raster X (mm)	Fast Raster Y (mm)	Yields W/o Cut	Yields w. 6mm Cut	Simulation (6mm size)	Simulation Acceptane
5943	2253.6	20	2.2279	-0.9	0.3	6.3	1.1	11.2	12.2	0.7	0.7	1	1	1	1
6033	2253.5	20	2.228	-1.3	-0.2	6.4	1.2	11.2	11.5	0.7	0.7	0.976	0.962	0.974	0.998
6061	2253.4	20	2.228	-1.1	0	7	1.4	11.2	11.5	0.7	0.7	0.952	0.956	0.998	0.992
With 6mm raster cuts, yields spread from 4.8% to 4.4%, agree simulation 4.2%															
5944	2253.5	19	2.2279	-1	0.2	6.4	1.2	11.2	12.2	0.7	0.7	1	1	1	1
5945	2253.6	19	2.2279	-1.4	-0.4	6.2	1.1	10.9	12.2	0.7	0.7	1.006	1.01	0.952	0.995
5946	2253.6	19	2.2279	-0.8	0.2	5.3	0.9	11.2	12.2	0.7	0.7	1.012	1.024	0.981	1.003
6034	2253.5	19	2.2279	-1.2	-0.1	6.5	1.2	11.2	11.5	0.7	0.7	0.982	0.982	0.971	0.997
6063	2253.4	19	2.2279	-1.1	0.1	7.2	1.5	11.2	10.1	0.7	0.7	0.981	1.005	0.975	0.986
6081	2253.4	19	2.2279	-1.3	-0.3	7.2	1.5	11.2	10.1	0.7	0.7	0.99	0.995	0.965	0.98
With 6mm raster cuts, yields spread from 3.1% to 4.2%, agree simulation 5.8%															

Packing Fraction Runs Yields – E2.2GeV, 5T Long

Run #	beam energy	material ID	Momentum	Horizontal X (mm)	Ph=dx/dz (mrad)	Vertical Y (mm)	Th=dy/dz (mrad)	Slow Raster X (mm)	Slow Raster Y (mm)	Fast Raster X (mm)	Fast Raster Y (mm)	Yields W/o Cut	Yields w. 6mm Cut	Simulation (6mm size)	Simulation Acceptane
5626	2253.8	17	2.2279	-0.4	-0.7	-3.5	-0.4	10.3	8.9	0.9	0.8	1	1	1	1
5641	2253.8	17	2.2279	-0.3	-0.4	-3.4	-0.2	10.3	8.9	0.9	0.8	1.007	0.988	1.018	1.001
5654	2253.8	17	2.2279	0.2	0.1	-3.6	-0.3	10.3	8.9	0.9	0.8	1.058	1.031	1.093	1.01
5655	2253.5	17	2.2279	0.7	0.6	-3.6	-0.3	10.3	8.9	0.9	0.8	1.064	1.03	1.181	1.014
5656	2253.6	17	2.2279	1.1	1	-3.6	-0.3	10.3	8.9	0.9	0.8	1.052	1.017	1.241	1.02
5704	2253.5	17	2.2279	1.1	0.8	-4.4	-1.4	10.3	8.9	0.7	0.6	1.055	1.015	1.199	1.013
With 6mm raster cuts, yields spread from 6.4% to 4.3%, agree simulation 22.4%															
5628	2253.8	18	2.2279	-0.3	-0.6	-3.6	-0.5	10.3	8.9	0.9	0.8	1	1	1	1
5631	2253.7	18	2.2279	0.4	0.3	-3.3	0	10.3	8.9	0.9	0.8	1.001	1.01	1.117	1.008
5635	2253.7	18	2.2279	0.7	0.6	-3.5	-0.3	10.3	8.9	0.9	0.8	0.999	0.999	1.164	1.014
5639	2253.6	18	2.2279	0.2	0.1	-3.5	-0.3	10.3	8.9	0.9	0.8	0.993	1.003	1.077	1.003
5652	2253.7	18	2.2279	0.3	0.2	-3.6	-0.4	10.3	8.9	0.9	0.8	1.053	1.057	1.103	1.006
With 6mm raster cuts, yields spread from 6.0% to 5.4%, agree simulation 16.5%															

Packing Fraction Runs Yields – E1.7GeV, 2.5T Tran

Run #	beam energy	material ID	Momentum	Horizontal X (mm)	Ph=dx/dz (mrad)	Vertical Y (mm)	Th=dy/dz (mrad)	Slow Raster X (mm)	Slow Raster Y (mm)	Fast Raster X (mm)	Fast Raster Y (mm)	Yields W/o Cut	Yields w. 6mm Cut	Simulation (6mm size)	Simulation Acceptane
4214	1710.5	7	1.691	3.7	3.3	-0.9	77.5	8.3	8.7	0.8	0.8	1	1	1	1
4215	1710.5	7	1.691	4	3.7	-1.2	77.1	8.3	8.7	0.8	0.8	1	1.006	1.044	1.006
4407	1710.5	7	1.691	2.8	3.6	-2.3	76.9	8.9	9	0.8	0.8	0	0	0.986	0.988
4408	1710.5	8	1.691	3	3.8	-2.5	76.7	8.9	9	0.8	0.8	0	0	1.002	0.991
4574	1710.6	8	1.691	2.9	3.8	-1.6	77.6	8.9	9	0.8	0.8	0.96	0.964	0.991	0.99

With 6mm raster cuts, yields spread from 4% to 4.2%, agree simulation 3.8%

Run 4407/4408 not replayed with updated optics, from old rootfiles, the large deviation Caused by run 4574

Packing Fraction Runs Yields – E2.2GeV, 2.5T Tran

Run #	beam energy	material ID	Momentum	Horizontal X (mm)	Ph=dx/dz (mrad)	Vertical Y (mm)	Th=dy/dz (mrad)	Slow Raster X (mm)	Slow Raster Y (mm)	Fast Raster X (mm)	Fast Raster Y (mm)	Yields W/o Cut	Yields w. 6mm Cut	Simulation (6mm size)	Simulation Acceptane
3446	2253.6	8	2.228	4.6	4.2	3.4	63.6	10.3	8.9	0.8	0.8	1	1	1	1
3575	2253.6	8	2.2281	2.2	1.2	0.7	60.4	8.8	7.7	0.8	0.8	1.054	1.028	0.718	0.991
3759	2253.5	8	2.228	1.6	0.8	2.9	61.9	7.5	6.5	0.8	0.7	1.172	1.118	0.673	0.977
3865	2253.6	8	2.228	1	0.8	0.6	60.9	9.2	8.1	0.8	0.8	1.134	1.132	0.649	0.982
With 6mm raster cuts, yields spread from 17.2% to 13.2%, agree simulation 36.1%															
3503	2253.7	7	2.228	2.1	3.3	1	60.8	10.3	8.9	0.8	0.8	1	1	1	1
3574	2253.6	7	2.228	2	0.9	0.5	60.1	8.8	7.7	0.8	0.8	1.15	1.135	0.83	1
3727	2253.4	7	2.2281	4.8	4.9	2.3	63.3	9	7.7	0.8	0.8	1.161	1.151	1.262	1.012
3864	2253.5	7	2.2281	0.8	0.7	0.7	60.8	9.2	7.9	0.8	0.8	1.191	1.3	0.766	0.986
With 6mm raster cuts, yields spread from 19.1% to 30.3%, agree simulation 49.6%															

Packing Fraction Runs Yields – E1.1GeV, 2.5T Tran

Run #	beam energy	material ID	Momentum	Horizontal X (mm)	Ph=dx/dz (mrad)	Vertical Y (mm)	Th=dy/dz (mrad)	Slow Raster X (mm)	Slow Raster Y (mm)	Fast Raster X (mm)	Fast Raster Y (mm)	Yields W/o Cut	Yields w. 6mm Cut	Simulation (6mm size)	Simulation Acceptane
4947	1156.7	11	1.1511	2.9	1.3	-6.7	117.8	10.6	8.5	0.7	0.9	1	1	1	1
5067	1157	11	1.1511	2.4	1	-5.3	117.8	9.5	8.1	0.7	0.8	0.719	0.706	0.987	1.019
4948	1156.7	12	1.1511	2.9	1.3	-6.7	117.8	10.6	8.5	0.7	0.9	1.017	1.02	1	1
5134	1156.9	13	1.1511	-0.9	0.1	-5.7	117.5	10.6	9.4	0.7	0.9	0.342	0.34	0.824	0.975
5219	1157.1	13	1.1511	-0.4	0.2	-5.8	117.5	10.6	9.4	0.7	0.9	0.331	0.321	0.842	0.98

Mat ID 13 small yields?

Run 4947/4948 at low current 8nA, Run 5067 at low current 17nA, NO BPM information use neighbor runs

Packing Fraction Runs Yields – E1.1GeV, Short 2.5T Tran

Run #	beam energy	material ID	Momentum	Horizontal X (mm)	Ph=dx/dz (mrad)	Vertical Y (mm)	Th=dy/dz (mrad)	Slow Raster X (mm)	Slow Raster Y (mm)	Fast Raster X (mm)	Fast Raster Y (mm)	Yields W/o Cut	Yields w. 6mm Cut	Simulation (6mm size)	Simulation Acceptane
5133	1156.8	14	1.1511	-1.4	0	-5.4	117.8	10.6	9.4	0.7	0.9	1	1	1	1
5197	1157.2	14	1.1511	-0.6	0.2	-4.9	118.2	10.6	9.4	0.7	0.8	1.628	1.644	1.051	1.016
5198	1157.2	14	1.1511	-0.6	0.2	-4.9	118.2	10.6	9.4	0.7	0.8	1.595	1.608	1.04	1.015
5264	1157.2	14	1.151	-0.1	0.3	-4.5	119.4	10.6	9.4	0.7	0.9	0.863	0.845	1.063	1.019
														Big deviation?	

Run 5197/5198 at low current 20nA, NO BPM information, use neighbor runs

Summary

- The raster cut did not help much for packing fraction runs
- Simulation is very sensitive to beam information
- Will send the raster cut to be put in mysql