Yields Drift Study

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IDEA

To Study Yields Drift :

Simulation:

- Use beam information as input
- Monte-carlo step by step
  --energy loss model, XS, snake model
- Regular acceptance cut applied to count the yields
- 1.1GeV, 4 momentum setting yields drift >3% in LHRS

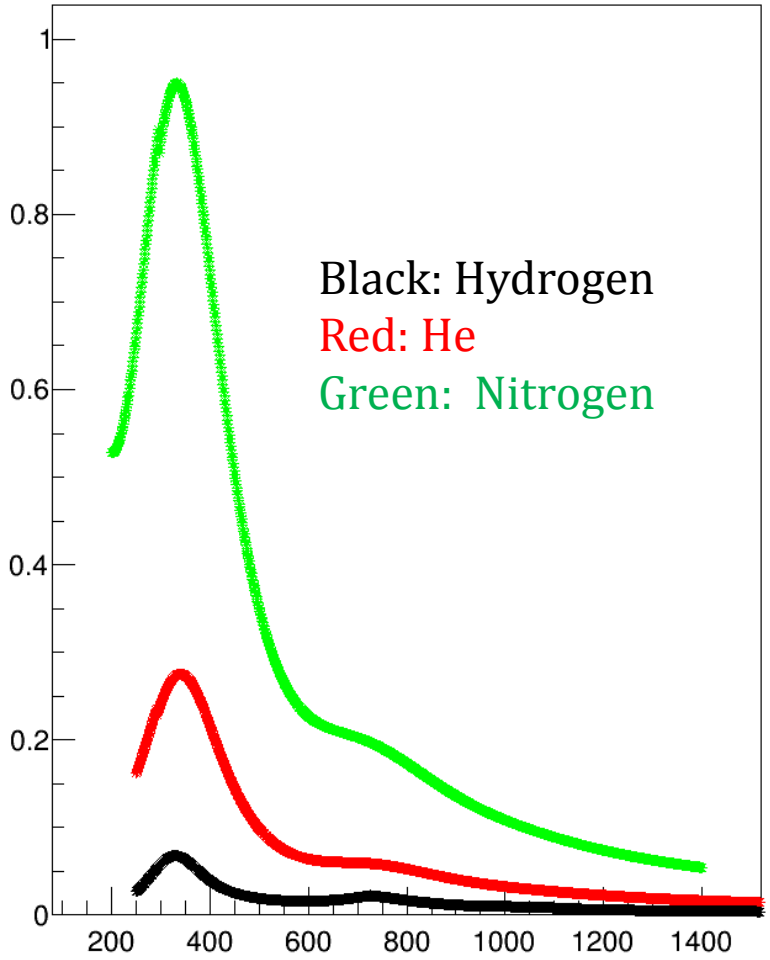
✓ 1589, 1494,1405,1320MeV

- 1.7GeV, 4 momentum setting yields drift >3% in LHRS

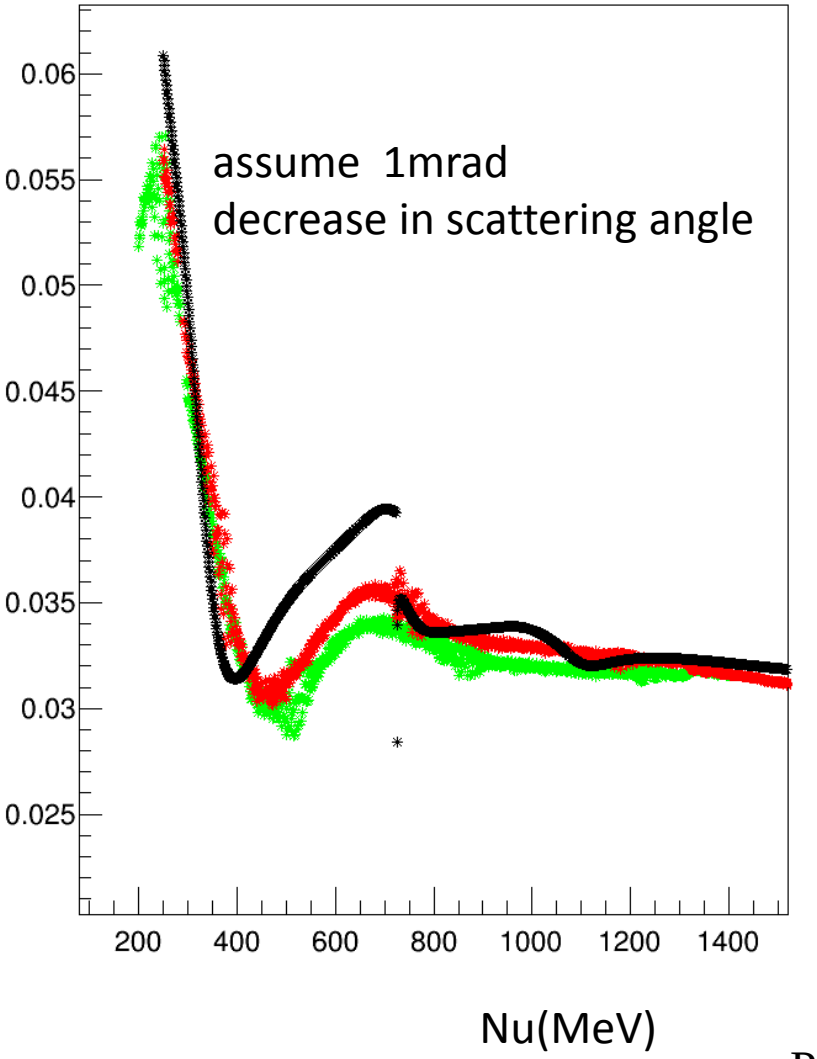
✓ 1017, 809, 752, 582 MeV

E1.7GeV PBosted XS -----calculate directly

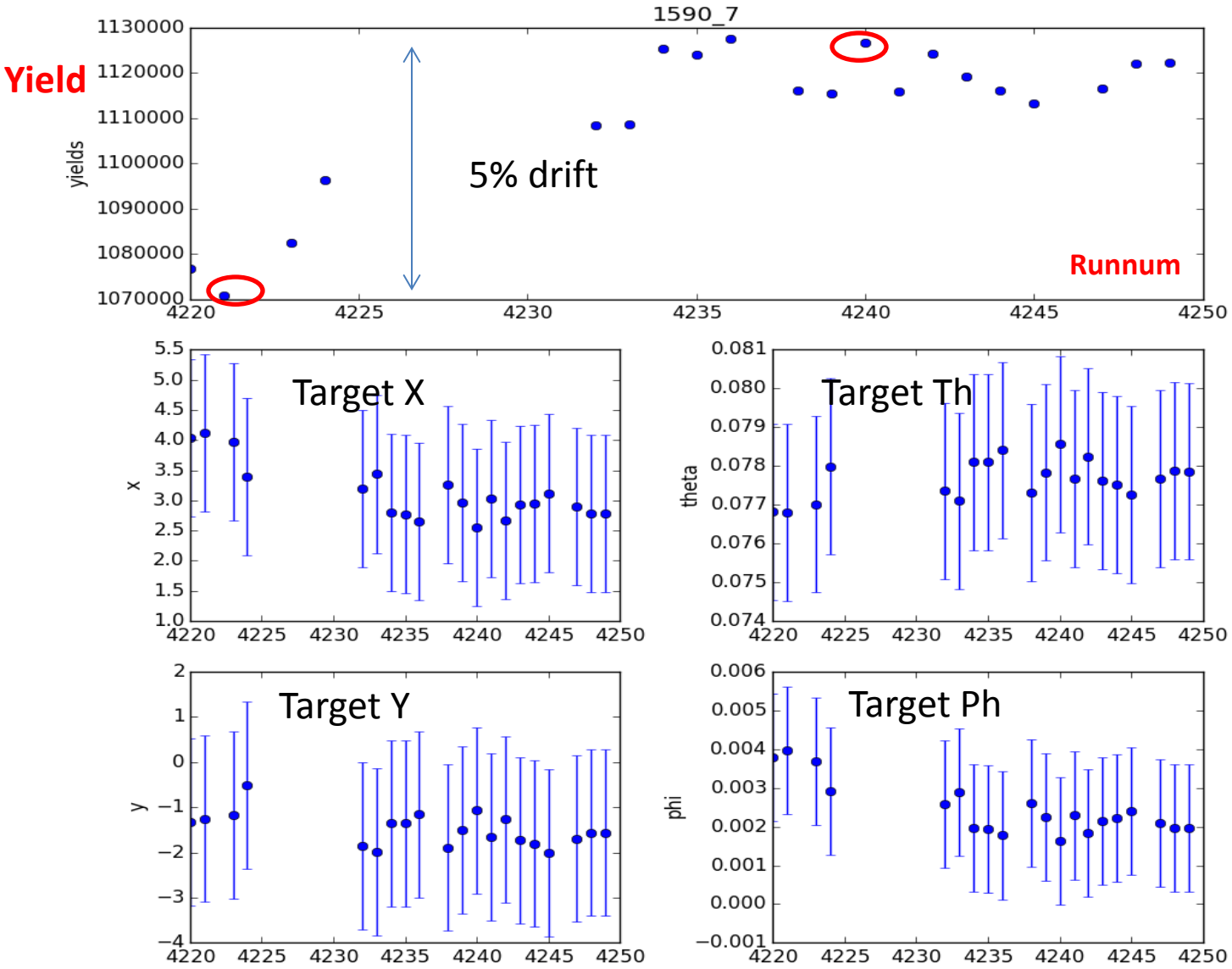
σ vs. Nu



XS change % vs. Nu



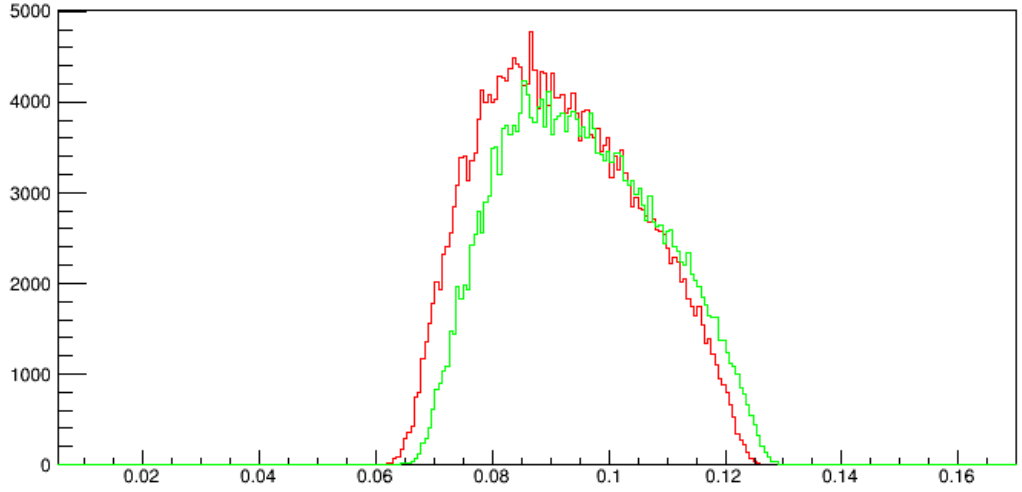
E1.7GeV P1589MeV-one example



Form Pengjia

E1.7GeV P1589MeV-one example

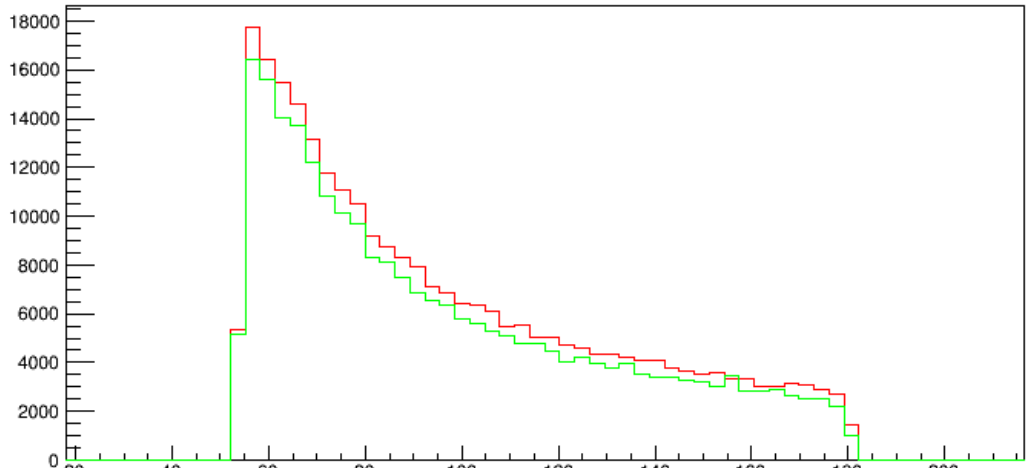
Simulated Scattering Angle Distribution



Angle/Rad

Red:
Run 4221
Green:
Run 4240

Simulated Dp Distribution



Nu/MeV

Weighted by
Cross section

Yields Table

Runs	Beam x/mm	Beam y/mm	Beam th/rad	Beam ph/rad	Exp. Yields	Simu. Yields
4221	4.1	-1.2	0.0768	0.0040	1	1
4240	2.6	-1.1	0.0786	0.0016	1.05	0.92

Note:

$beam\_x_{4221} > beam\_x_{4240}$ ⟶

$\theta\_scatt_{4221} < \theta\_scatt_{4240}$ ⟶

$XS_{4221} > XS_{4240}$?

The same effect from beam angle beam_ph, tan(beam_ph)=dx/dz in lab

Yields Table For E1.7GeV Drift settings

Momentum /MeV	Runs	Beam x/mm	Beam y/mm	Beam th/rad	Beam ph/rad	Exp. Yields	Simu. Yields
1589	4221	4.1	-1.2	0.0768	0.0040	1	1
1589	4240	2.6	-1.1	0.0786	0.0016	1.05	0.92
1494	4336	1.7	-1.0	0.0774	0.0042	1	1
1494	4564	2.2	-1.3	0.0778	0.0029	1.12	0.96
1405	4297	2.7	-1.4	0.0781	0.0019	1	1
1405	4324	3.0	-0.2	0.0785	0.0026	0.97	1.02
1320	4350	1.5	-0.0	0.0784	0.0039	1	1
1320	4565	2.3	-1.7	0.0774	0.0031	1.08	1.01

Consider raster size change in simulation

Yields Table For E1.1GeV Drift settings

Momentum /MeV	Runs	Beam x/mm	Beam y/mm	Beam th/rad	Beam ph/rad	Exp. Yields	Simu. Yields
1017	4791	3.5	-8.6	0.1169	0.0015	1	1
1017	4831	2.6	-7.3	0.1175	0.0012	0.97	0.98
809	5185	-0.6	-4.9	0.1182	0.0002	1	1
809	5281	0.5	-5.2	0.1186	0.0005	0.96	1.03
752	5204	-1.1	-5.6	0.1176	0.0000	1	1
752	5282	0.2	-5.5	0.1183	0.0004	0.95	1.08
582	4987	2.9	-5.3	0.1170	0.0010	1	1
582	4995	1.9	-4.3	0.1178	0.0008	0.96	0.97

Todo

- Reverse relationship (data versus simulation) for yields in 1.1 and 1.7GeV setting - Suggestions?

- Work on the 403216 septum snake model