Goals

- 1. Target “boiling” i.e. density change wrt current

- 2. Target density change along z_target axis

7. Process Steps

For the physics of the experiment, it is important that changes to the density of the target be understood. The density of the cell may also be a function of position along the beam line (in beam Z).

1. Set the HRS to a high rate kinematics, which for the 2.2 GeV running, will be the quasi-elastic peak.
2. Set Beam Current to 5uA
3. Take empty cell data to determine the rate of scattering from the end-caps
4. Take data with one run for each gas cell with at least 100k events AFTER subtracting the end-cap contribution. This ensures that there will be enough statistics such that the density changes along the length of the cell can be studied.
5. Repeat steps 3) and 4) for 10 μA, 15 μA, and 20 μA. (minimum set)
6. Repeat steps 3) and 4) for 2.5 μA, 7.5uA, 12 μA, 17.5 μA and 23 μA. NOTE: If the very low current is problematic for the accelerator, increase to a larger value but try to be < 5 μA.

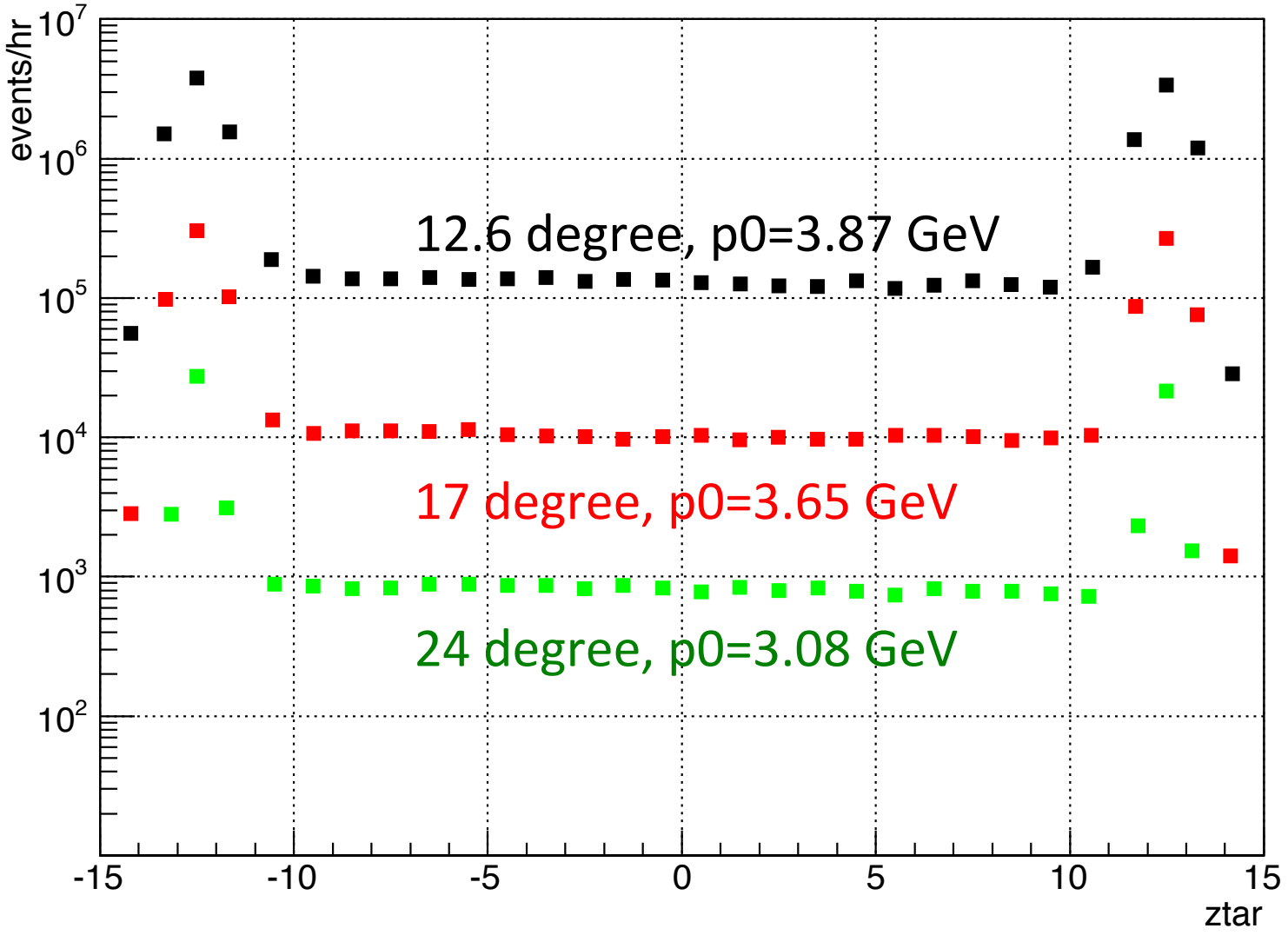
- Draft from Dave Meekins

Kinematics

- Beam Energy: 4.3 GeV
- Pyhsics: xbj = 1, QE peak
- Targets: 1H, 2H, 3H, 3He gas cells, and
  empty cell (Aluminum)

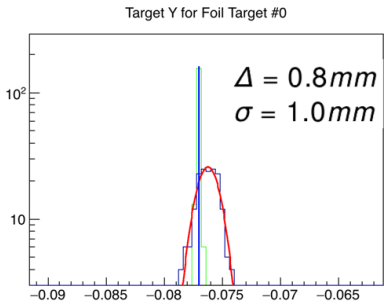
- Phase-space cuts used in this estimation:
  - X': 40 mrad
  - Y': 20 mrad
  - Delta: 3.5%

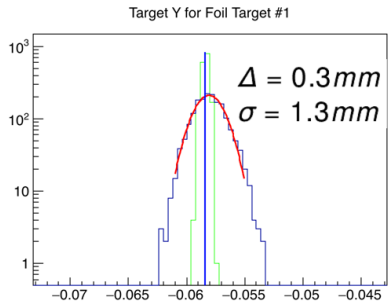
Events-per-hour : z_target length (cm), 20 uA

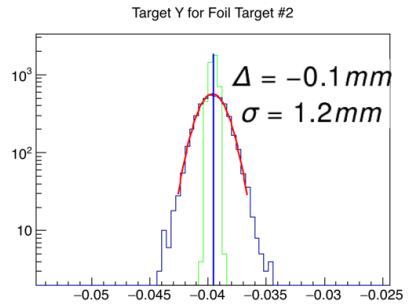


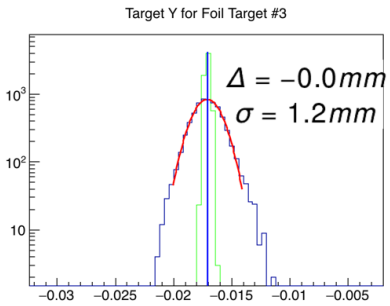
09.25 Updates

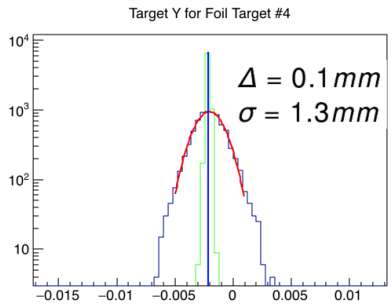
- Check ytar resolution from Gmp optics run 22828 (from Tong Su):
- ~1.5mm at 48.666 degree

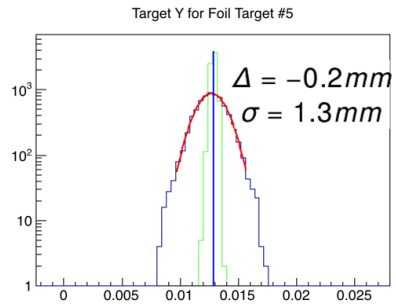


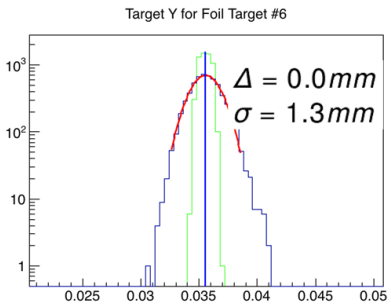


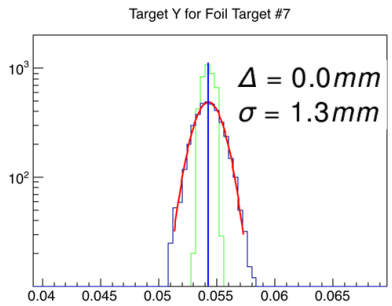


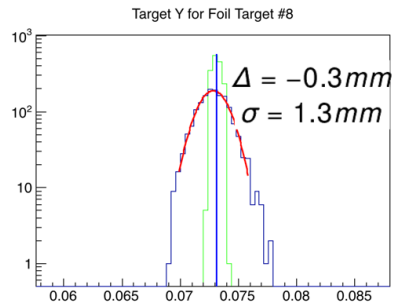






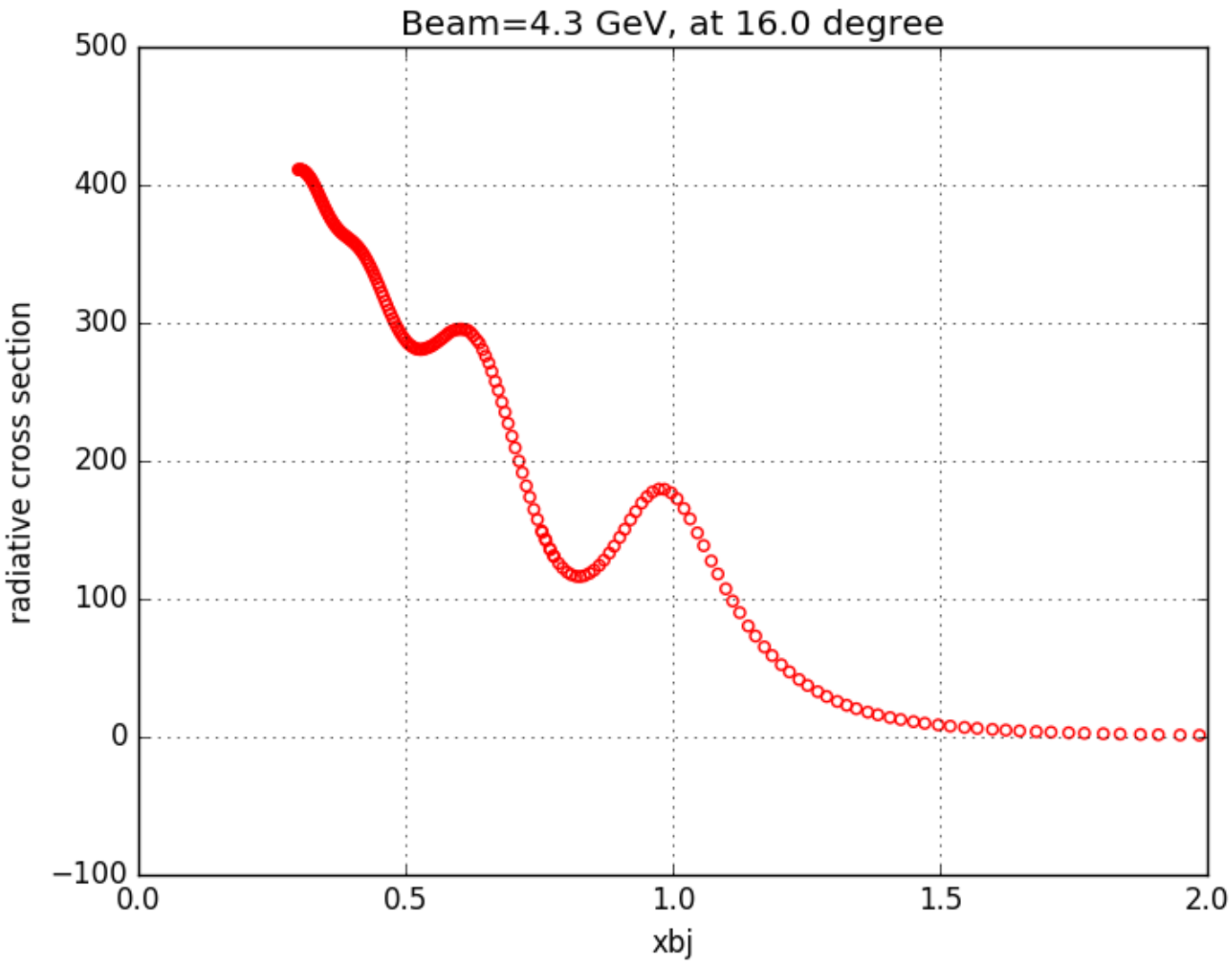




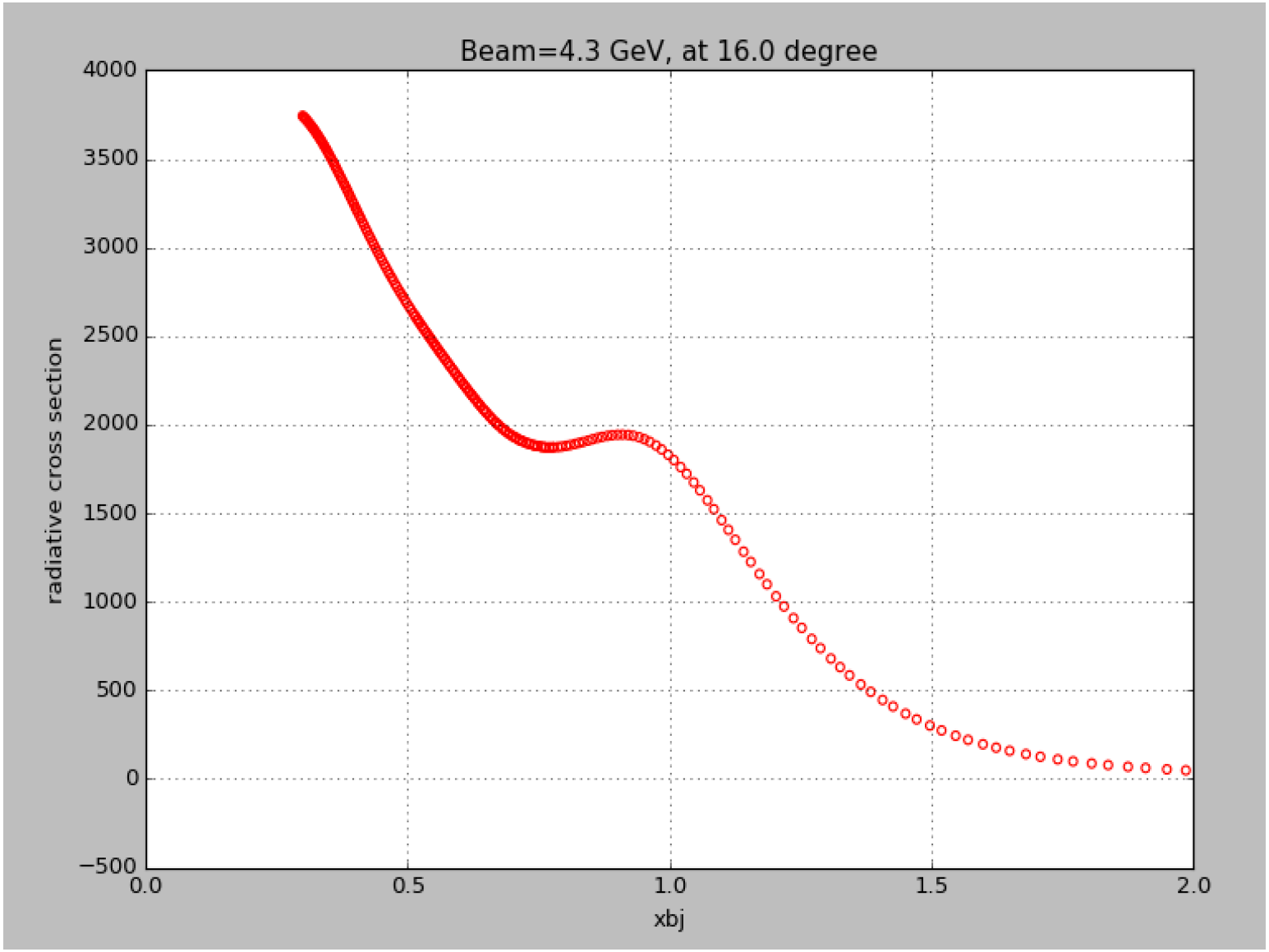


Ztar length (cm)	Angle	Ytar length (cm)	Ytar resol (cm)	Ztar resol (cm)
15	12.6	3.27	0.3	1.38
15	16	4.13	0.3	1.09
15	24	6.10	0.3	0.74

Tritium cross section:

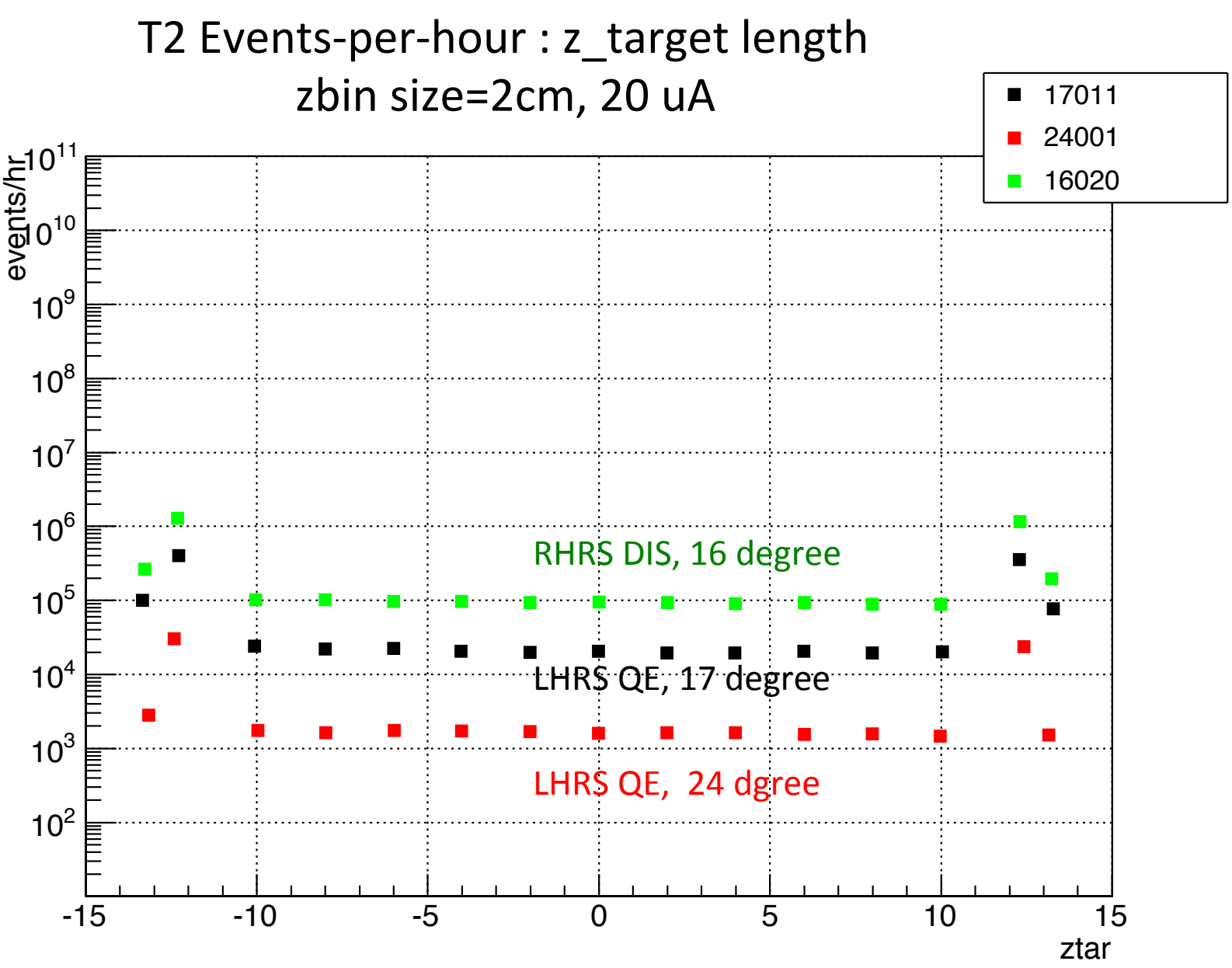


Aluminum cross section:



Kinematics

- Left arm: QE peak
  - 17 degree, E'=3.65 GeV
- Right arm: DIS
  - 16 degree, E' = 3.1 GeV


T2 Events-per-hour : z_target length
zbin size=2cm, 20 uA
17011
24001
16020
events/hr
10^{11}
10^{10}
10^{9}
10^{8}
10^{7}
10^{6}
10^{5}
10^{4}
10^{3}
10^{2}
RHRS DIS, 16 degree
LHRS QE, 17 degree
LHRS QE, 24 dgree
-15
-10
-5
0
5
10
15
ztar

RHRS (16 degree) Hours Count

Current(uA)	Event /hr	Run time per target (hr)	Total hrs (5 targets)
2.5	12500	0.8	4
5	25000	0.4	2
8	40000	0.25	1
12	60000	0.17	0.85
16	80000	0.13	0.65
20	100000	0.1	0.5
23	115000	0.1	0.5

Total beam time on RHRS: 10 hrs

LHRS (17 degree) ~ RHRS / 0.2 = 50 hrs