Suggested changes to agenda

10:00 – 10:20 Update of Lawrence H. simulations for beam intensity for Nov 2020 SNS data – YK 20’

10:20 – 10:40 Reset of oscillating function of n-nbar in collision with walls and experimental test of that at SNS with n spin precession – YK 30’

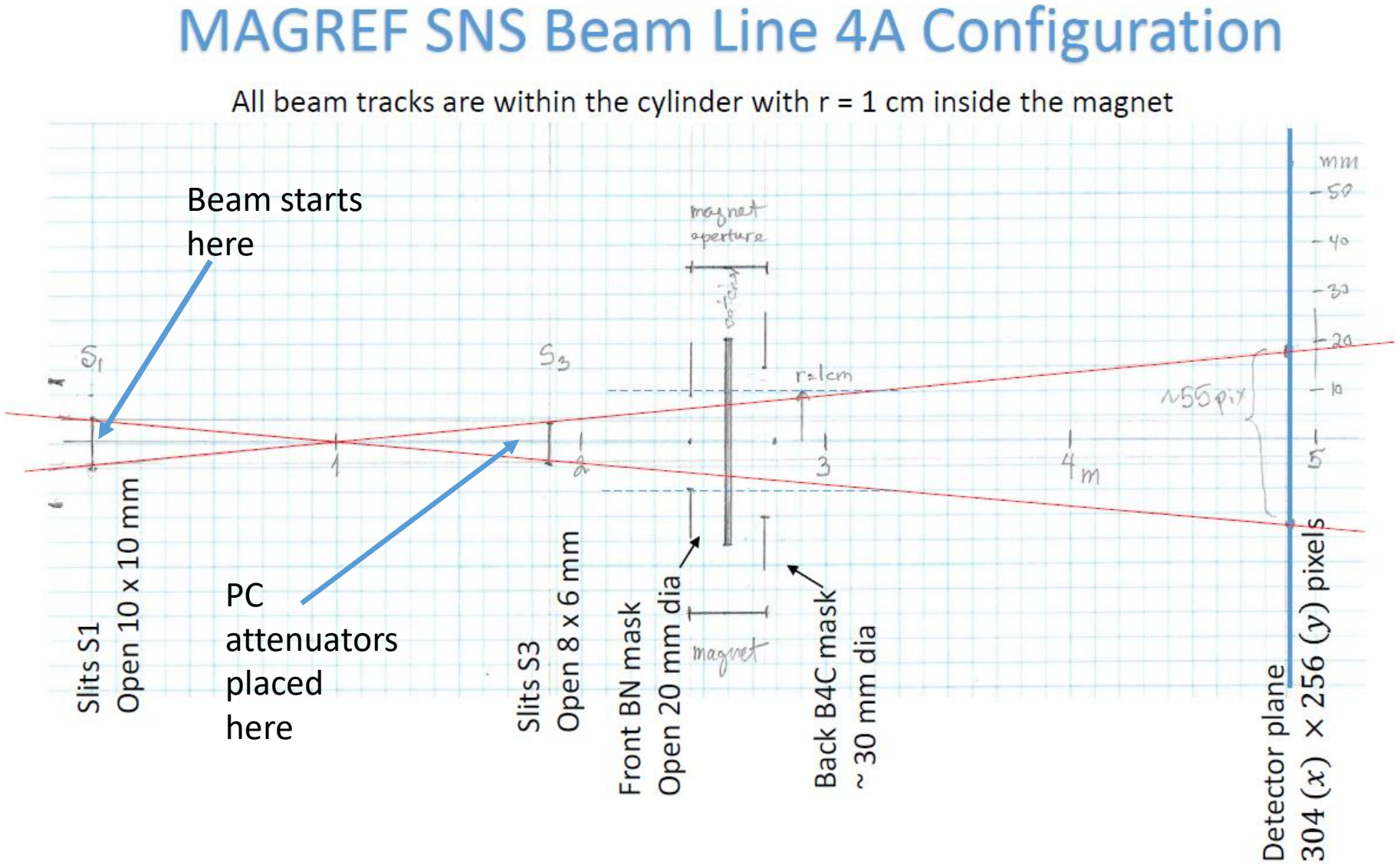
10:40 – 11:00 Approach to STEREO experiment calculations – Cary Rock 20’

ESS developments – will leave for the next time 20’
Venetian Blinds reflector for NNBar – will leave for the next time 30’

L.H. simulations of PC plates attenuation for Nov 2020 MAGREF SNS data

L. Heilbronn, D. Powers, Y. Kamyshkov / UT

Notes used to determine simulation geometry



PHITS simulation of cold neutron beam attenuation through polycarbonate

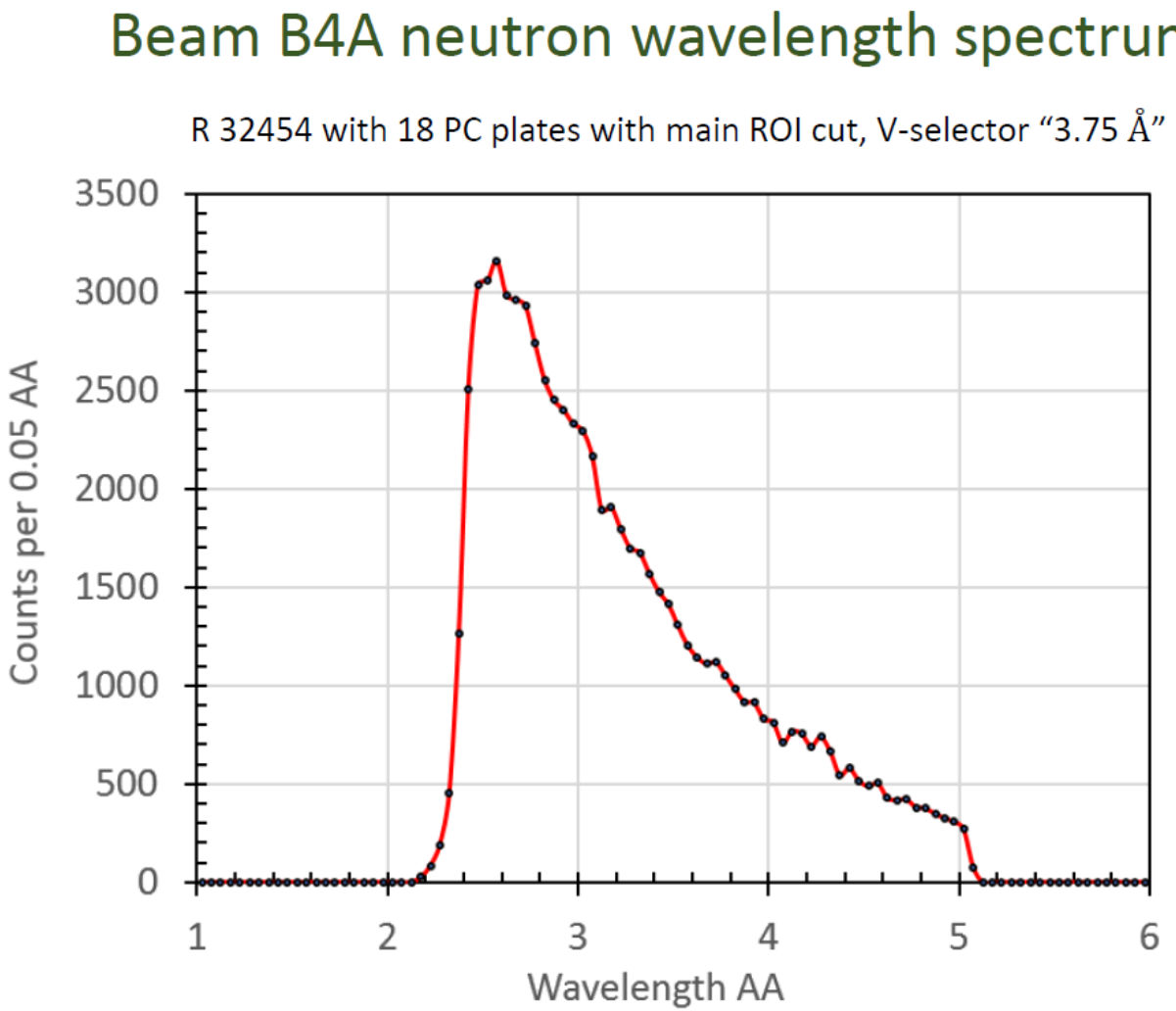
- Simulation of runs that used 18, 20 and 24 pieces of polycarbonate (PC), each piece 1.27-mm thick.
- S1, S3, Front BN mask, Back B_4C mask and air were included in the simulation.
- Geometry used in the simulation did not include the magnet, detector shielding, or surrounding concrete walls, floor and ceiling.
- PC attenuators were placed just upstream from S3, with the downstream edge of the entire set of slabs in the same position for each simulation run

Geometry notes continued

Specifications

Source- to-sample distance	18.703 m
Sample- to-detector distance	2.450 - 2.580 m
Detector size	21 x 18 cm^2
Detector resolution	1.5 mm
Moderator	Coupled supercritical hydrogen
Bandwidth	$\Delta\lambda$ = 2.74 Å
Wavelength range	1.8 Å < λ < 14.0 Å

Neutron spectrum used for incident fluence on PC attenuators



Simulation methodology

- PC thicknesses used were 0, 12, 16, 18, 19, 20, 21, 22 and 24 slabs
- Neutrons were scored at the detector plane
- The following was scored for each neutron entering the detector plane:
  - Neutron position in x, y, and z (z along the beam axis) in the detector
  - Unit direction vectors in x, y and z.
  - Neutron energy
  - Time of arrival from start of simulation
  - Number of times the neutron scattered in the S3 collimator
  - Number of times the neutron scattered in the PC attenuator
  - Number of times the neutron scattered in all materials in the simulation

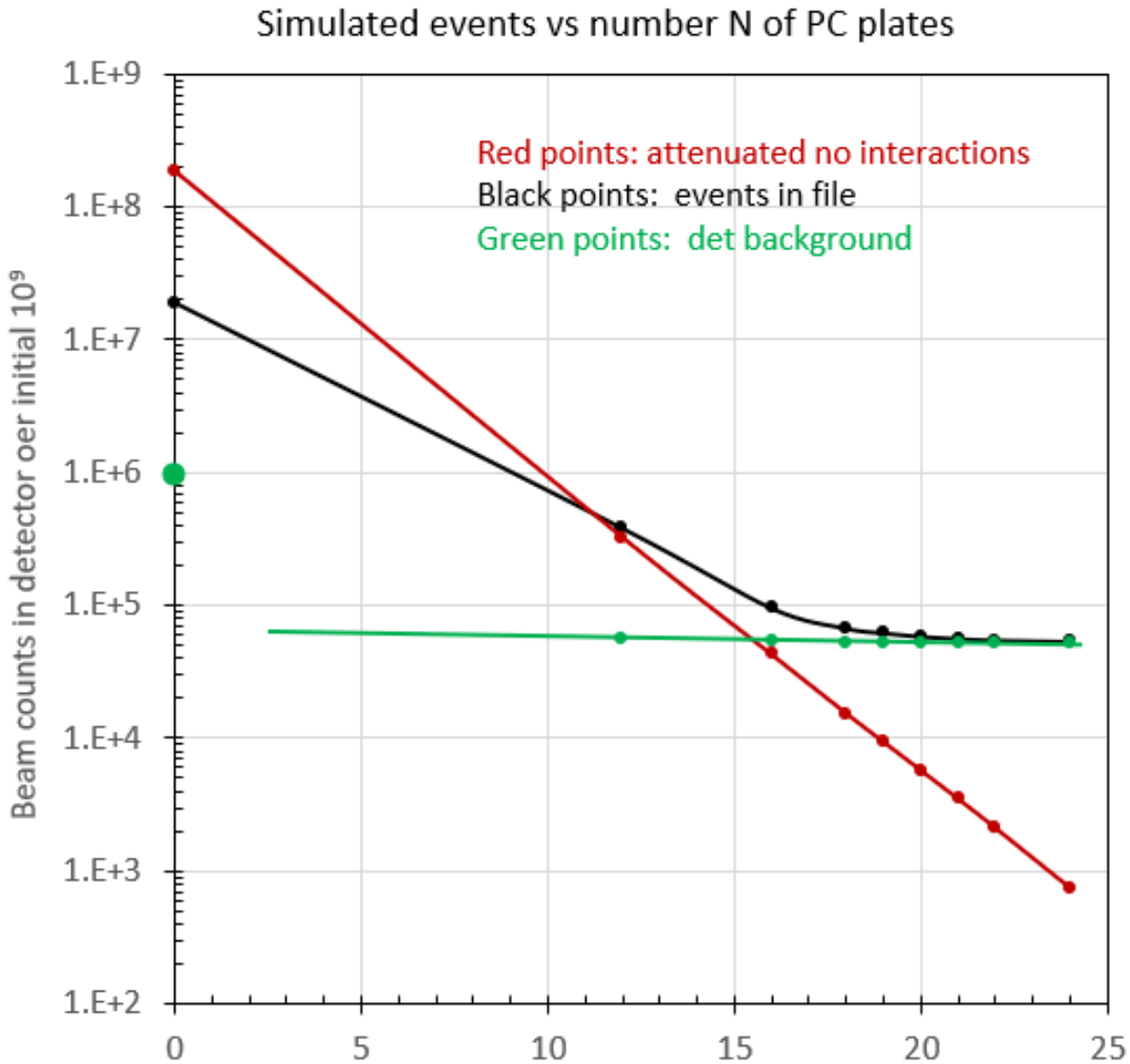
- Simulation files are downloadable from UT OneDrive

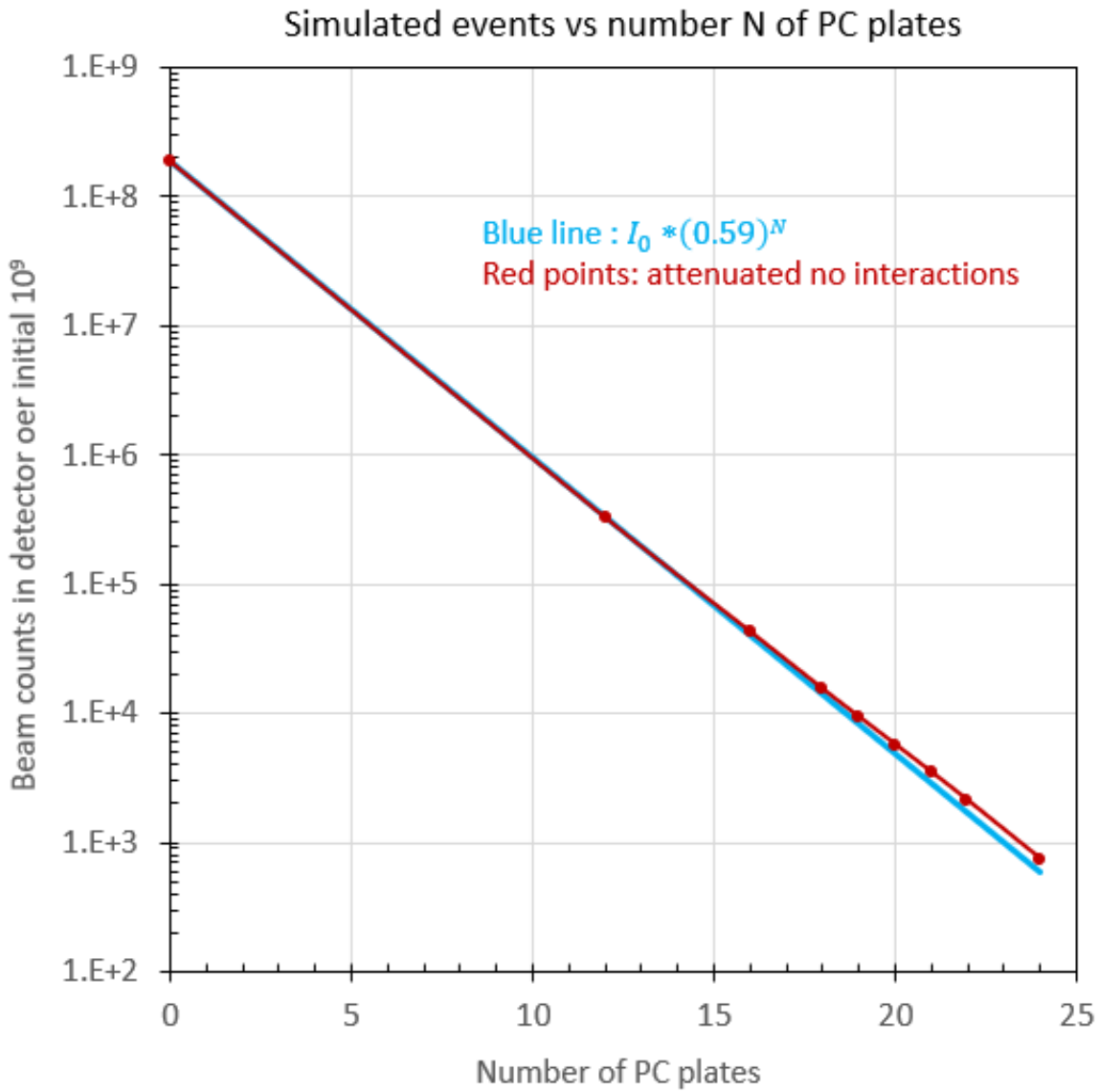
Source Statistics

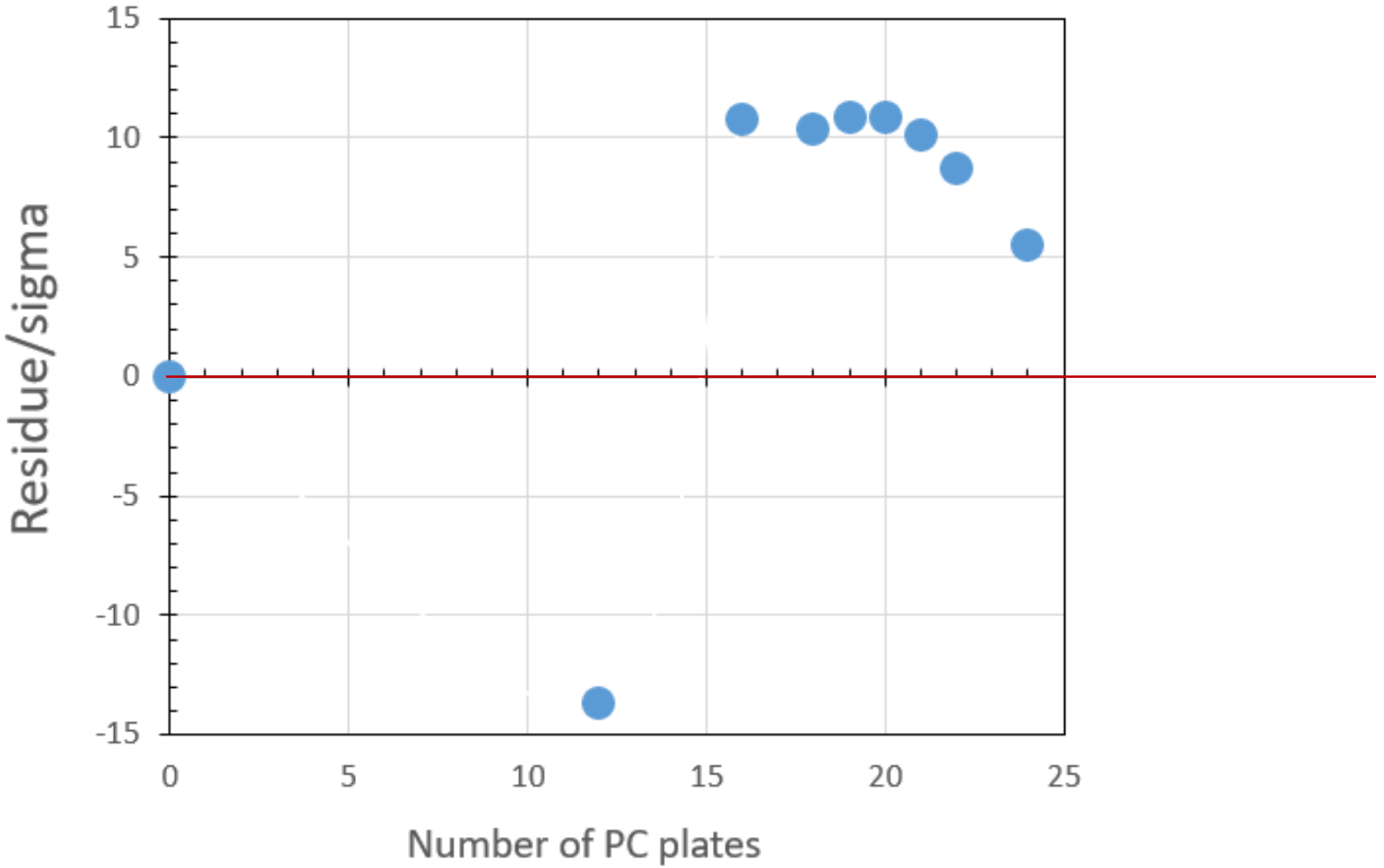
Number of PC	Initial n's
0	1.E+08
12	1.E+09
16	1.E+09
18	1.E+09
19	1.E+09
20	1.E+09
21	1.E+09
22	1.E+09
24	1.E+09

Simulations do not reproduce correctly all the geometry, beam divergence and backgrounds, but can be used for checks of

1. exponential law of attenuation
2. shape of beam induced bkgr under the peak

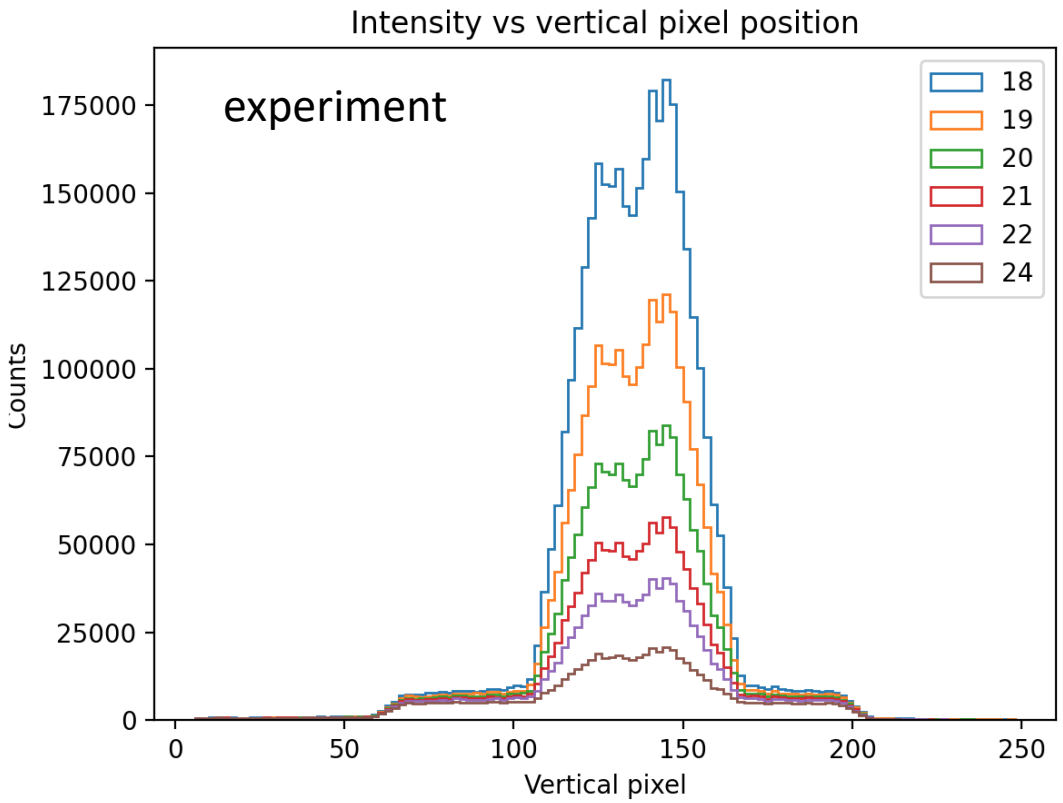

Simulated events vs number N of PC plates
Red points: attenuated no interactions
Black points: events in file
Green points: det background
Beam counts in detector oer initial 10⁹
1.E+9
1.E+8
1.E+7
1.E+6
1.E+5
1.E+4
1.E+3
1.E+2
0
5
10
15
20
25

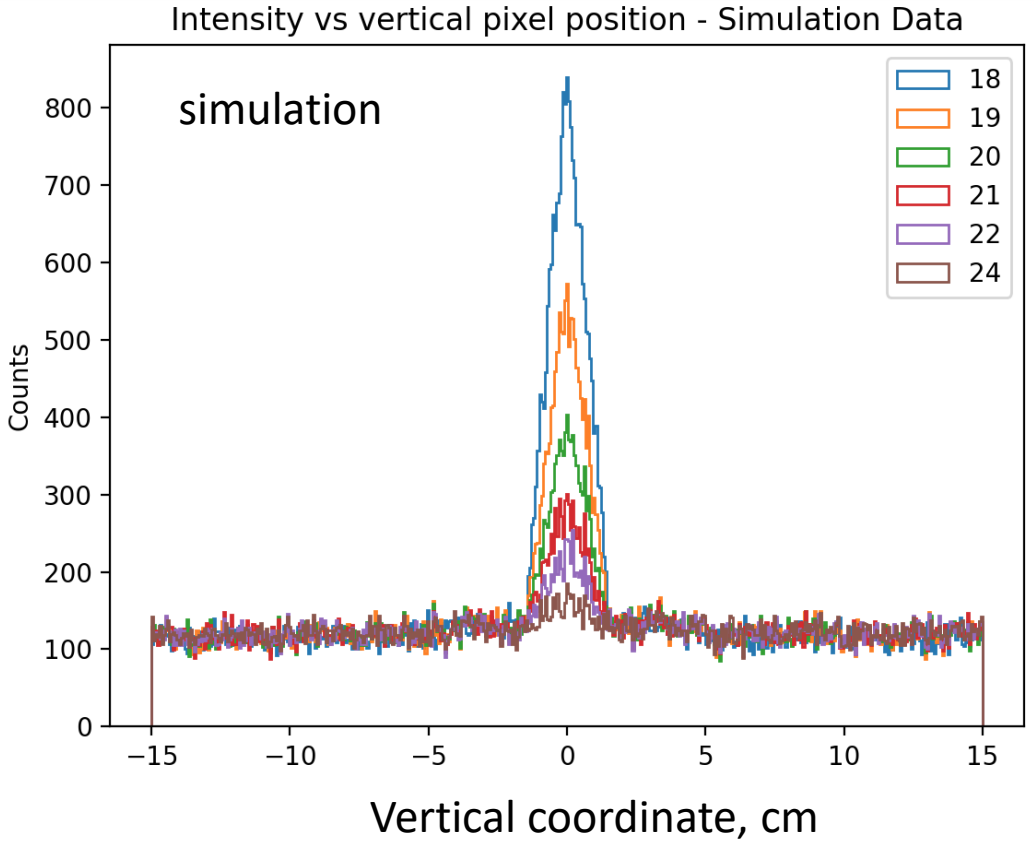

Simulated events vs number N of PC plates
Blue line : $I_0 * (0.59)^N$
Red points: attenuated no interactions
Beam counts in detector oer initial 10^9
1.E+9
1.E+8
1.E+7
1.E+6
1.E+5
1.E+4
1.E+3
1.E+2
0
5
10
15
20
25
Number of PC plates



Lawrence is rechecking the point 12 PC

Detector Y beam distributions Linear scale





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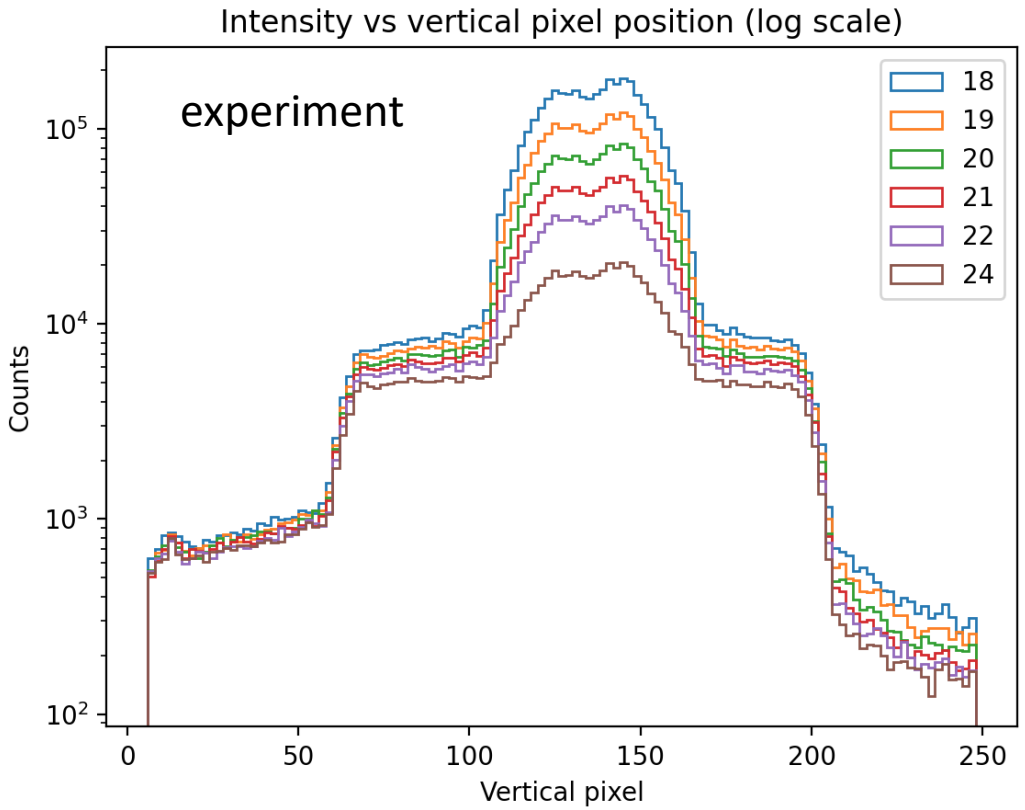
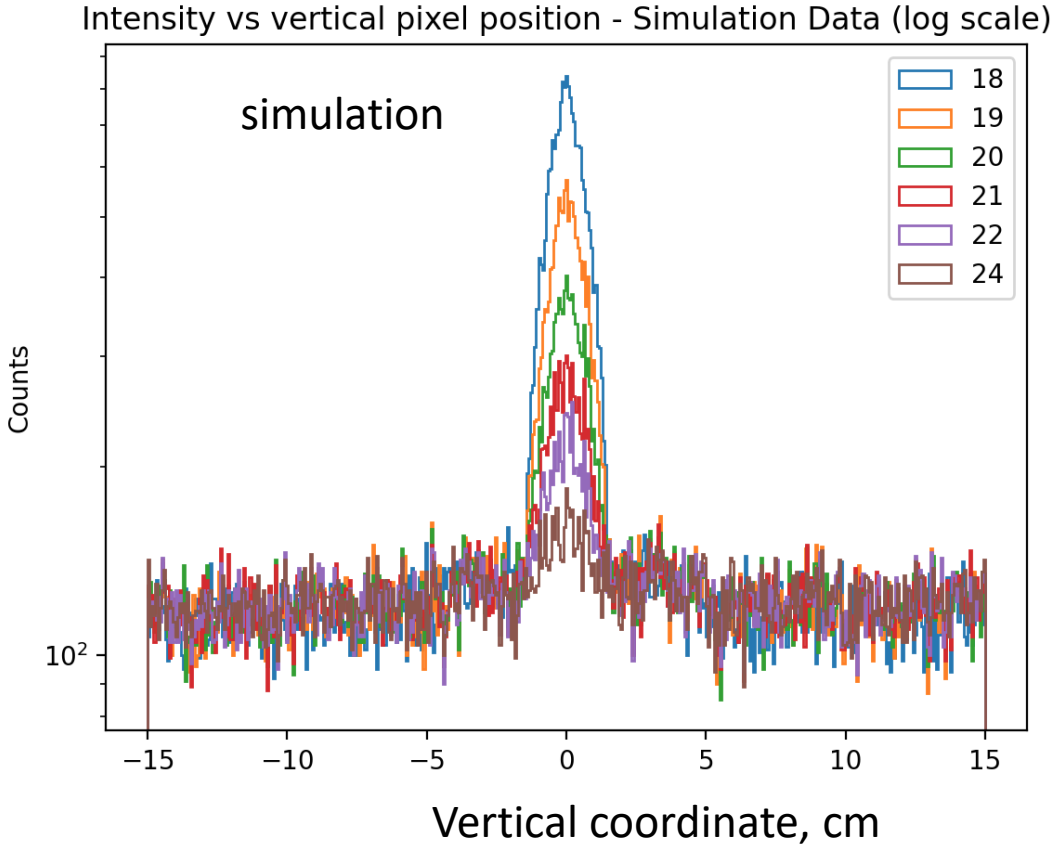
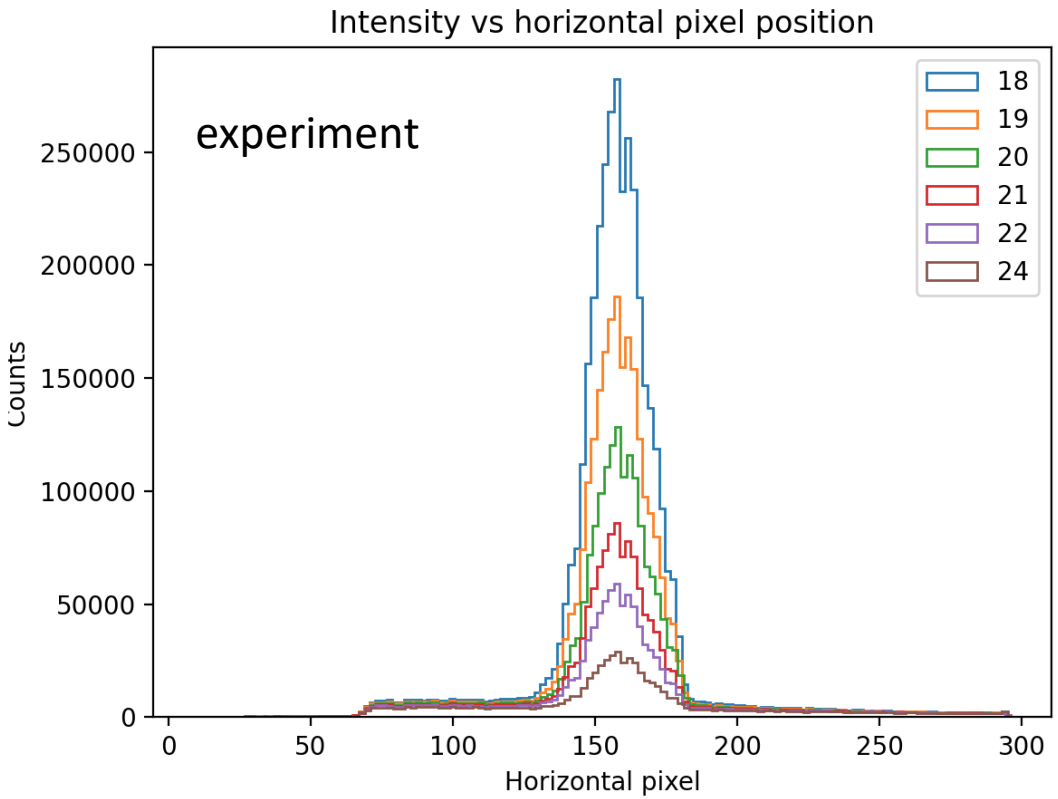
Detector Y beam distributions Log scale

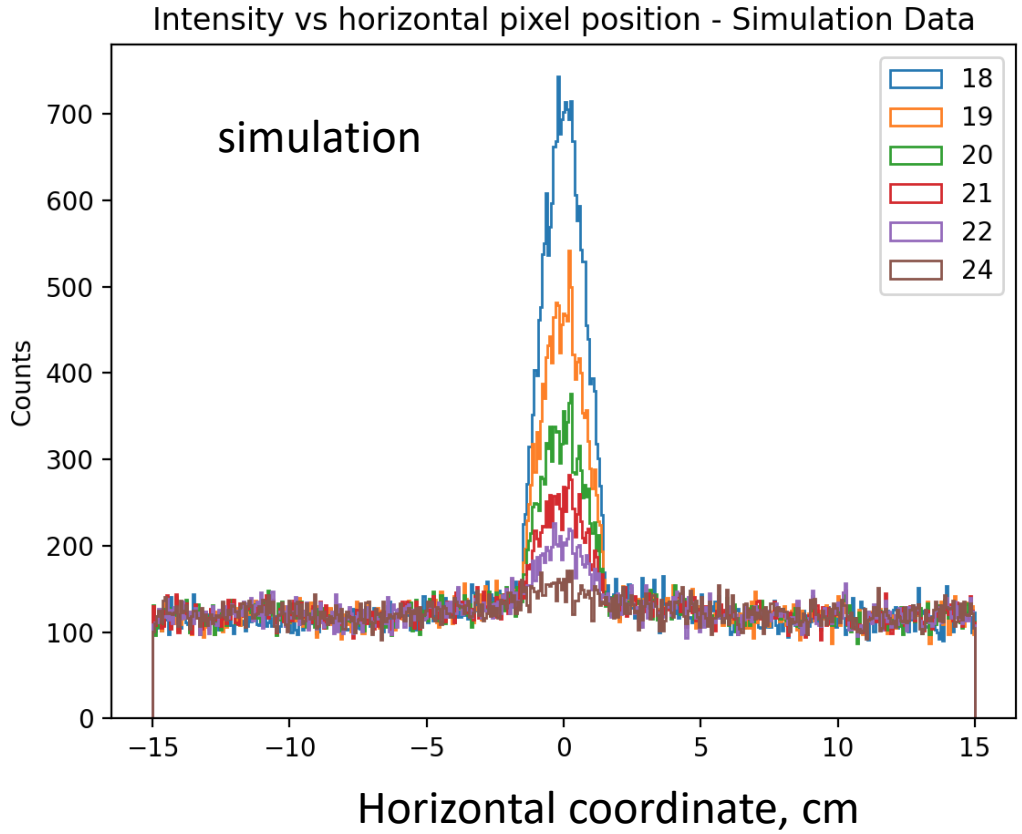




Devyn Powers

Detector X beam distributions Linear scale





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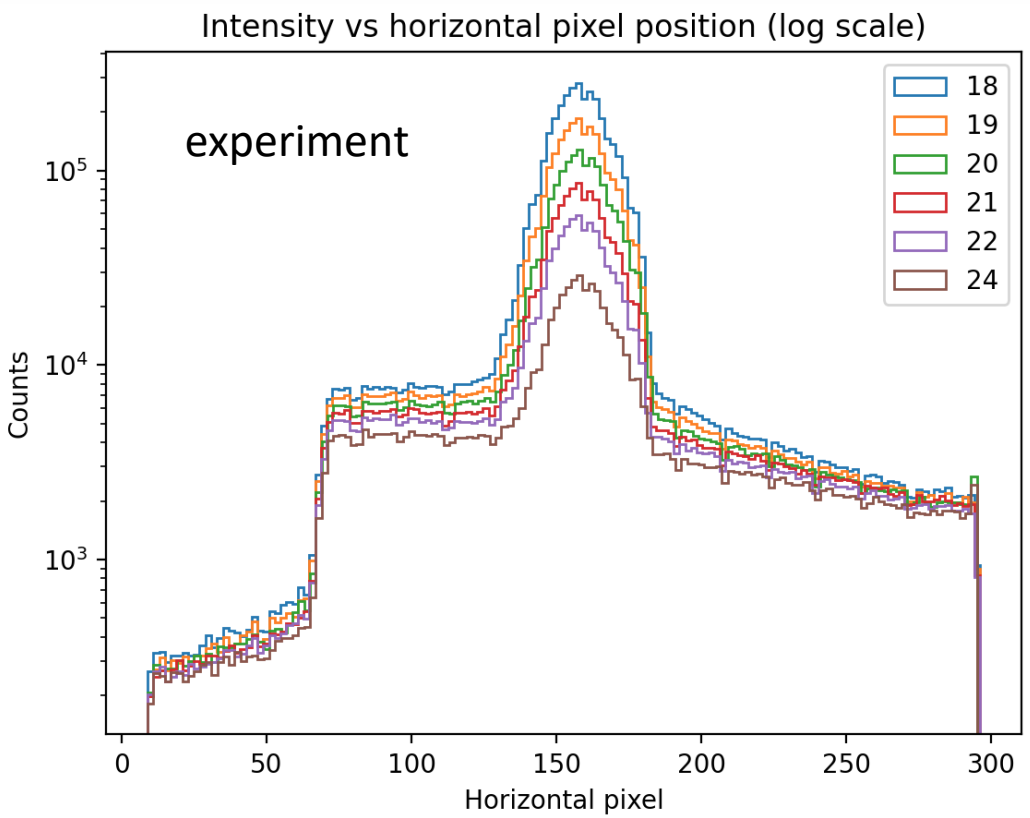
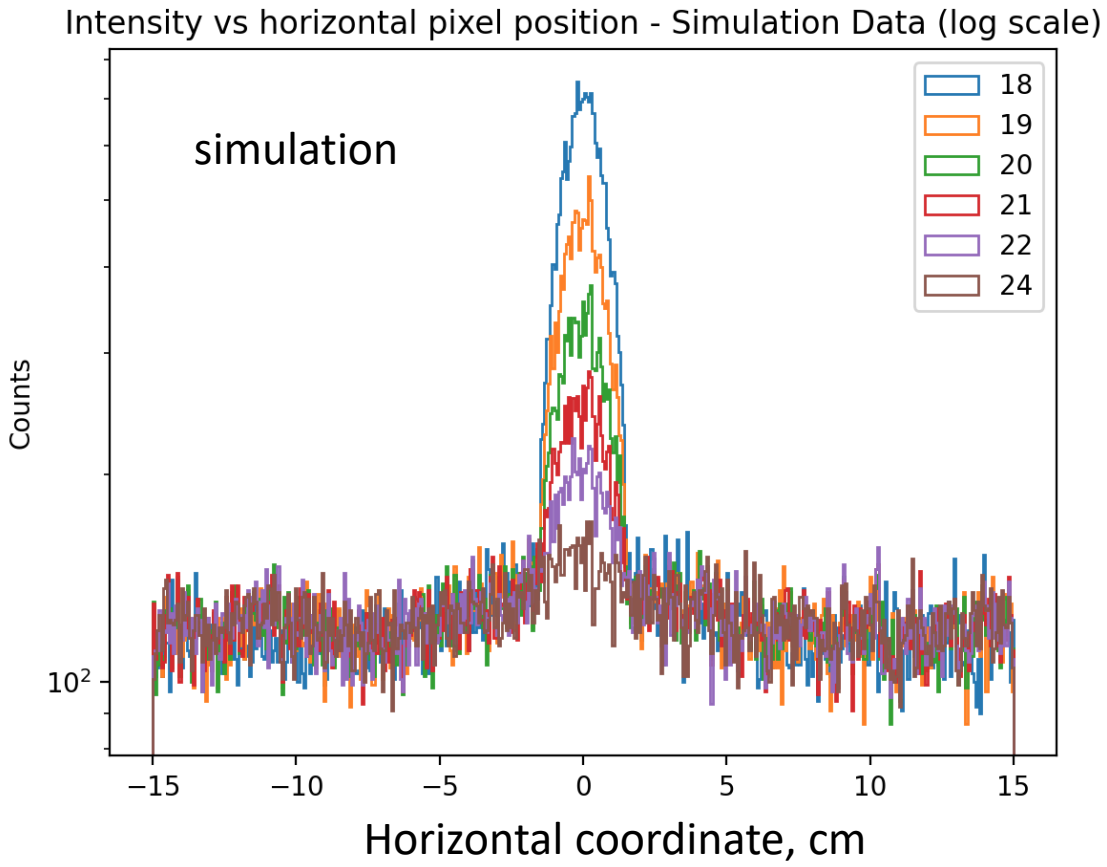
Detector X beam distributions Log scale





Data suggest background shape in ROB as $B = b_0 + b_1 \cdot x + b_2 \cdot y \quad (b_1 < 0;\ b_2 > 0)$

Devyn Powers