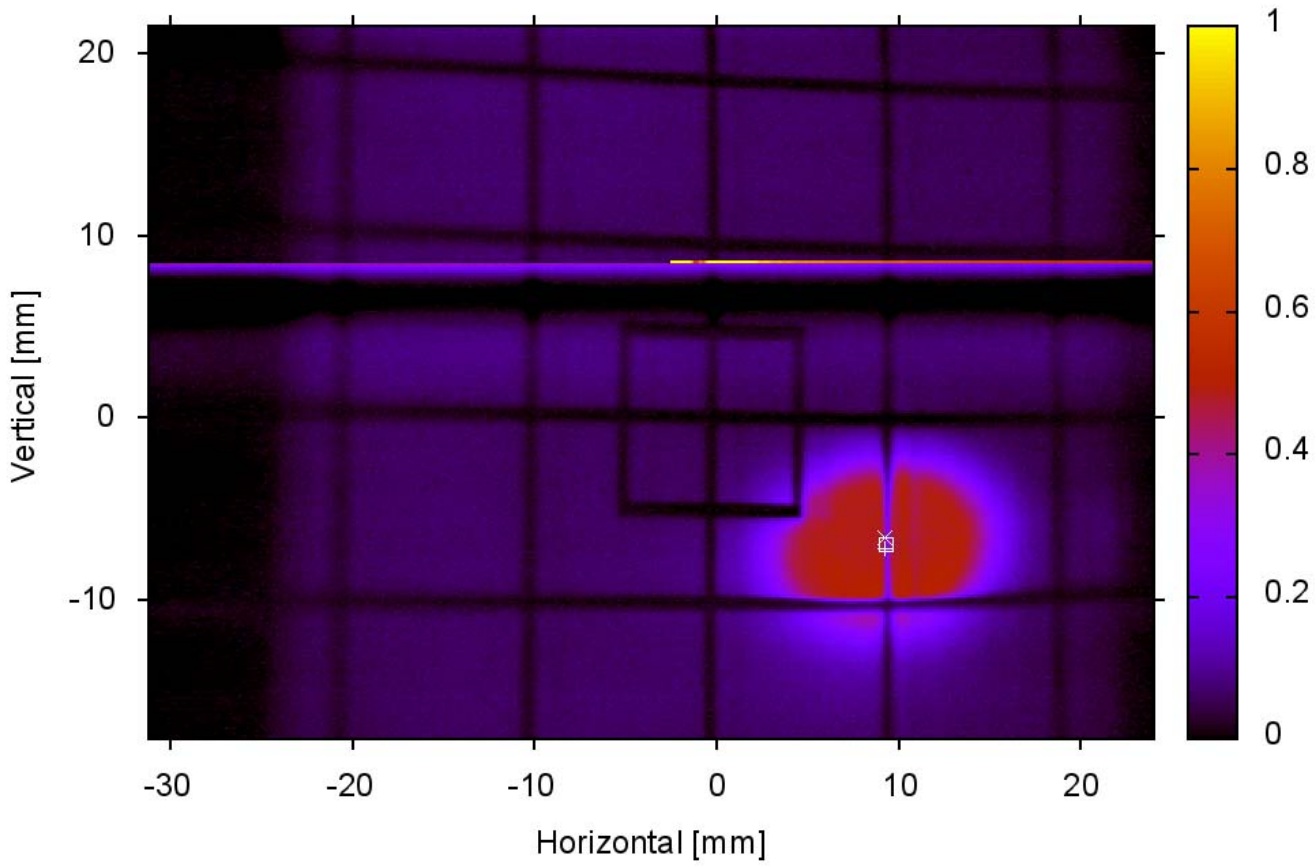
MERIT Beam Spot Position Analysis

H. Kirk

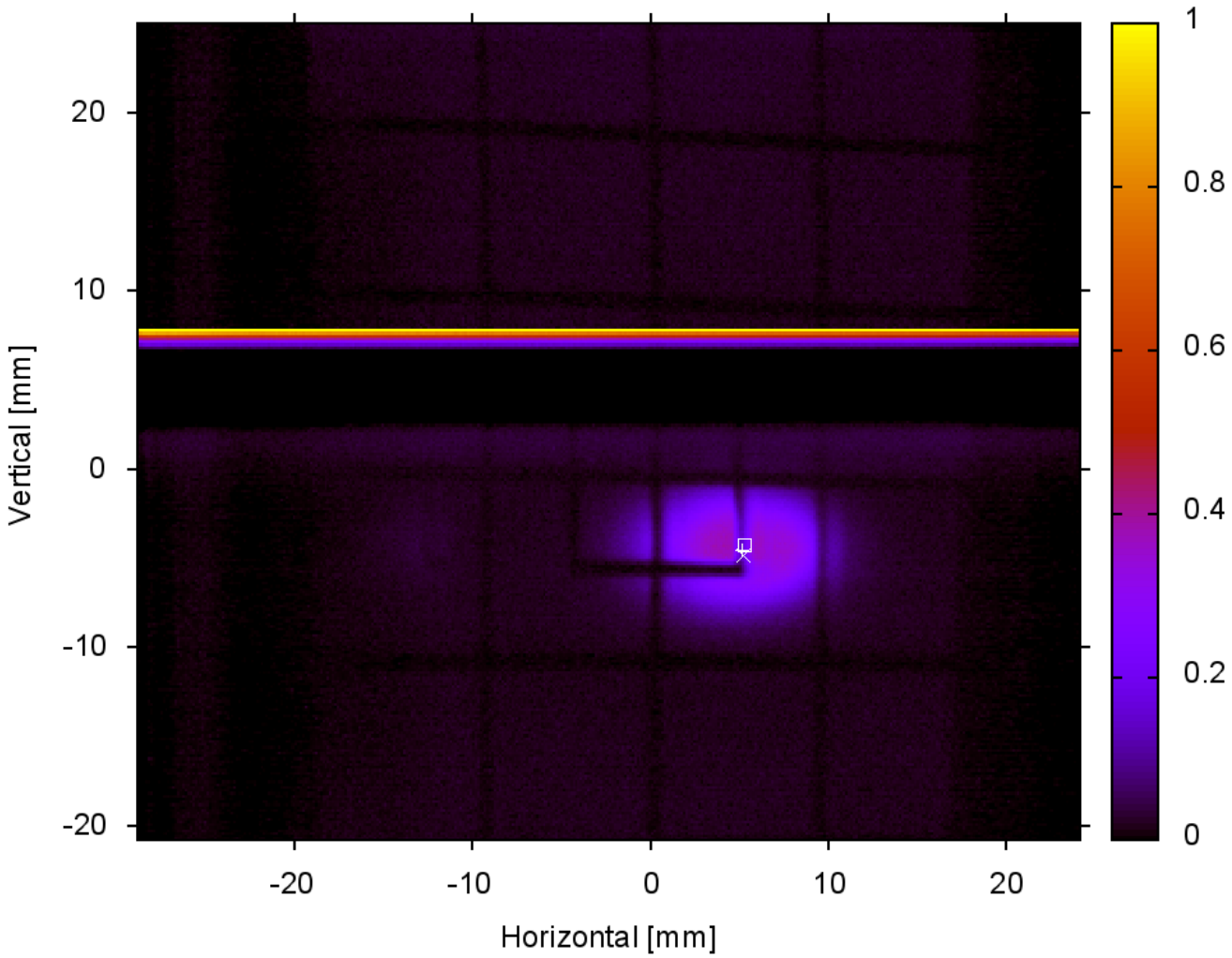
MERIT EVO Meeting

May 4, 2012

Flag 454

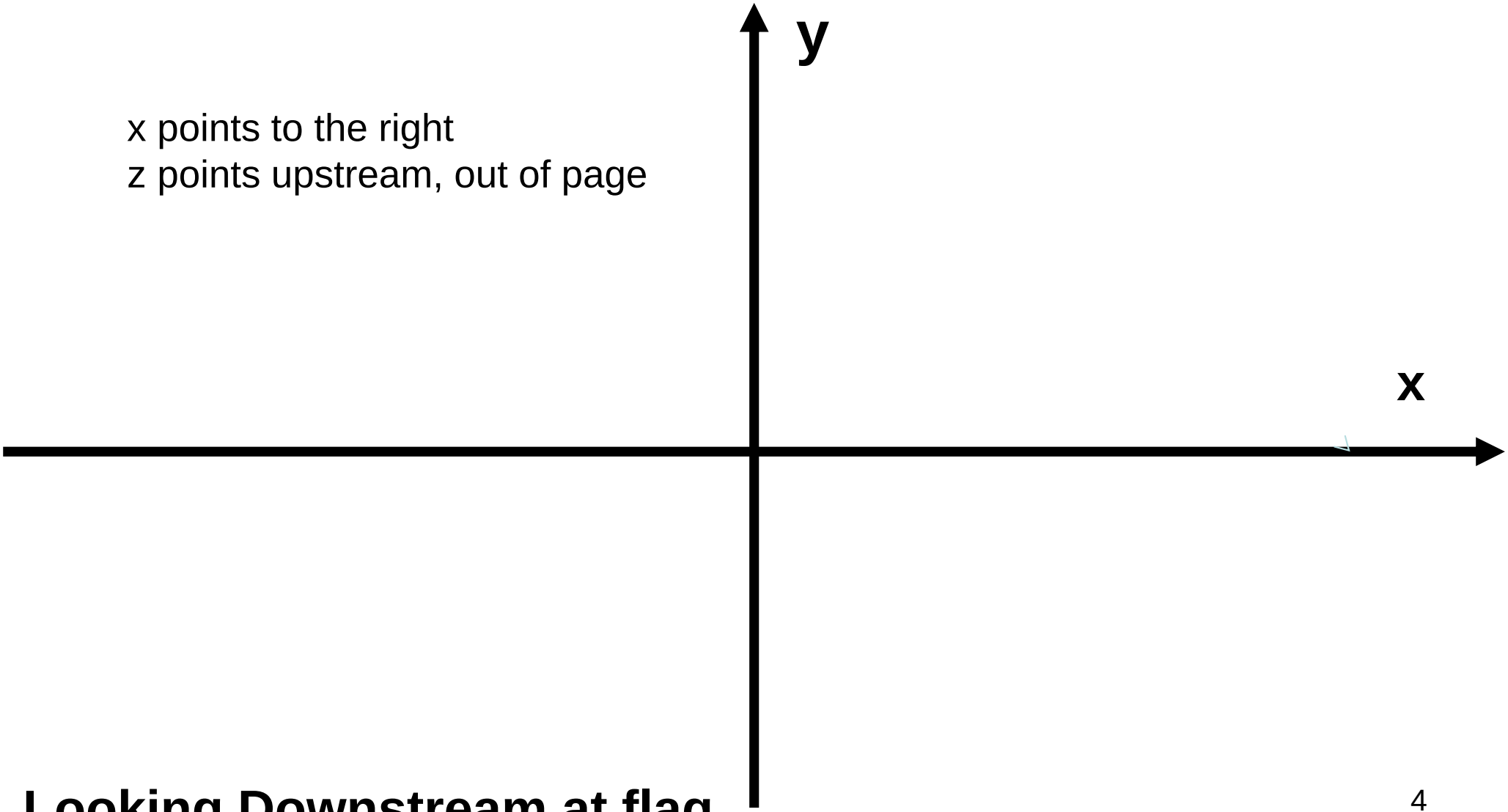

20
10
0
-10
Vertical [mm]
-30
-20
-10
0
10
20
Horizontal [mm]
1
0.8
0.6
0.4
0.2
0

Flag 484


Vertical [mm]
20
10
0
-10
-20
-20
-10
0
10
20
Horizontal [mm]
1
0.8
0.6
0.4
0.2
0

Flag Coordinates

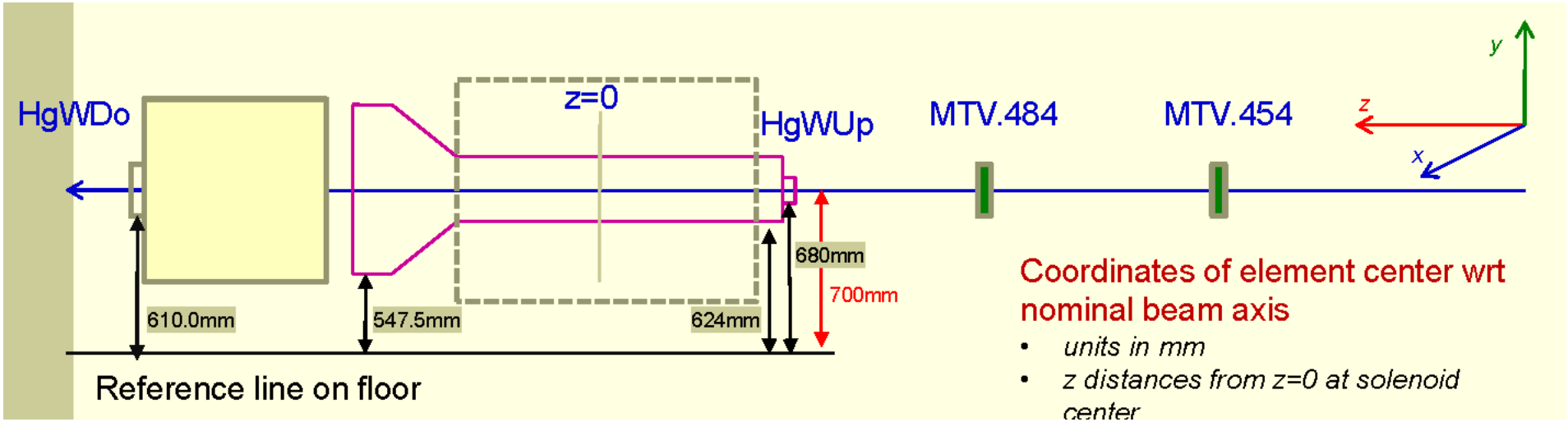
x points to the right
z points upstream, out of page



Looking Downstream at flag

Survey Coordinates

x points to left
z points downstream



Post-Run Survey

Values in Survey Coordinates

Coordinates of element center wrt nominal beam axis

- *units in mm*
- *z distances from z=0 at solenoid center*

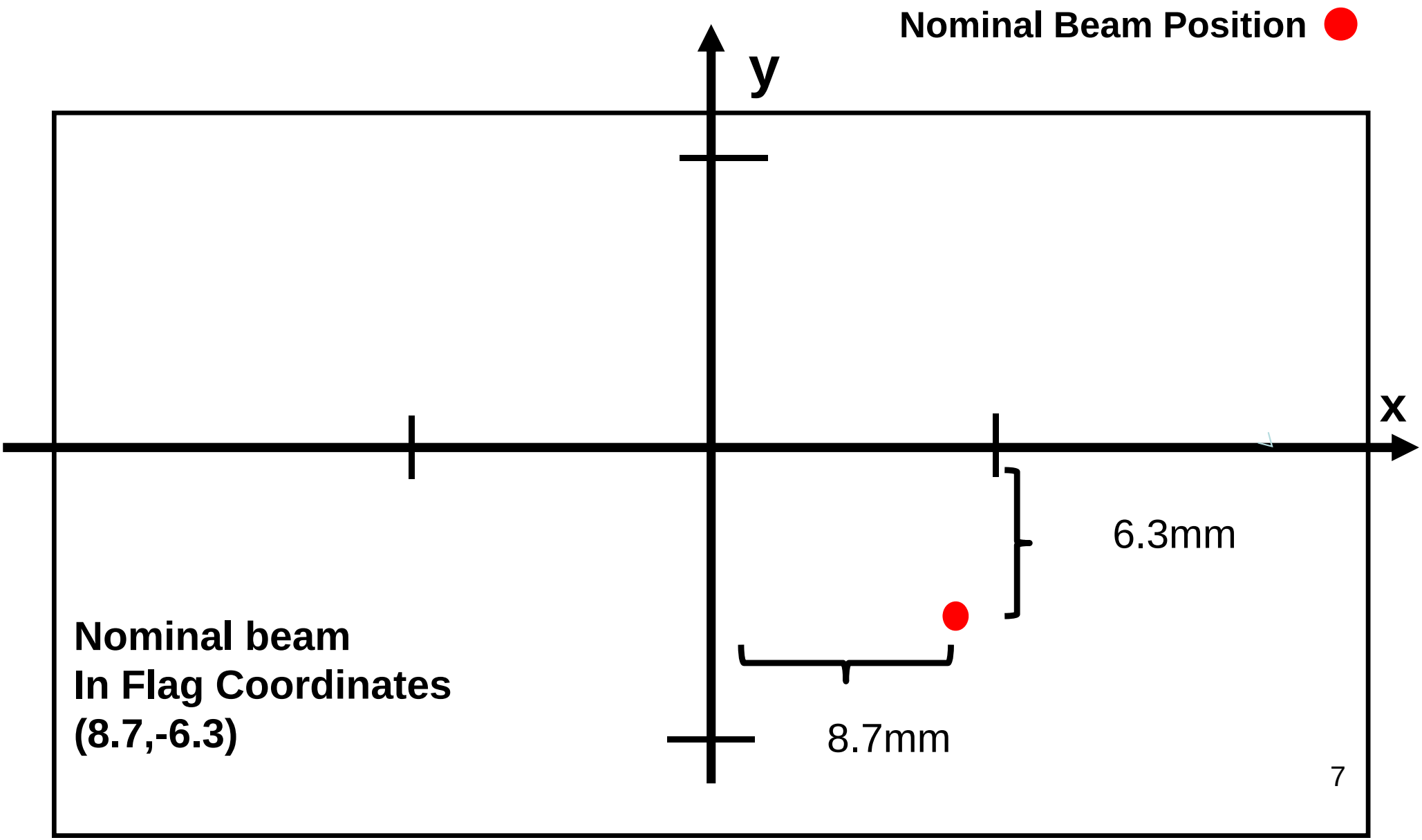
Element	{x, y, z}
MTV.454	{+8.7,+6.3, -5893.95}
MTV484	{+13.4, +4.6, -4230.95}
HgWUp	{-1.5,-10.0,-742.95}
HgWDo	{+57.0, -26.0, +2950.2}
Hgz=0	*{-1.0,??,0.0}*

18

Possible sign error in Survey:
Maybe window coords of window center should be (-1.5,10)

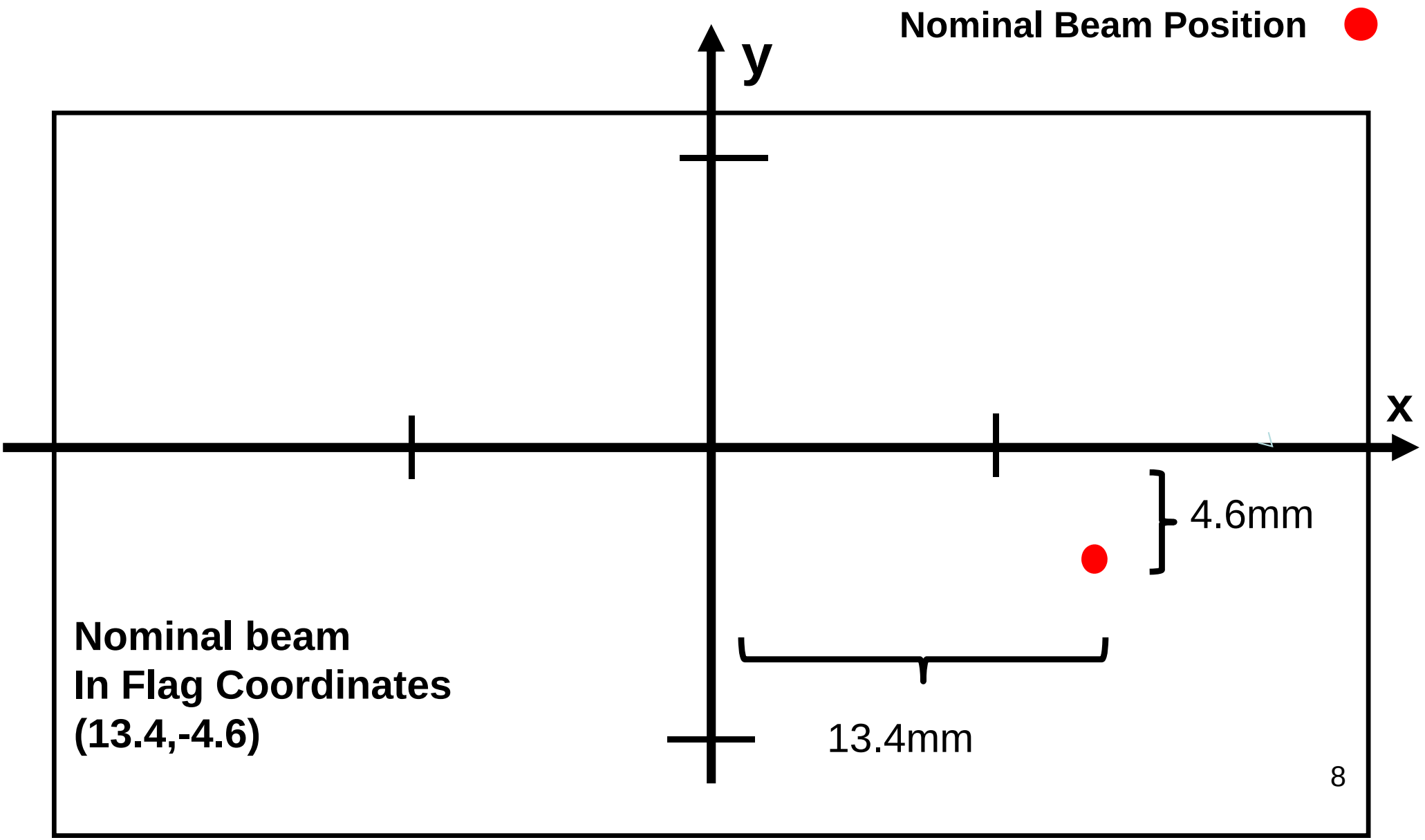
Flag 454

Values in Flag Coordinates

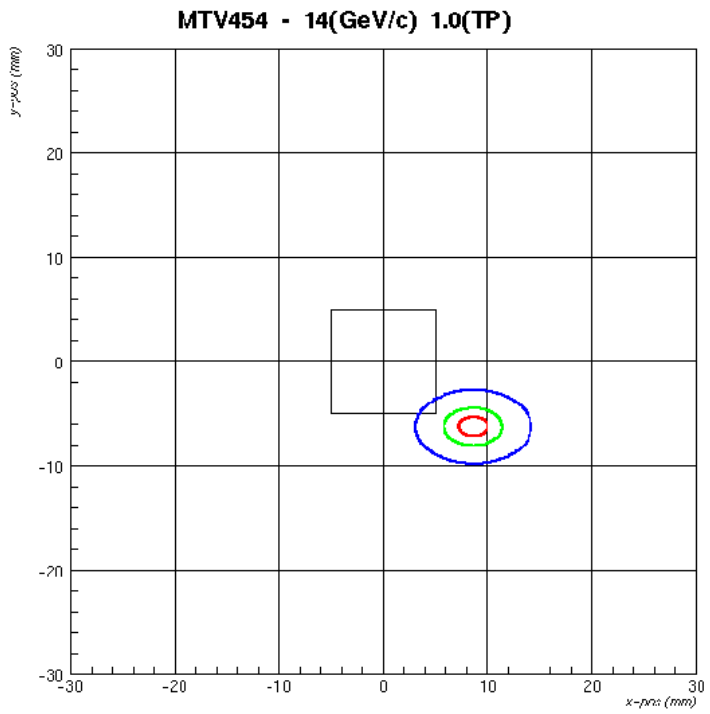


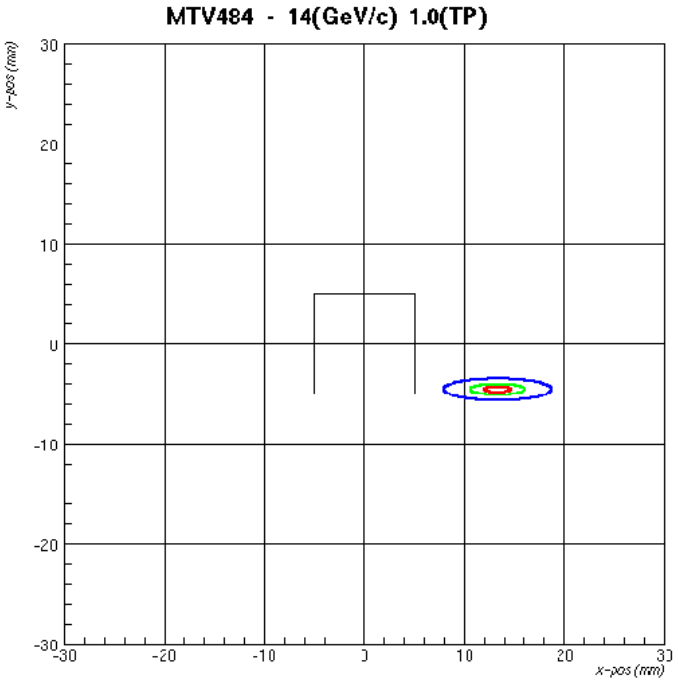
Flag 484

Values in Flag Coordinates



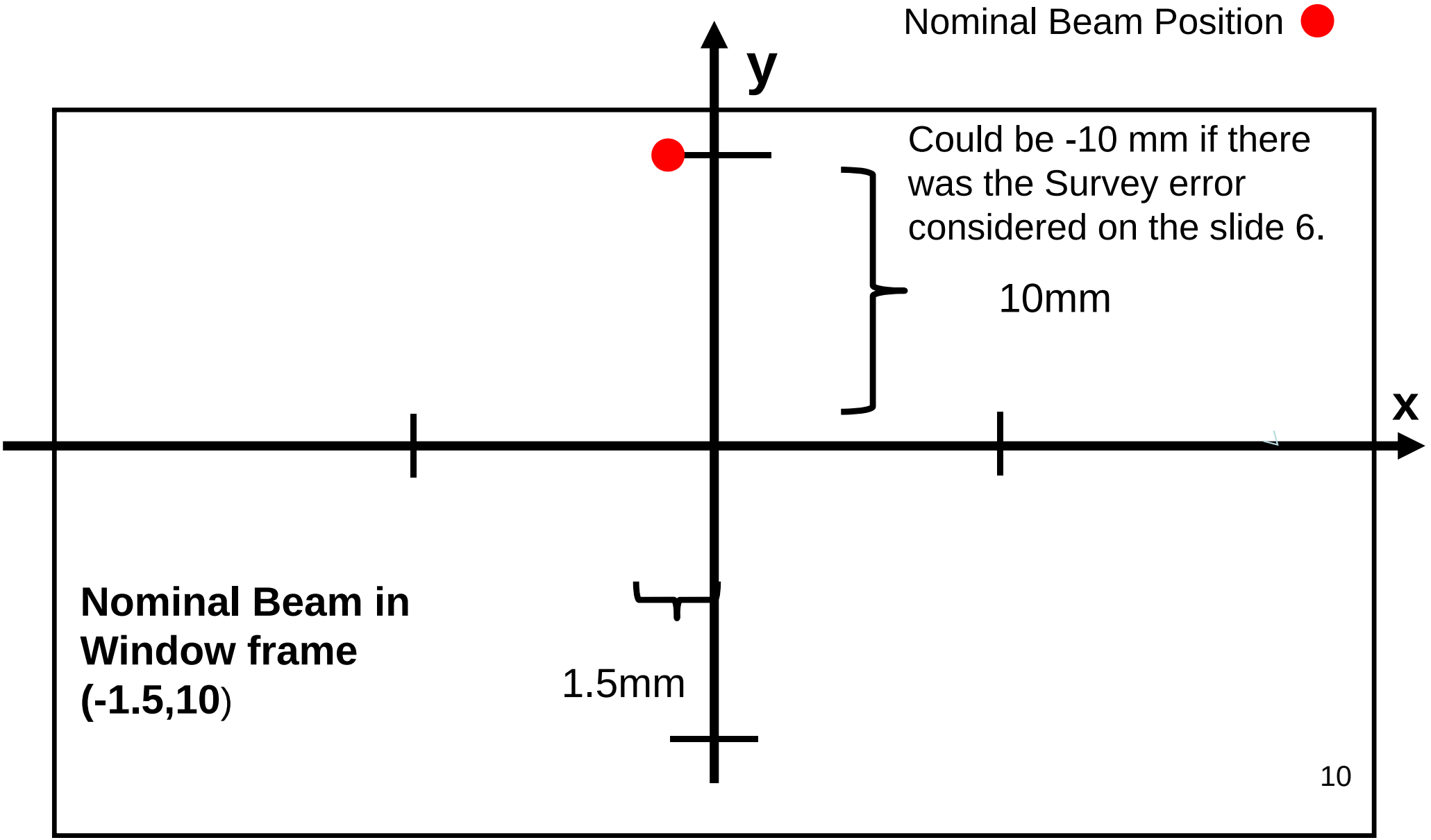
Ilias's Rendering



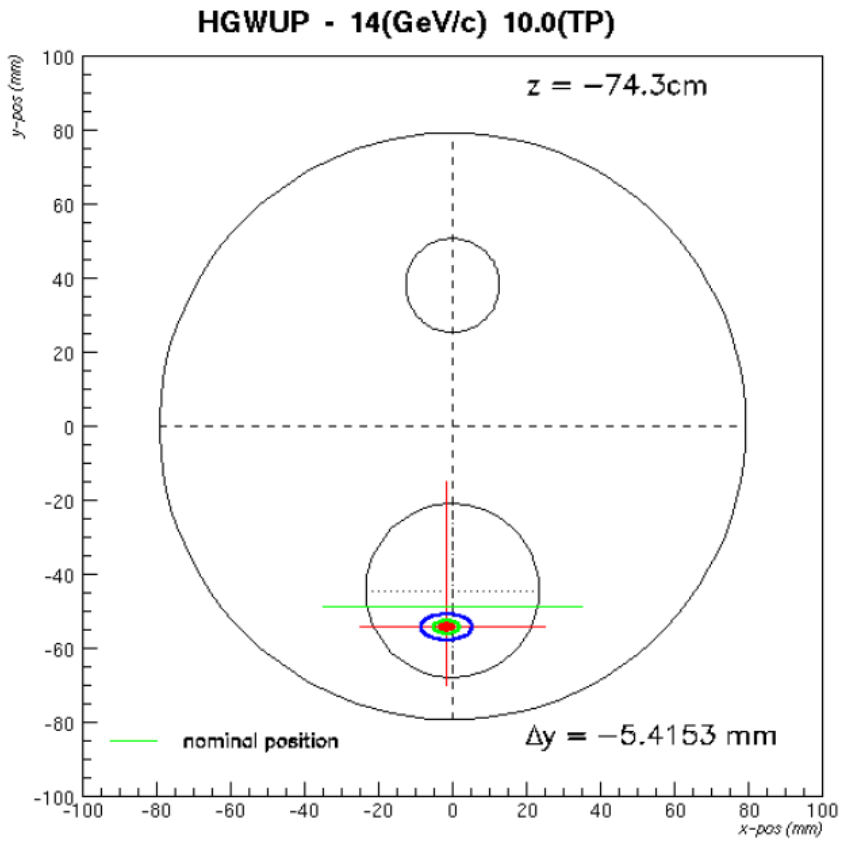


Beam Window

Values in Flag Coordinates



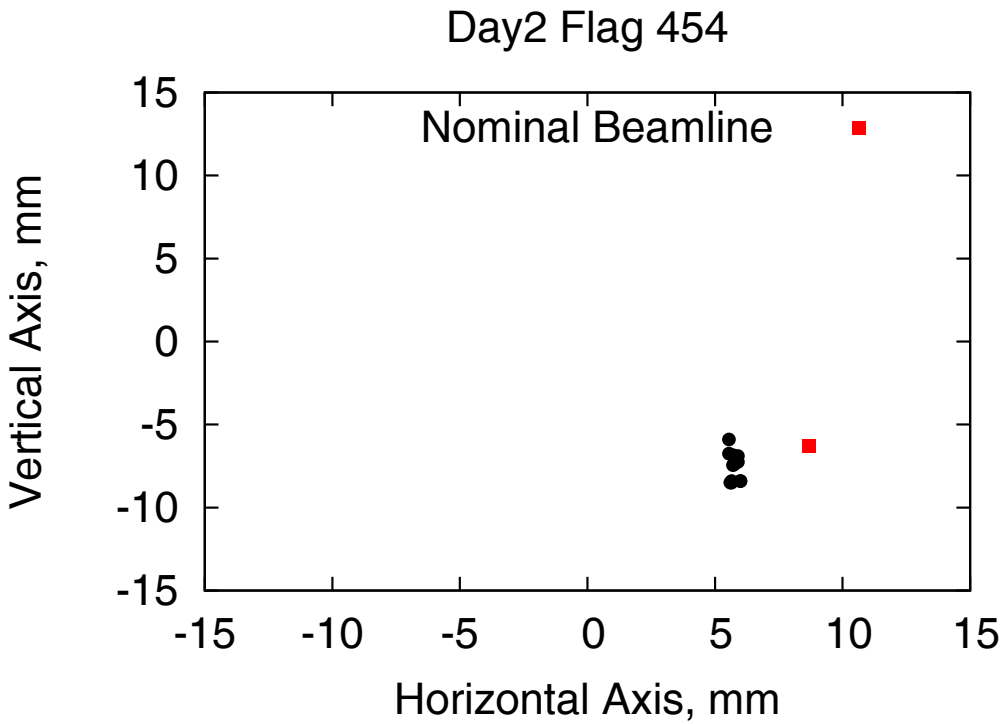
Ilias's Window/Beam Position

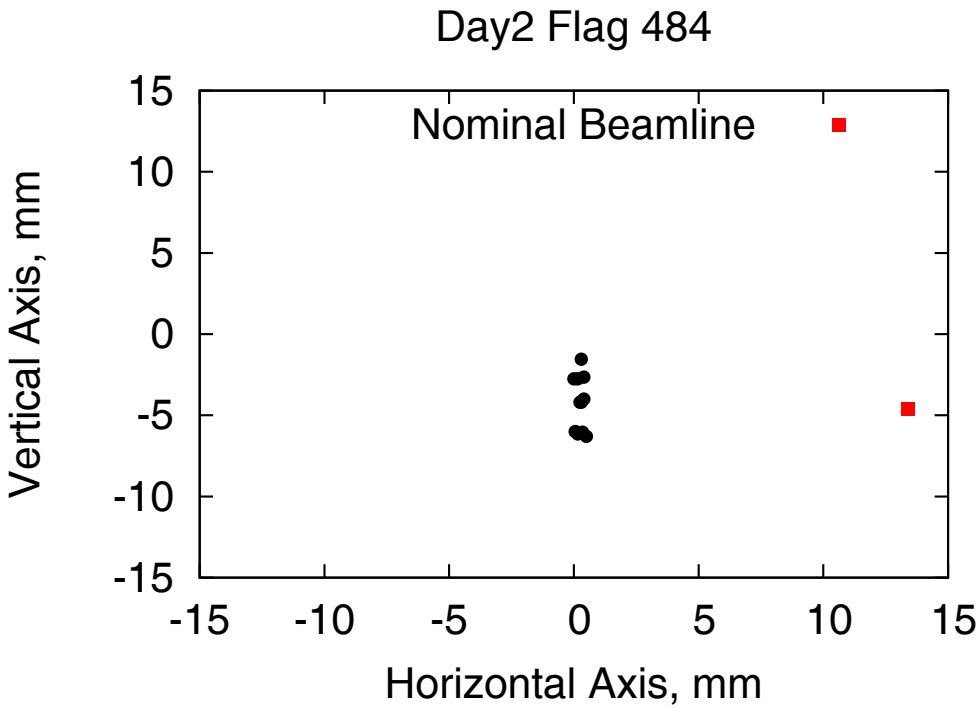


Seems to have assumed there was the sign error considered on slide 6.

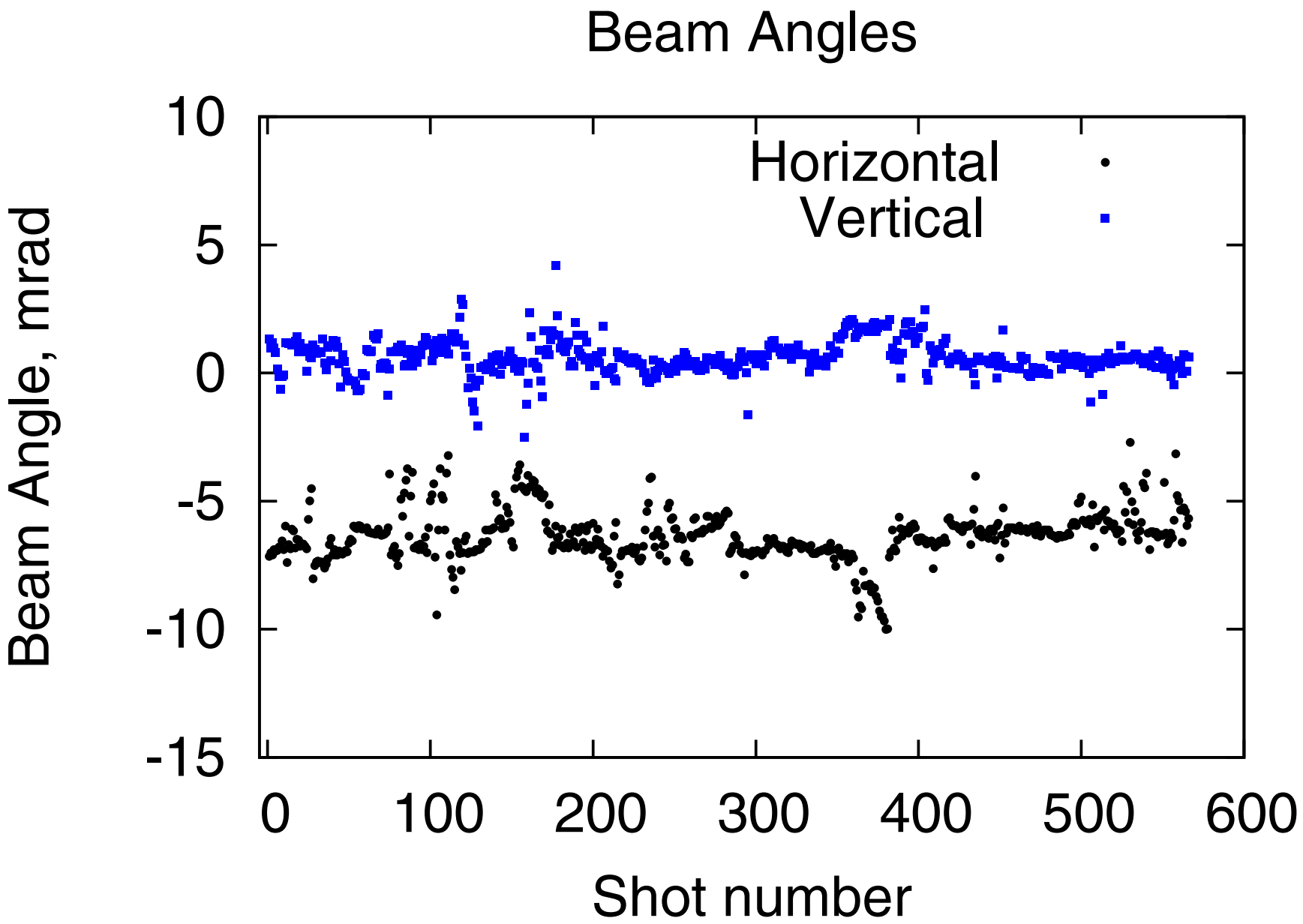
Beam Commissioning

Here, and in the rest of this note, measurements of the beam spot position in Flag Coordinates are by Hee Jin Park

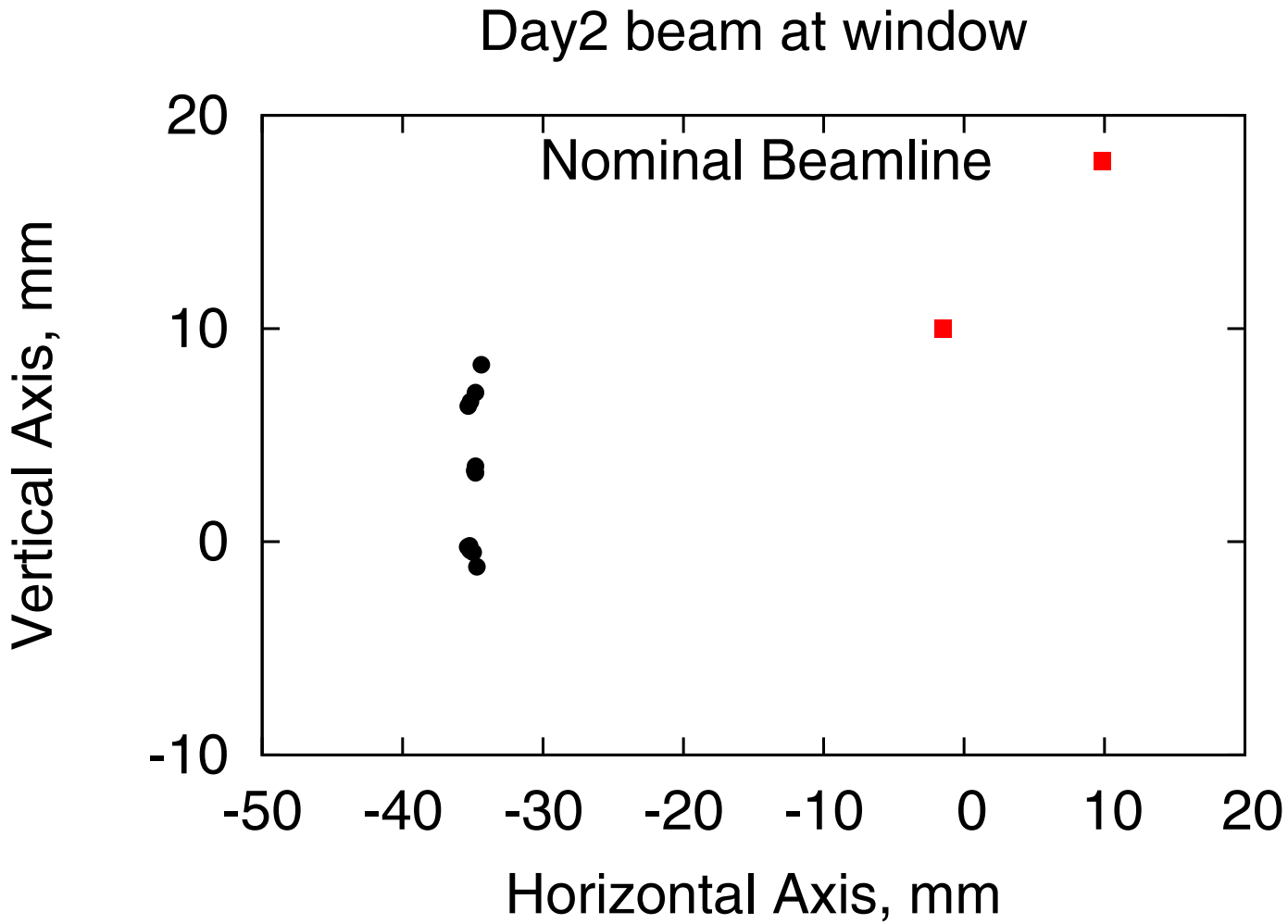




Calculated Beam Angles



Calculated Beam at Window



Beam Positions - I

Let:

x_1, y_1, z_1 be the beam coordinates at flag 454 relative to the nominal beam line;

x_2, y_2, z_2 be the beam coordinates at flag 484 relative to the nominal beam line;

x_3, y_3, z_3 be the beam coordinates at the beam window relative to the nominal beam line.

Define:

x_b, y_b to be the coordinates of the nominal beam relative to the flag axes;

x_m, y_m is the measured beam position relative to the overlaid grid at each flag;

x_o, y_o is the measured flag origin relative to the overlaid grid at each flag.

Beam Positions II

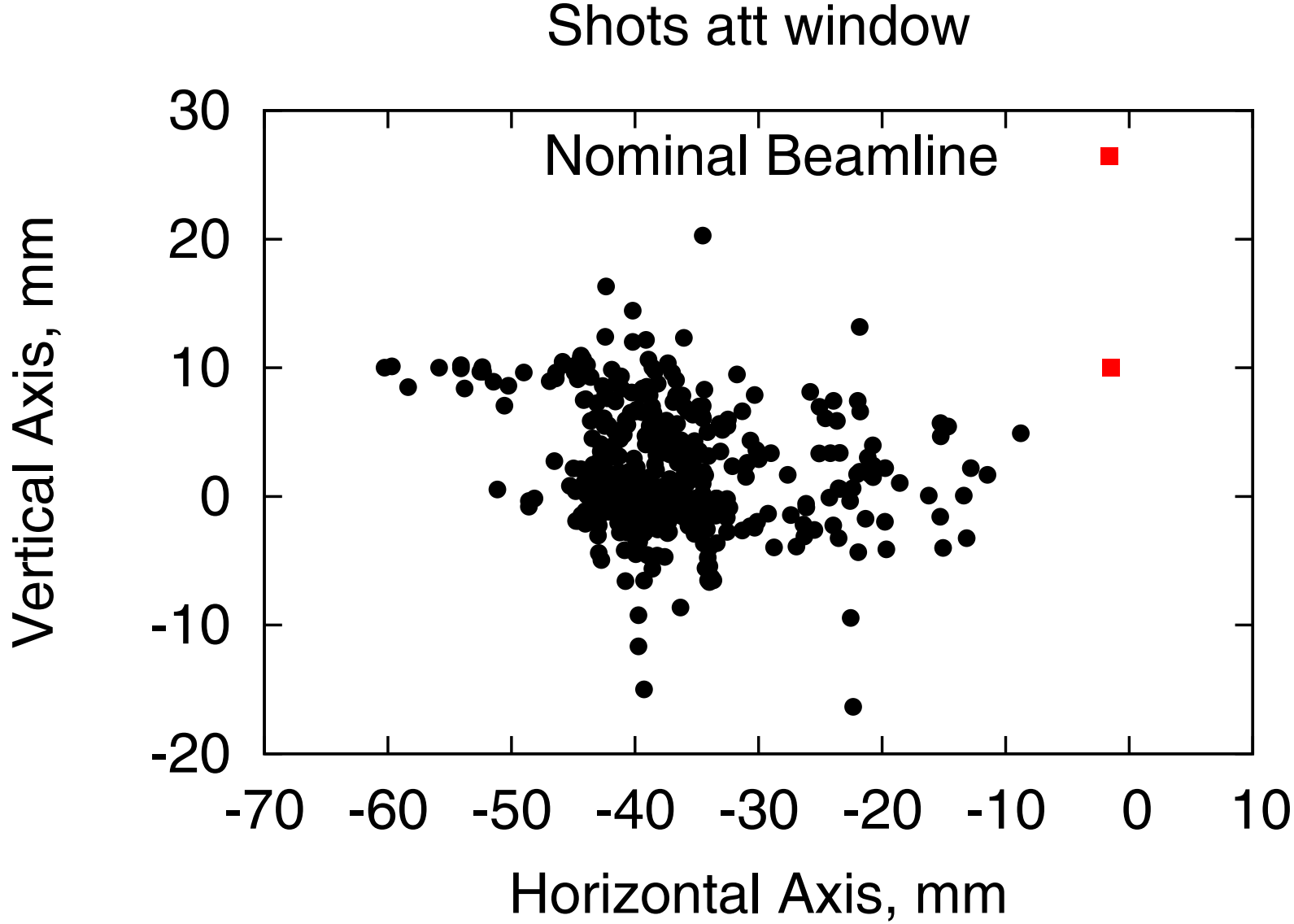
For flag 454 $x_1 = x_{1m} – x_{1o} – x_{1b}$ and $y_1 = y_{1m} – y_{1o} – y_{1b.}$
For flag 484 $x_2 = x_{2m} – x_{2o} – x_{2b}$ and $y_2 = y_{2m} – y_{2o} – y_{2b.}$

We then get at the beam window relative to the nominal beam line:

$$x_3 = x_2 + [(z_3-z_2)/(z_2-z_1)] * (x_2-x_1) \text{ , and}$$
$$y_3 = y_2 + [(z_3-z_2)/(z_2-z_1)] * (y_2-y_1)$$

All Analyzed Beam Shots

Extrpolated positions relative to nominal beamline



All Shots Fine Scale

Extrpolated positions relative to nominal beamline