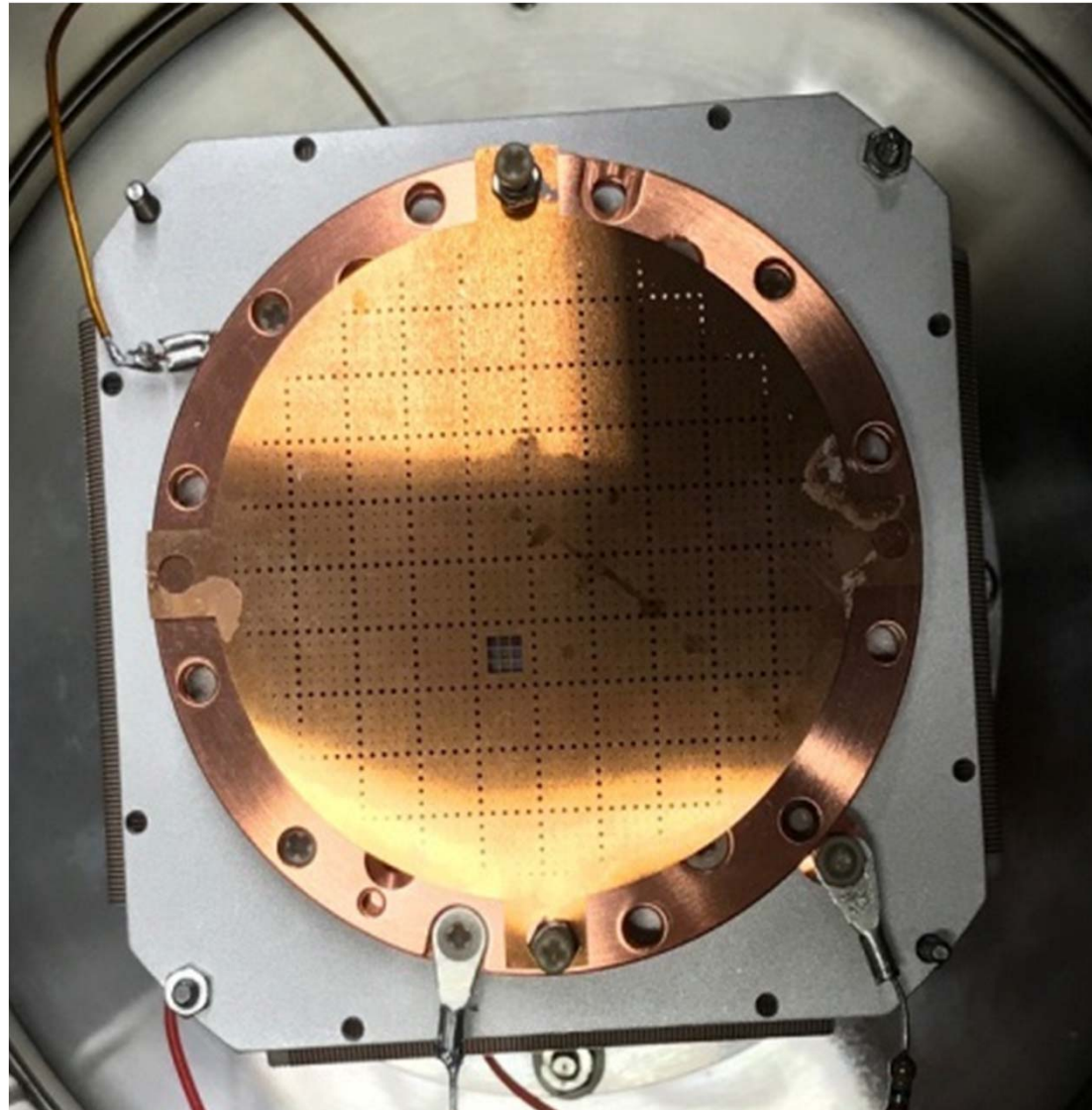


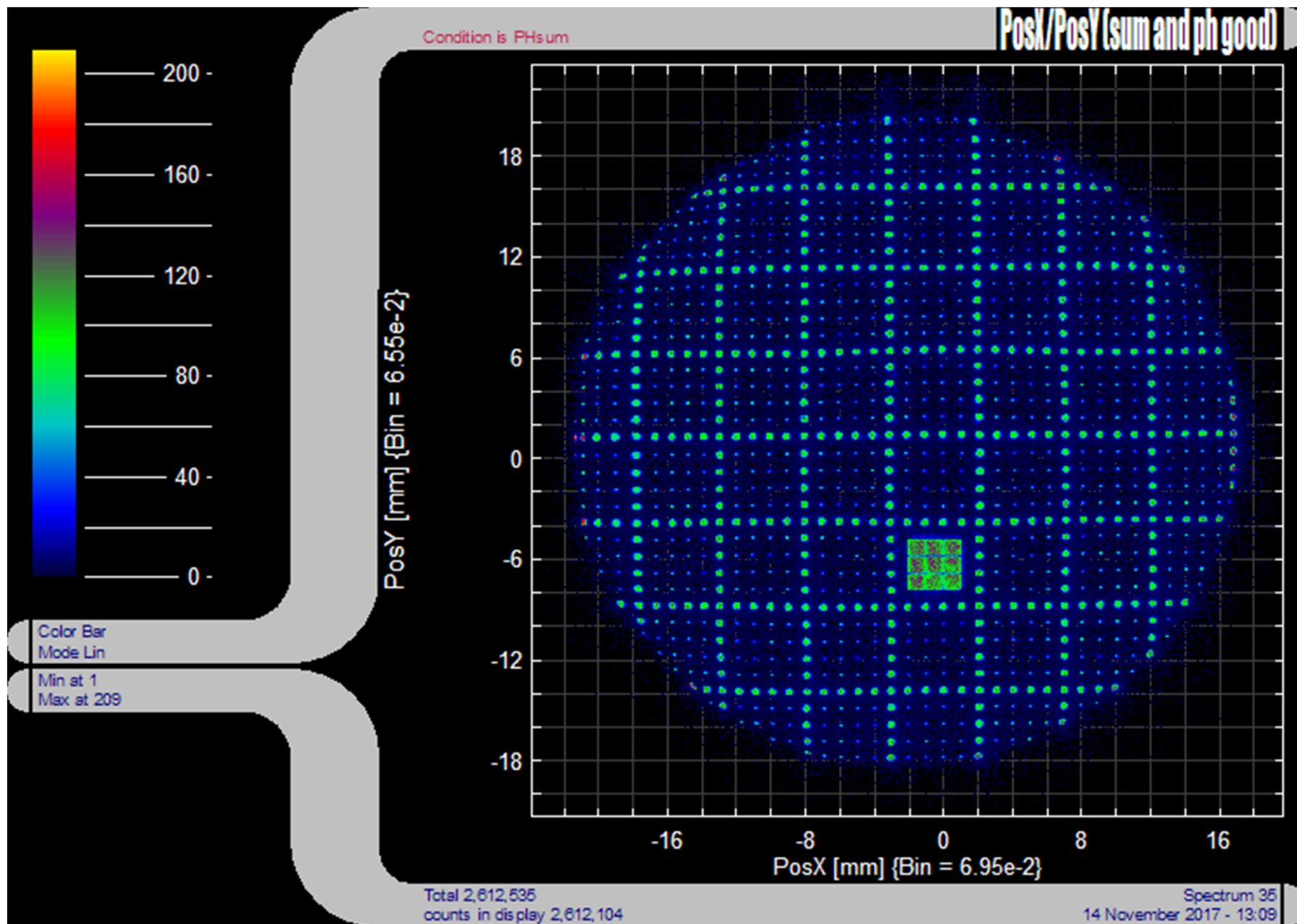
Effect of pore tilt angle on “detector walk”

DLD40

(40 mm active)



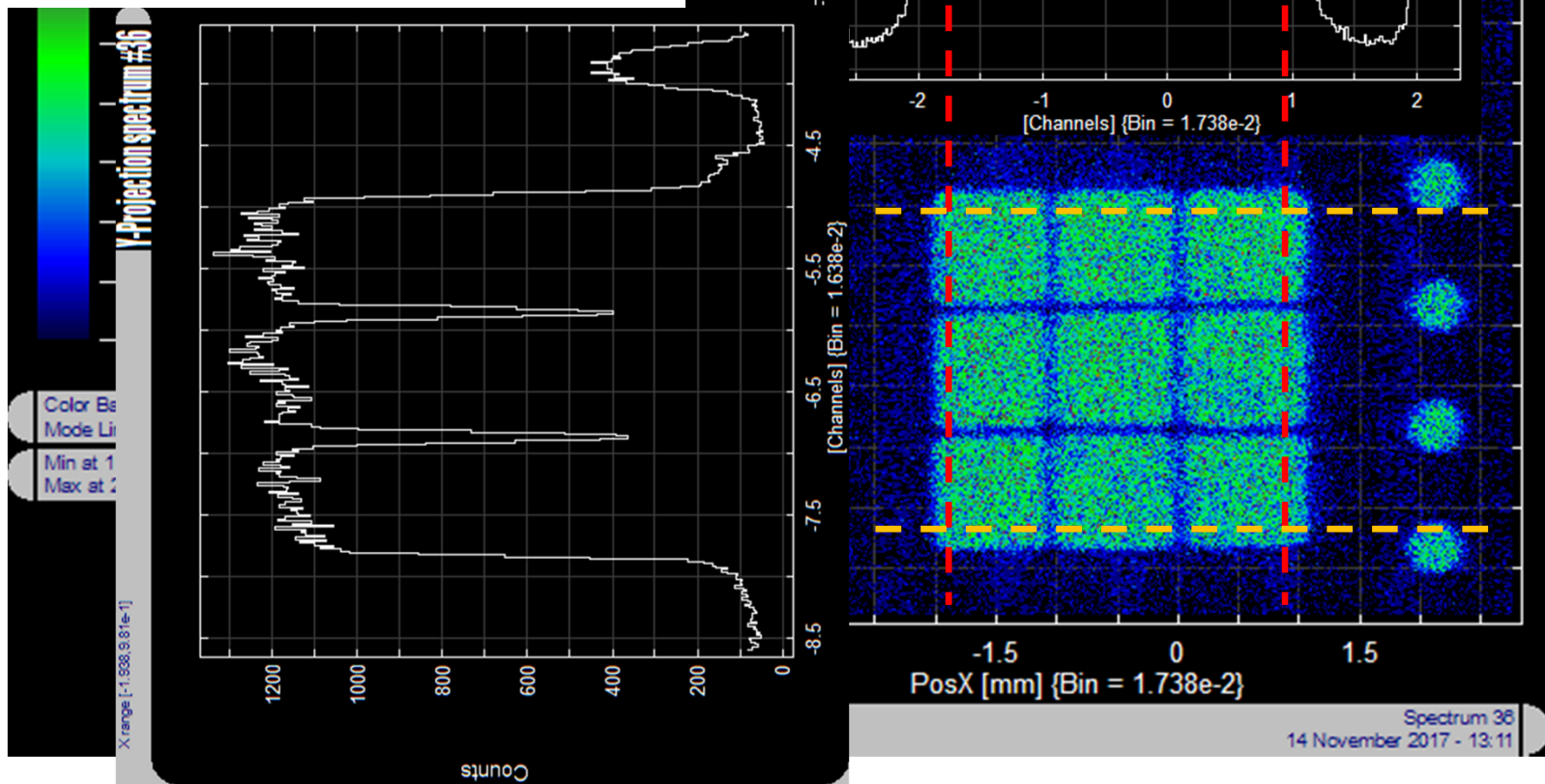
Shadow mask image of pin holes with diam. 0.15 mm (every mm) or 0.4 mm (every 5 mm),
Illuminated by an Am-241 source, emitting alpha and gamma rays.



Close-up onto “window”
with 100 μm bars every mm

Resolution is good in Y-direction
(up/down)

Inferior resolution in X-direction
(left/right)



Reason for inferior resolution along x-dimension:

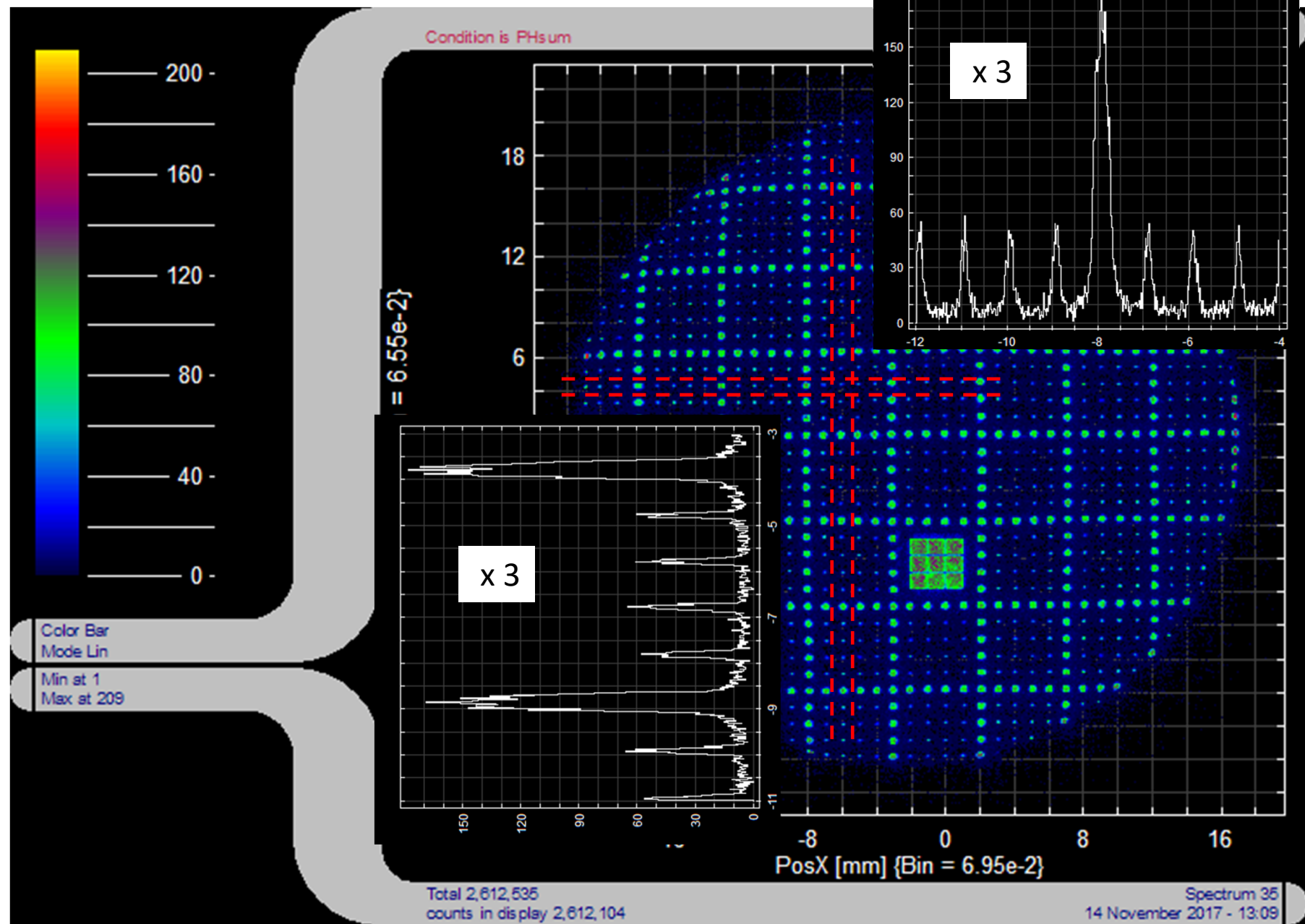
“Detector walk” from pore tilt angle, which was aligned in x-direction

see

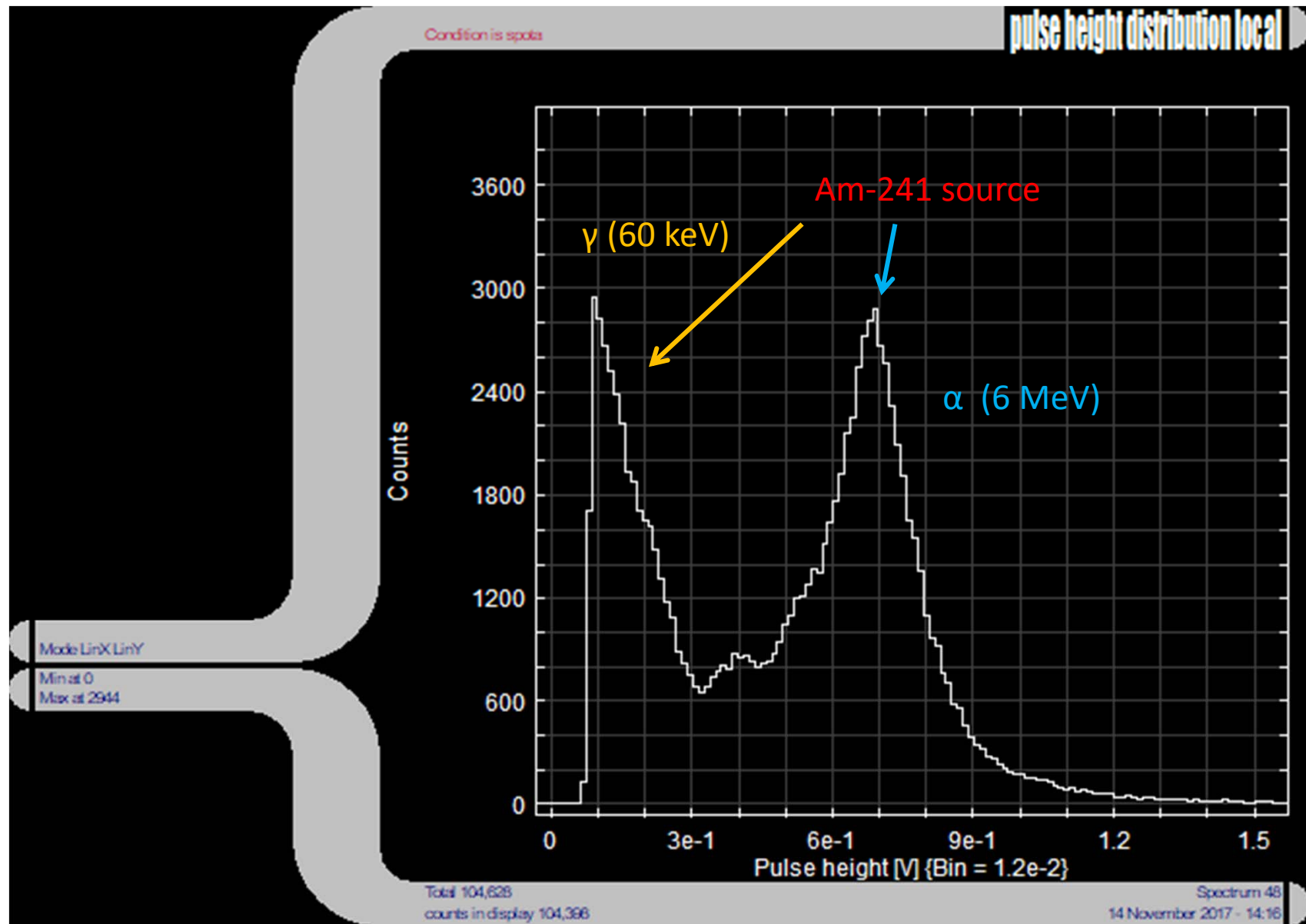
To proof this for this case, narrow regions around hole rows and x- and y-direction were defined and the position of the holes were plotted as function of pulse height.

Detector walk can thus be measured and quantified.

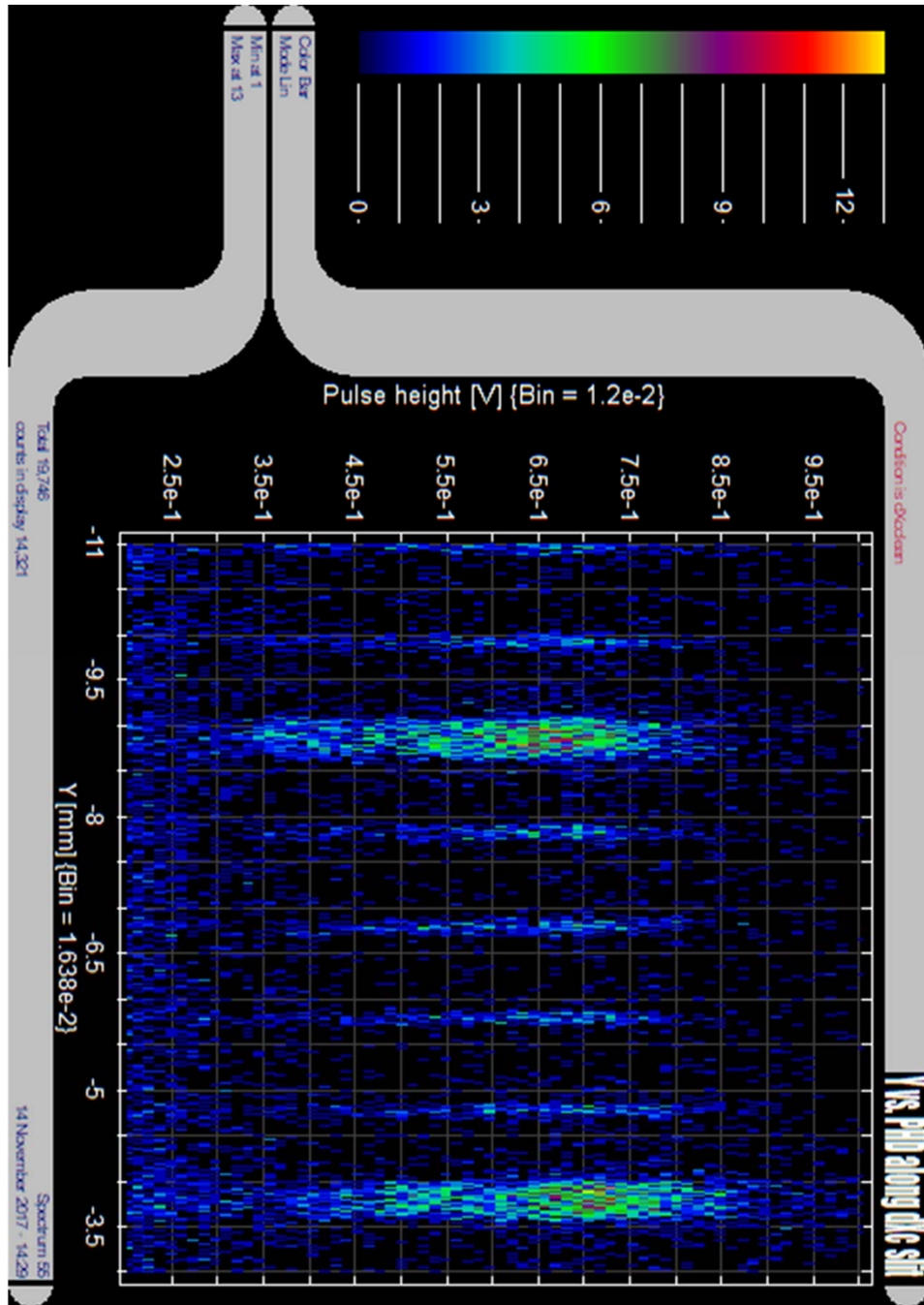
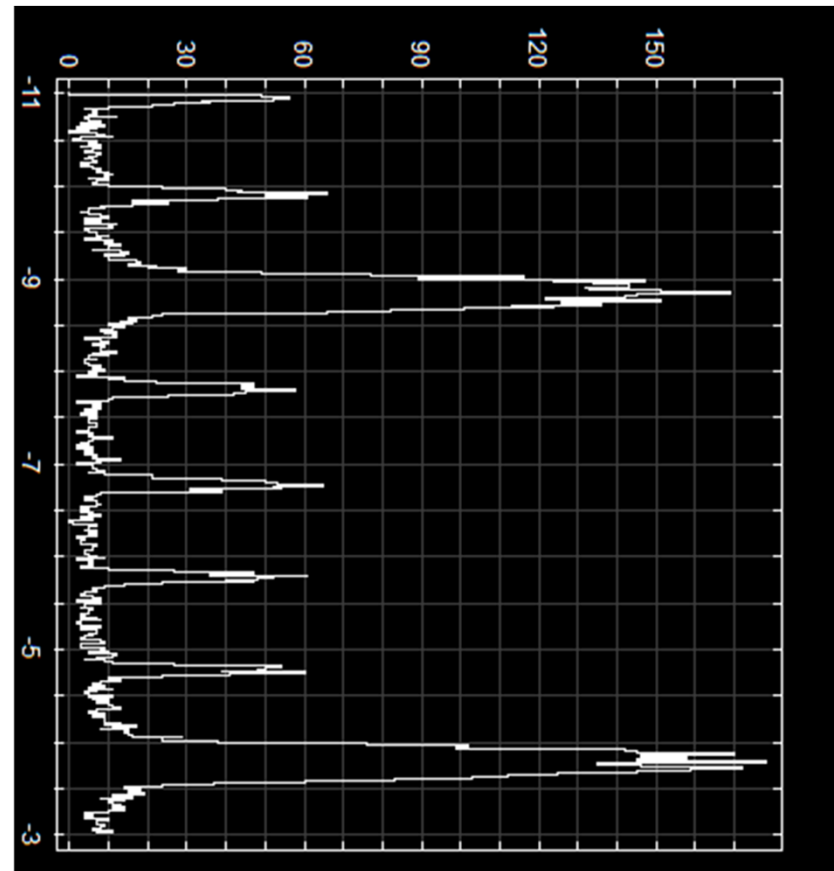
MCP: 12/15 μ , 80:1 chevron , 20deg pore tilt



Use pulse height information Ph:



Y-position as function of pulse height



pulse height →

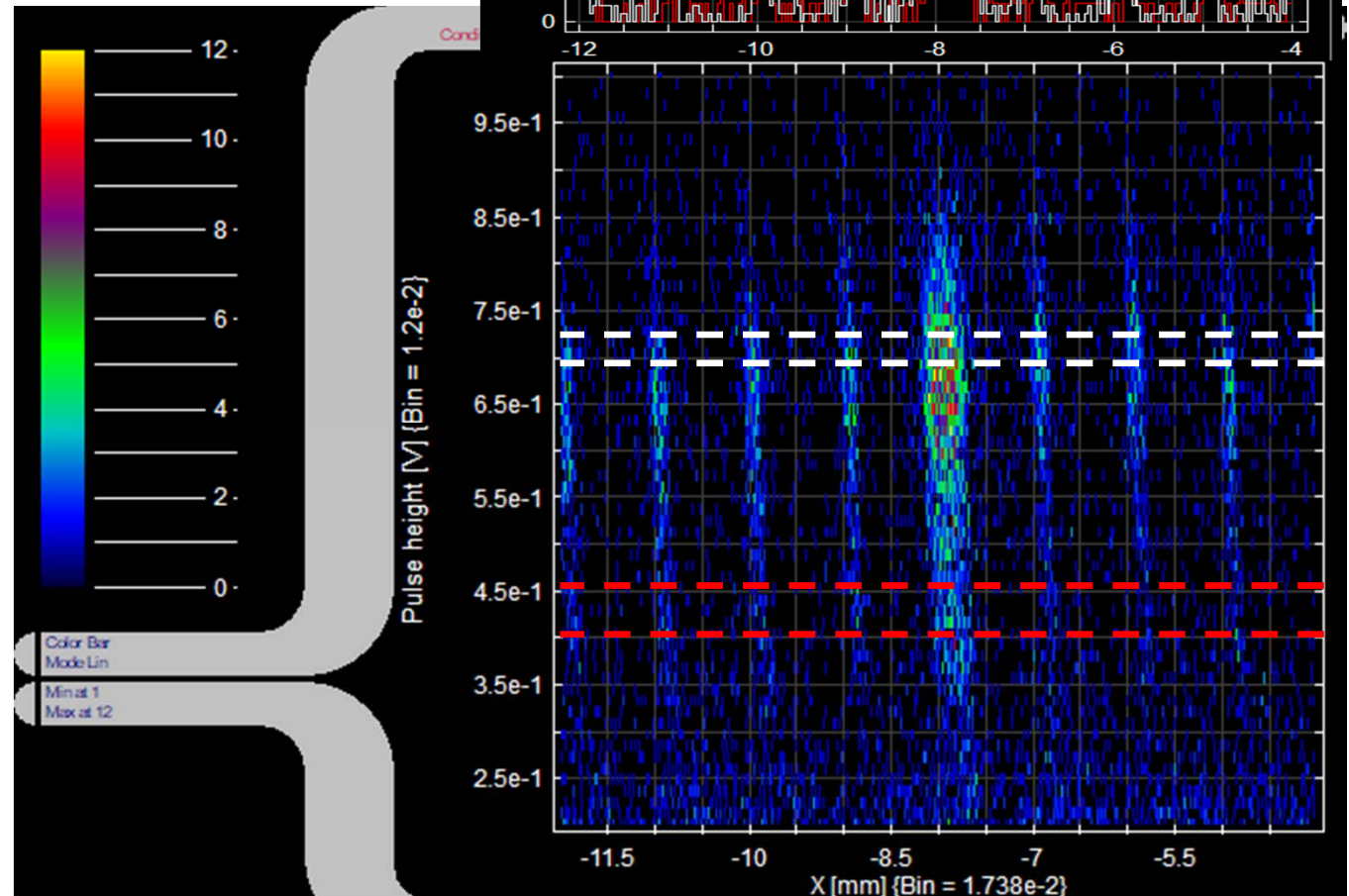
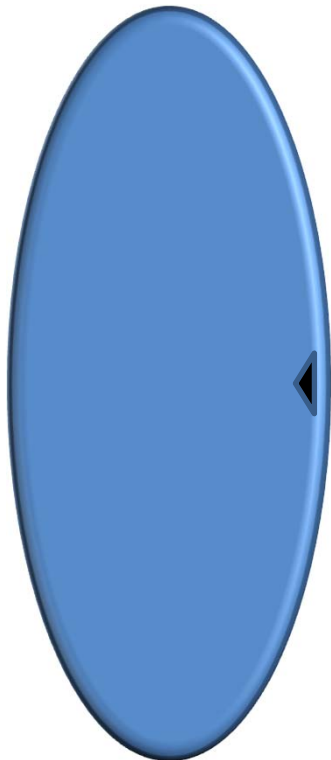
X-position as function of pulse height

Here: Tilt marker was aligned along X-direction:

Stronger clouds are emitted more backwards !



Δx

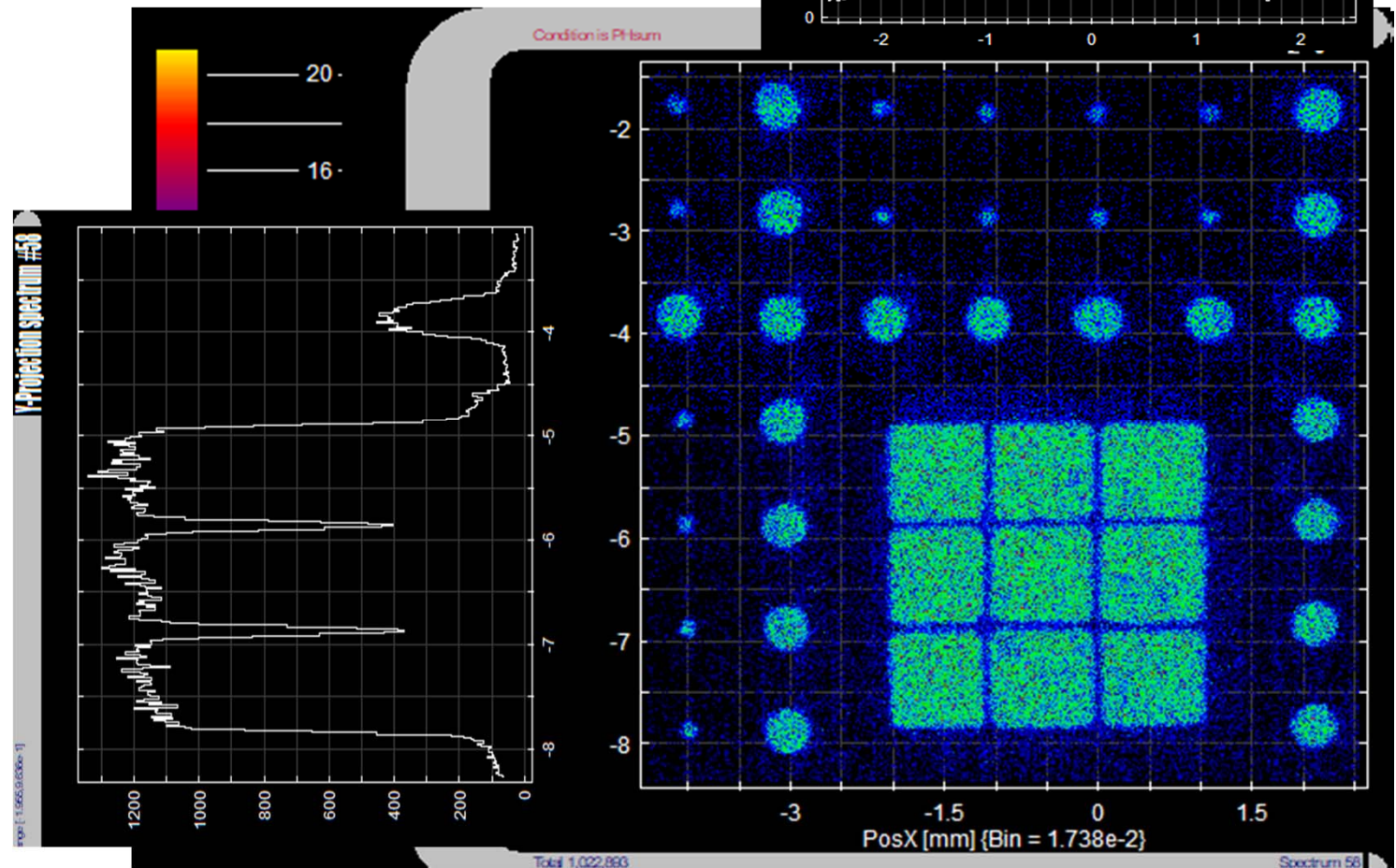


Software-corrected X-position:

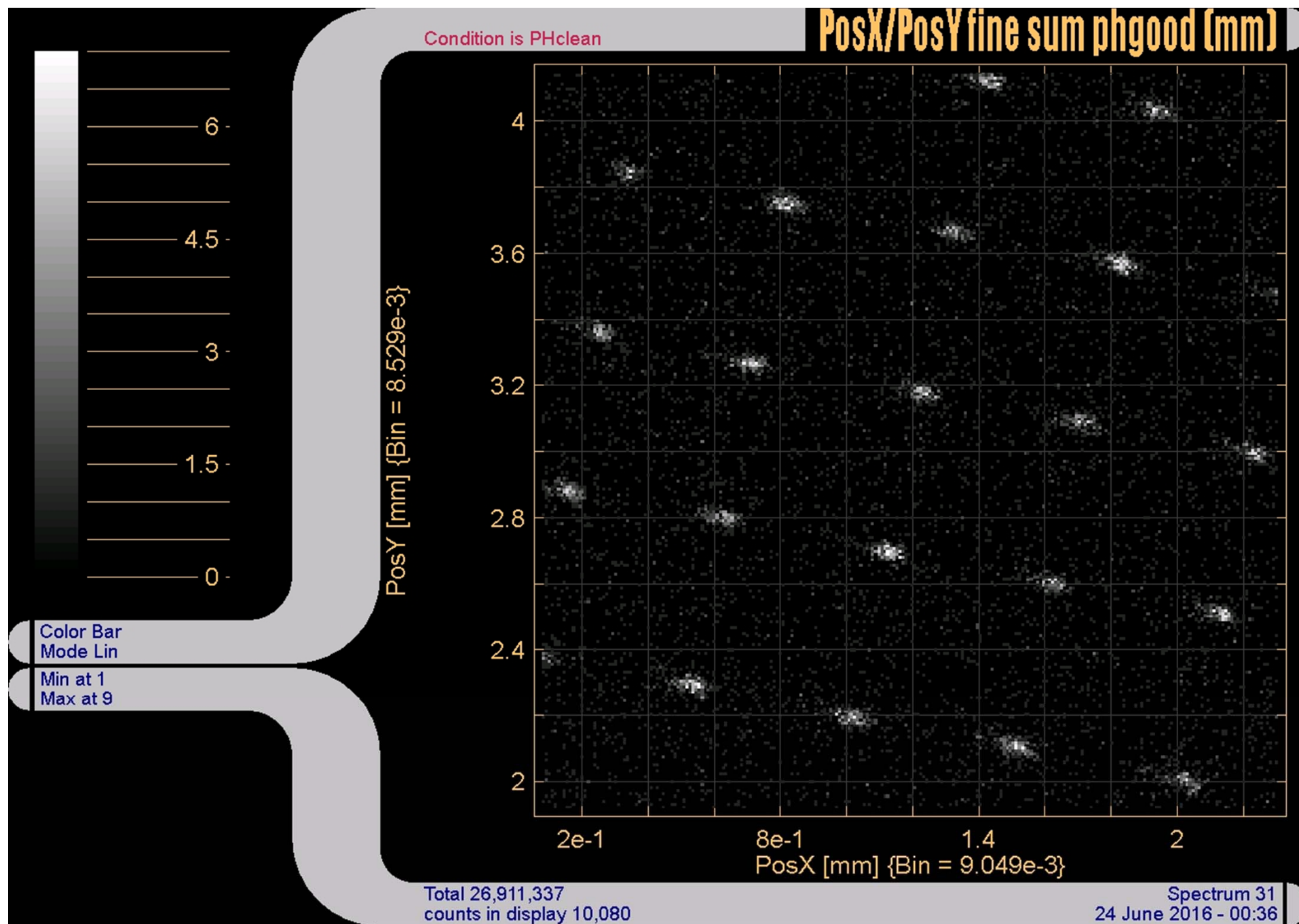
$$X_{\text{walkcorr}} = X + \Delta x$$

$$\Delta x = dx/dPh * Ph$$

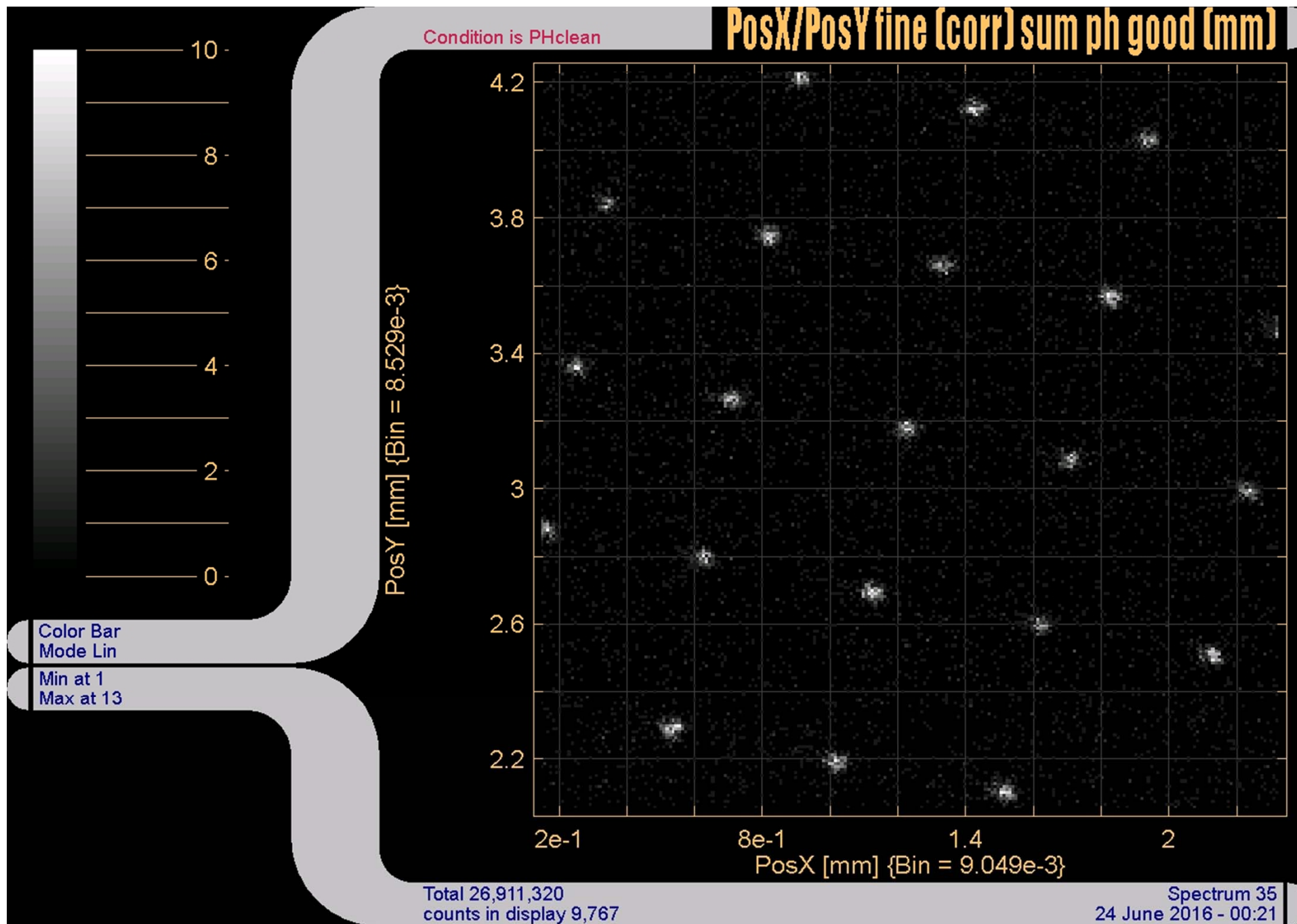
Spatial resolution recovered in X



Measurement at rotated angle marker position. Mask has 40 μm pin holes every 0.5 mm



40 μm pin holes every 0.5 mm, with detector walk correction



Optimal spatial resolution only if:

- Pulse height is measured
- Azimuthal position of angle marker (last MCP stage) is known
(or can be measured comparing images at different Ph gates)
- Correction factors dx/dPh and dy/dPh are determined

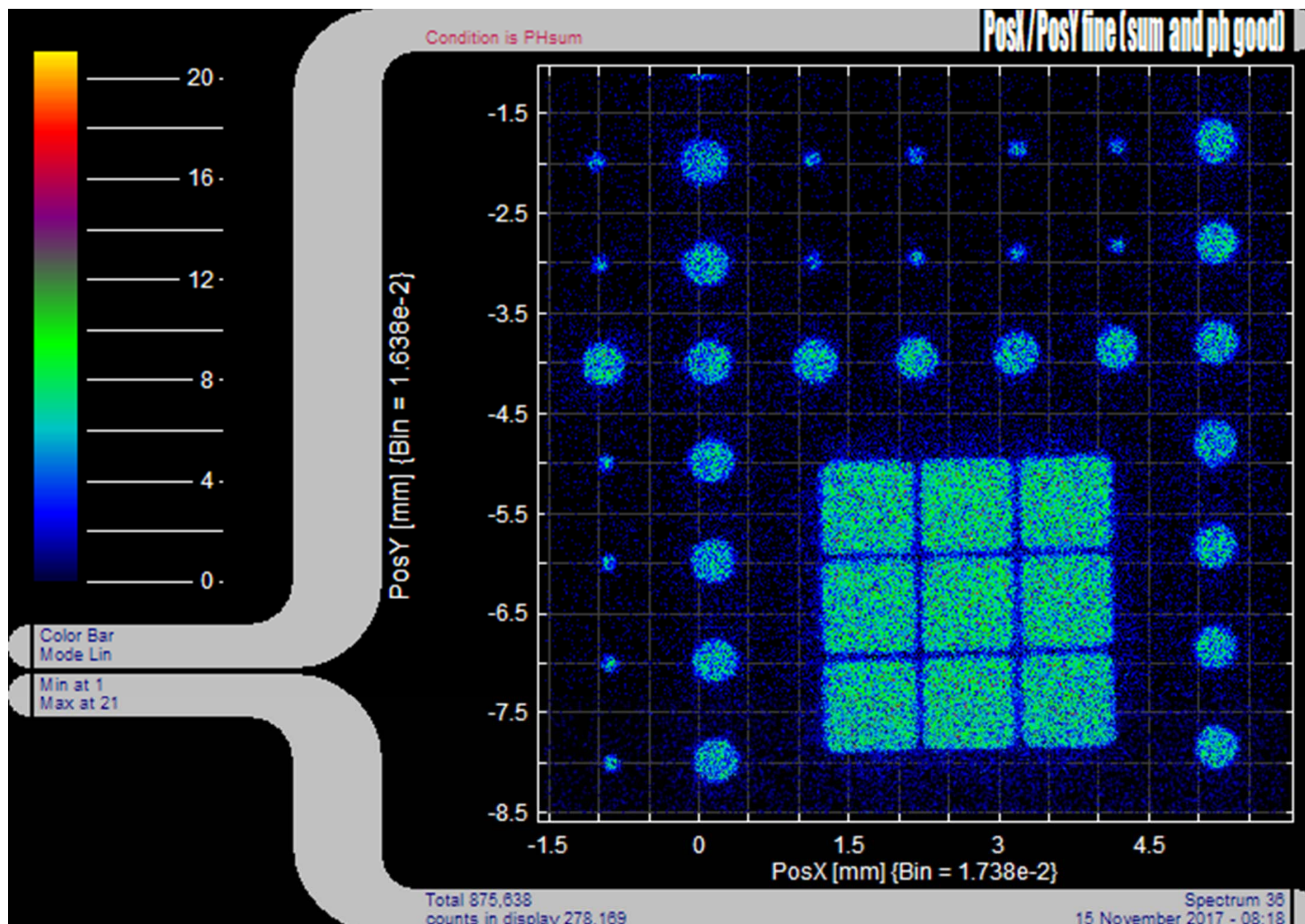
Alternative solution: use zero degree tilt angle MCP as final stage:

F1217-01 MOD14

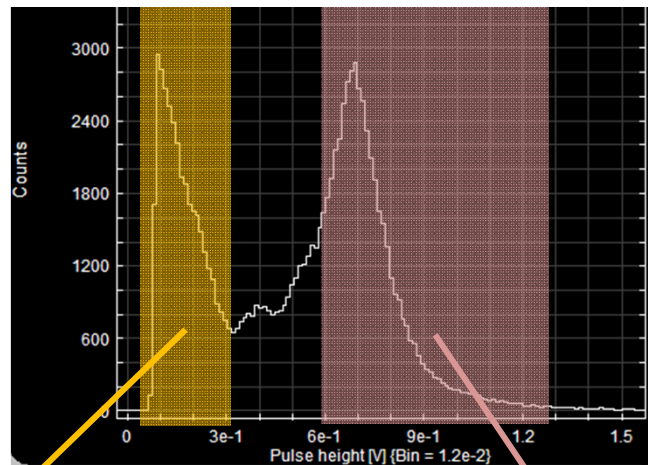
12/15 μ m, 0 deg tilt angle, 40:1, OAR 70%

operated at 600V bias as third MCP (others: 60:1, 19 deg)

Measurement with 0deg MCP (as final stage of a Z-stack)



Mean spot
position [mm]:
(-0.16 / 11.31)



Mean spot
position [mm]:
(-0.16 / 11.23)

