Issues from last week…

- Dividing parabolic mirror into more segments, with same length.
- Set maximum step number to avoid window TIR problem.
- Find a way to score exact position.

Unsolved Problems

- Window problem is not solved yet.
- Still analyzing data by reading terminal output.(can be solved)
- Simulating with various beam position should be done.

Parabolic mirror

- The velocity of the particle along the parabola is

$$v = \frac{d}{dt}(t, at^2) = (1, 2at)$$

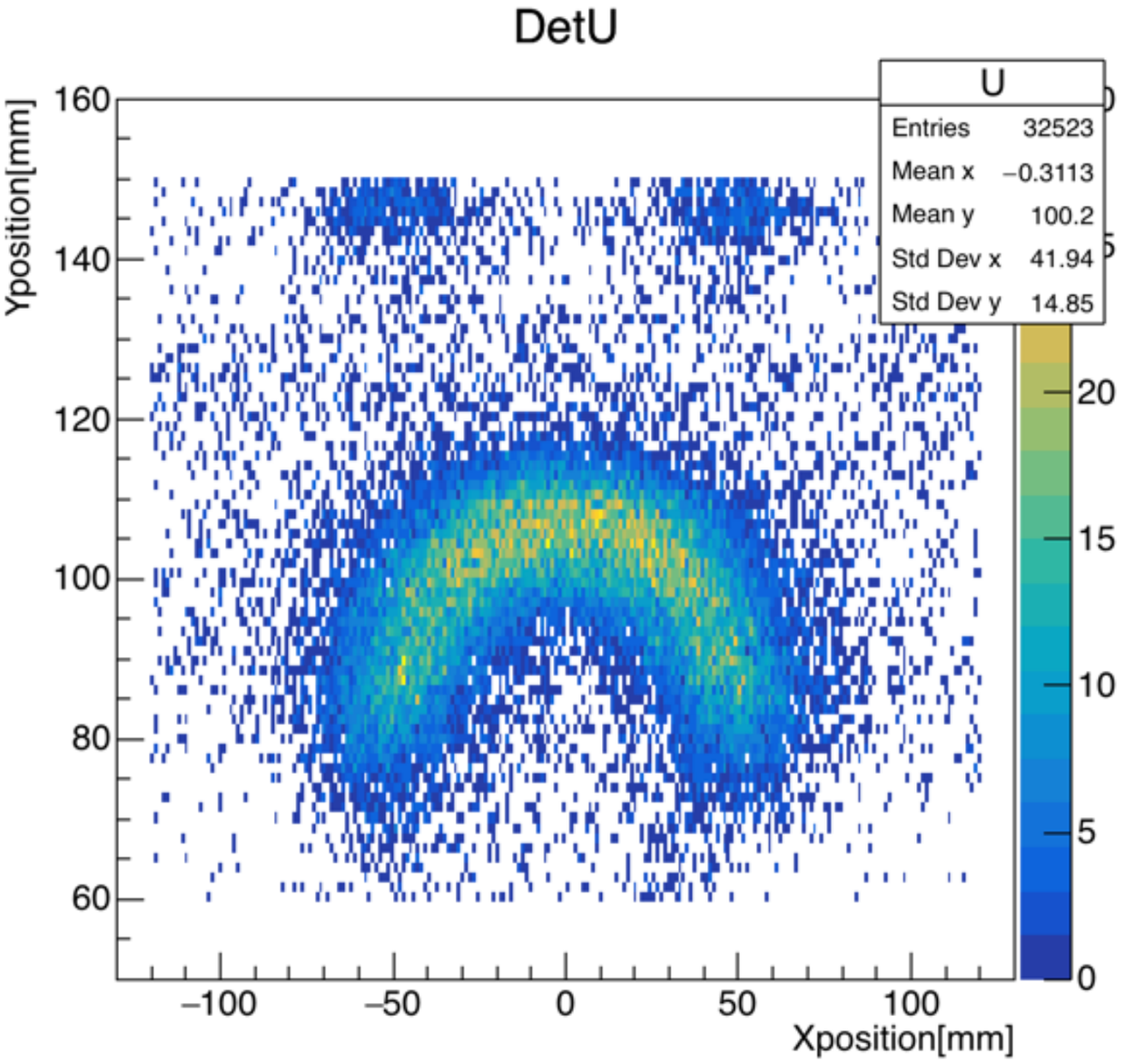
- Taking idea from D.G., re-parametrization of the curve so that normalized velocity is

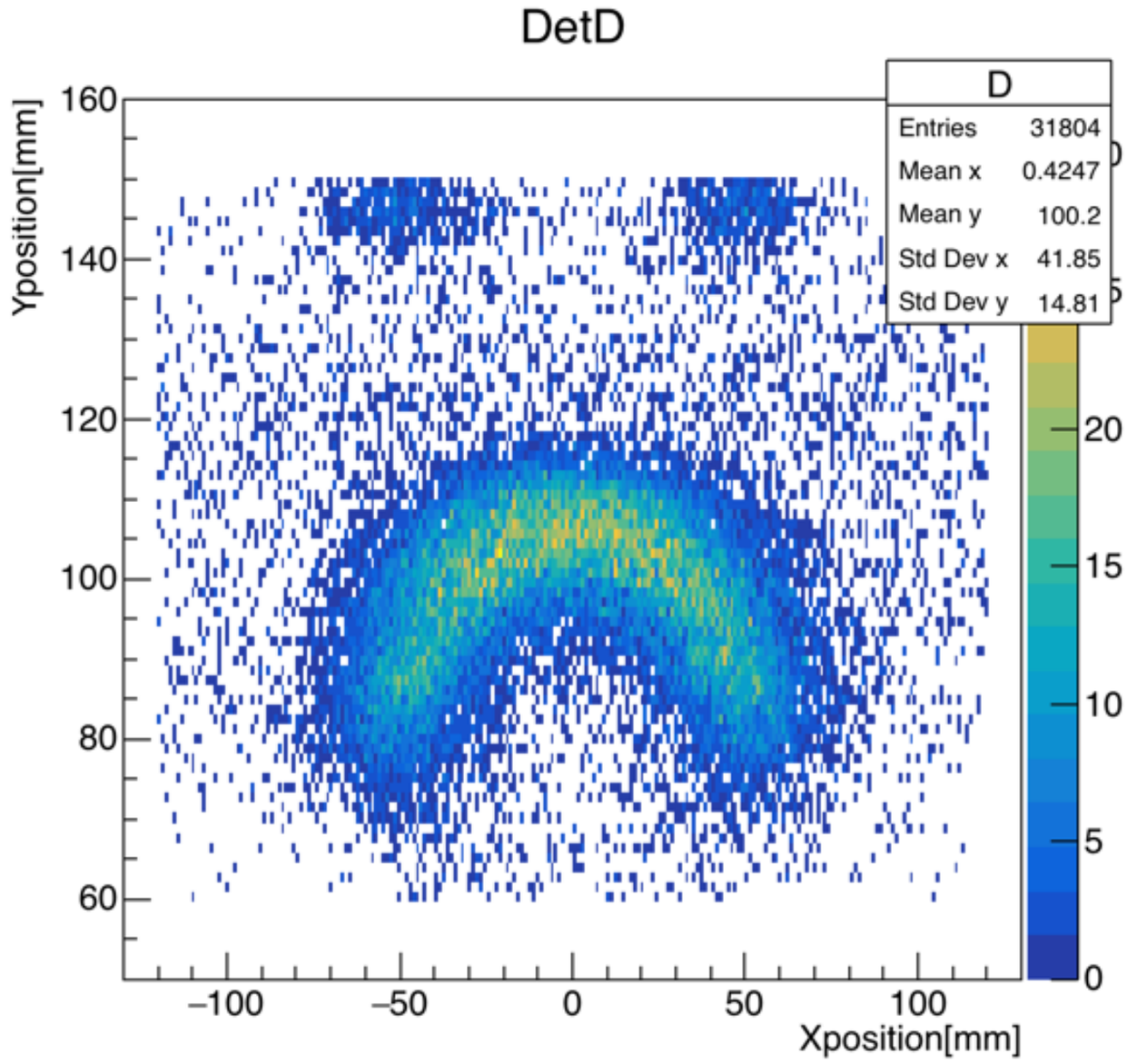
$$\vec{v}_n = \frac{\vec{v}}{|v|} = \frac{1}{\sqrt{1+4a^2t^2}}(1, 2at)$$

- Used (psuedo) Runge-Kutta method to improve accuracy.

$$t = x = y = 0$$
$$x(t) = \frac{1}{\sqrt{a+4a^2t^2}}$$
$$y(t) = \frac{2at}{\sqrt{a+4a^2t^2}}$$
$$\vec{s}_{i+1}\big|_x = \vec{s}_i\big|_x + \frac{1}{6}(x(t) + 4x(t + x(t)/2) + x(t + x(t)))$$
$$\vec{s}_{i+1}\big|_y = \vec{s}_i\big|_y + \frac{1}{6}(y(t) + 4y(t + x(t)/2) + y(t + x(t)))$$
$$t = t + x(t)$$

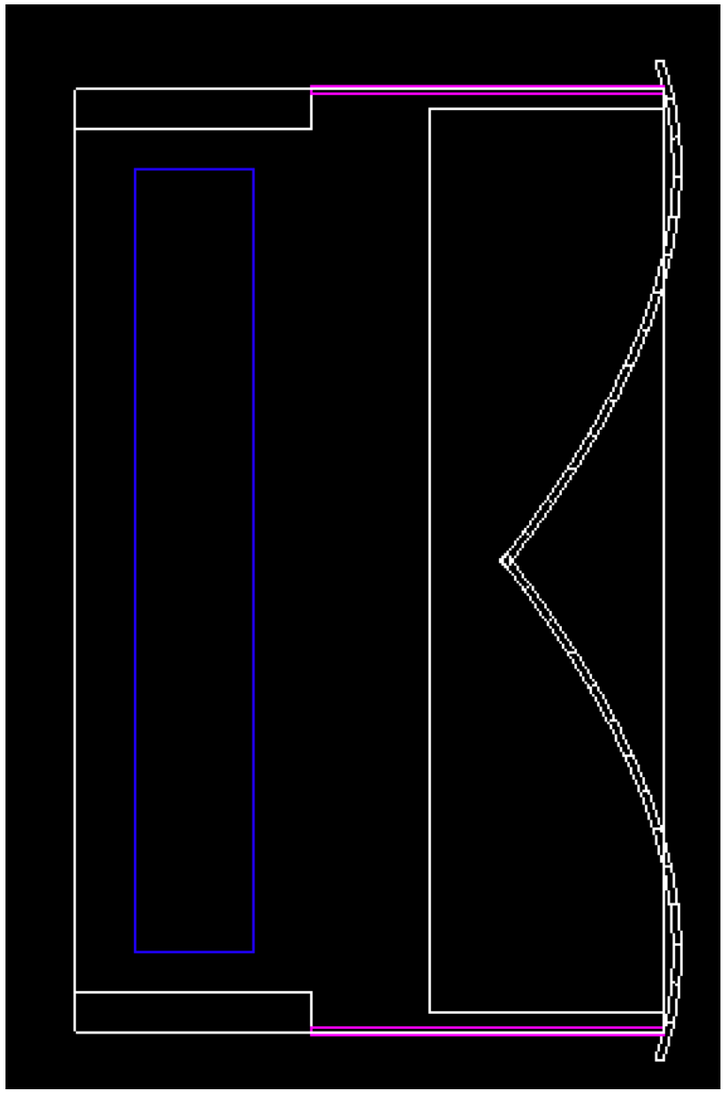
Succeed on scoring ...

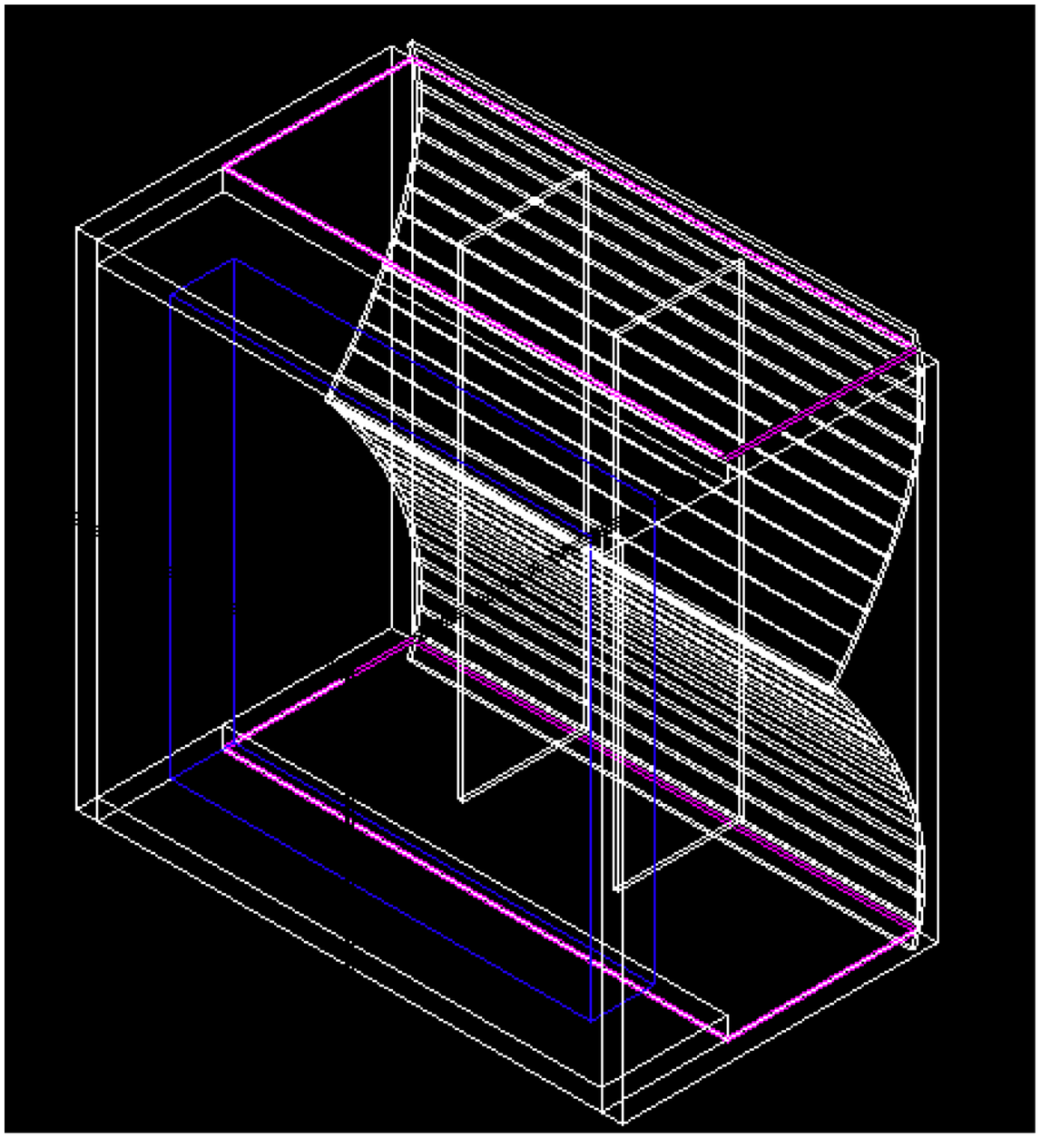




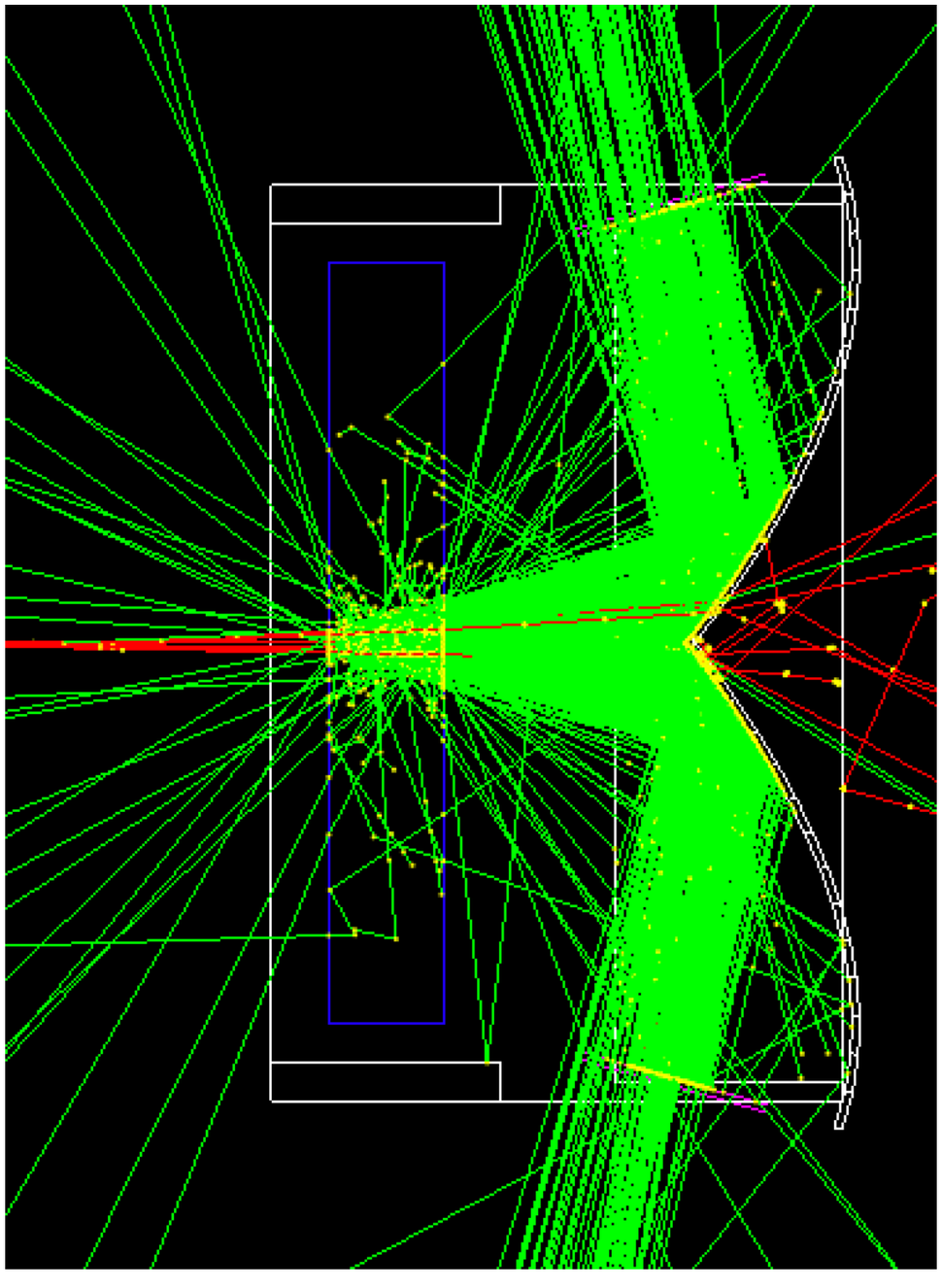
- Cerenkov radiation without scattering

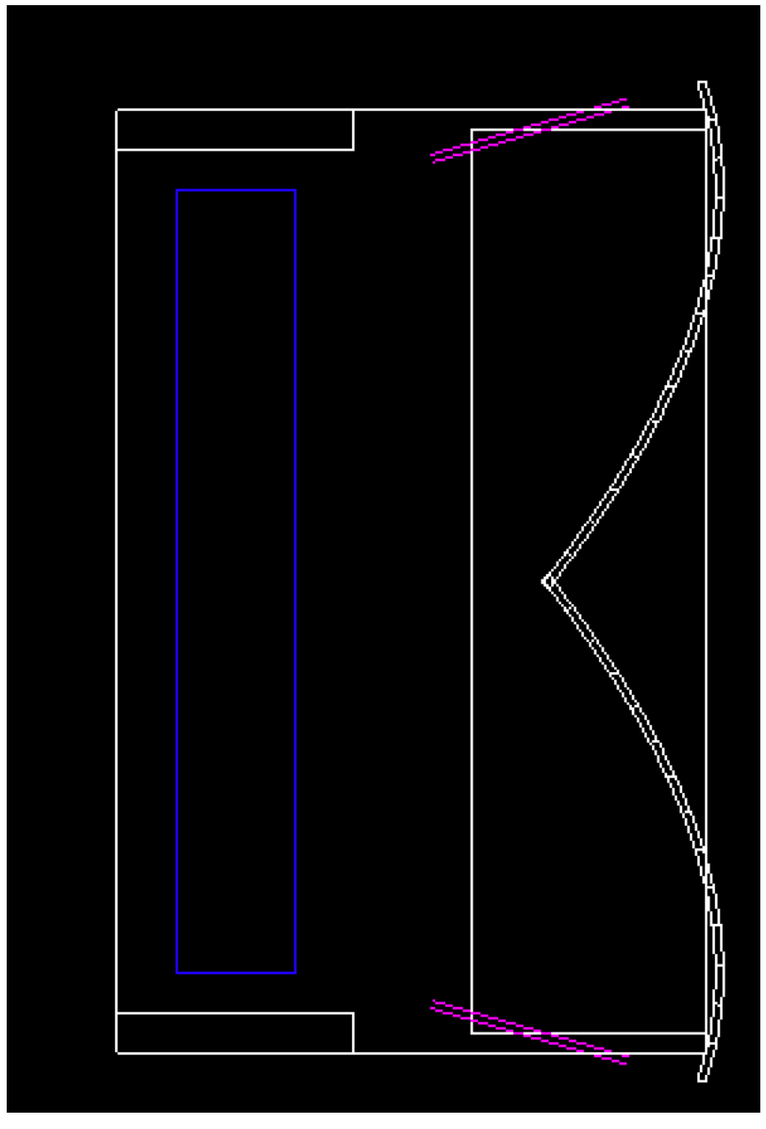
Added vertical mirror to divide rooms.





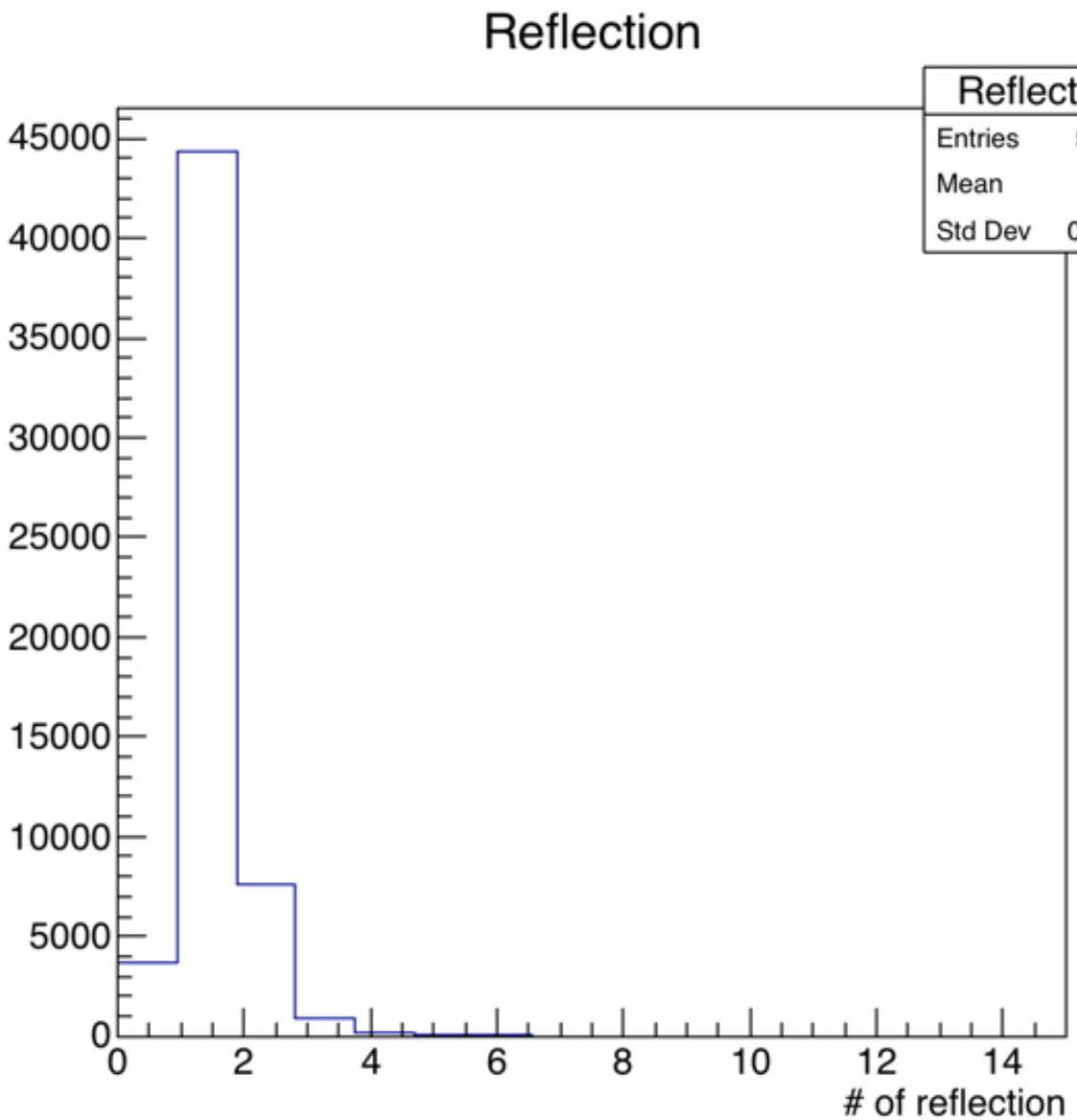
Parabola and PMT

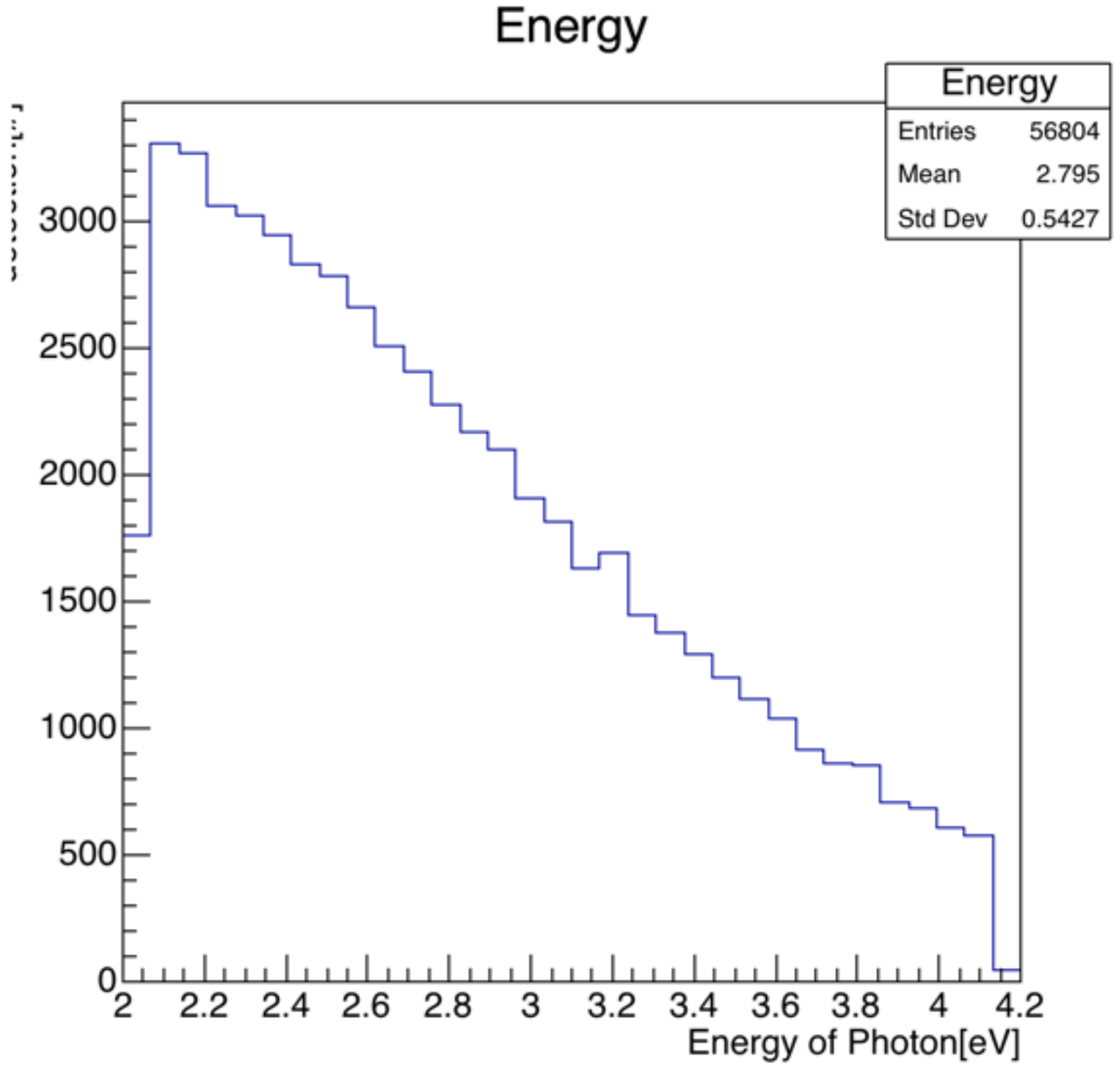




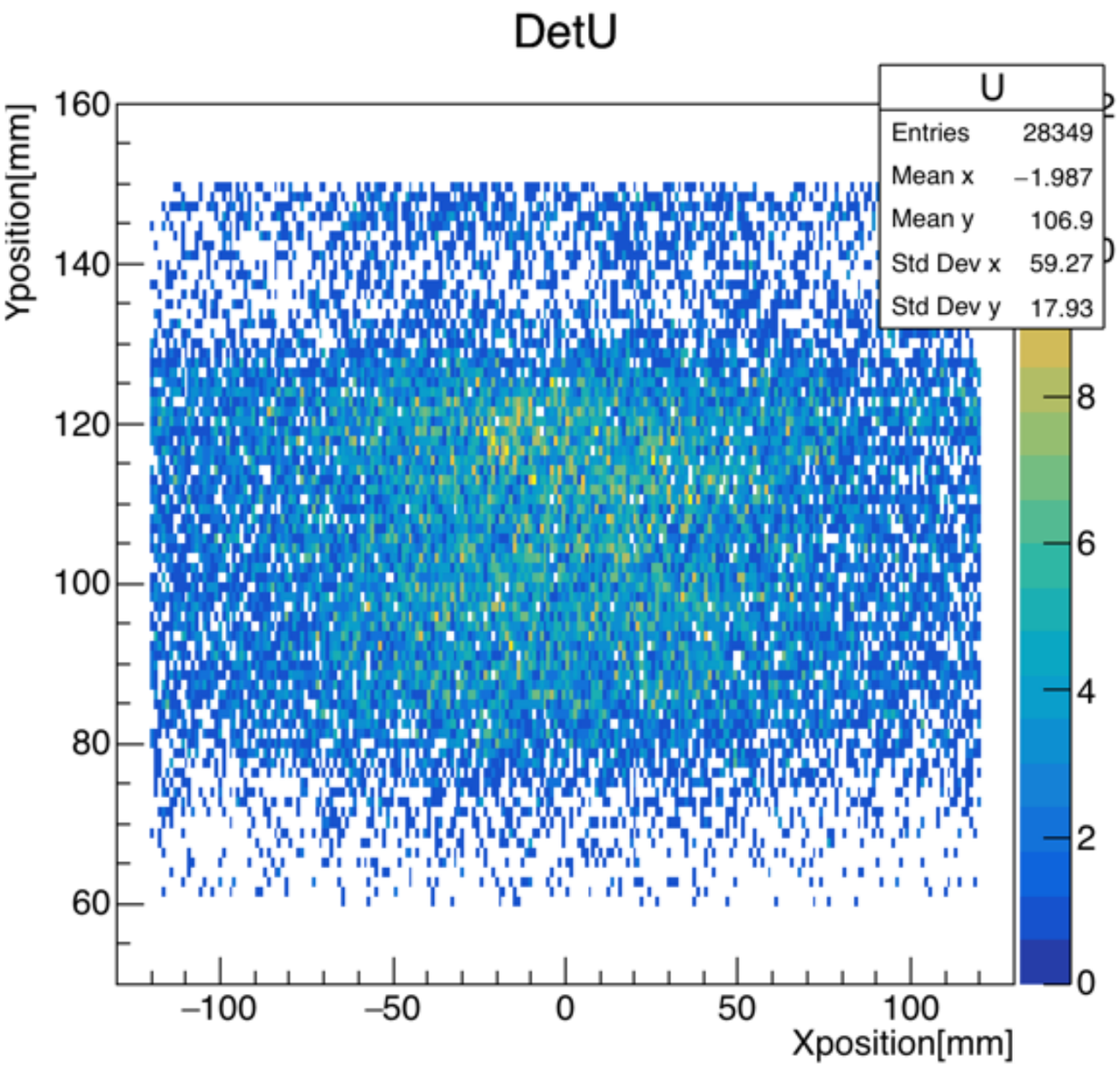
- Parabola looks fine.
- Tilting PMTs would be better.

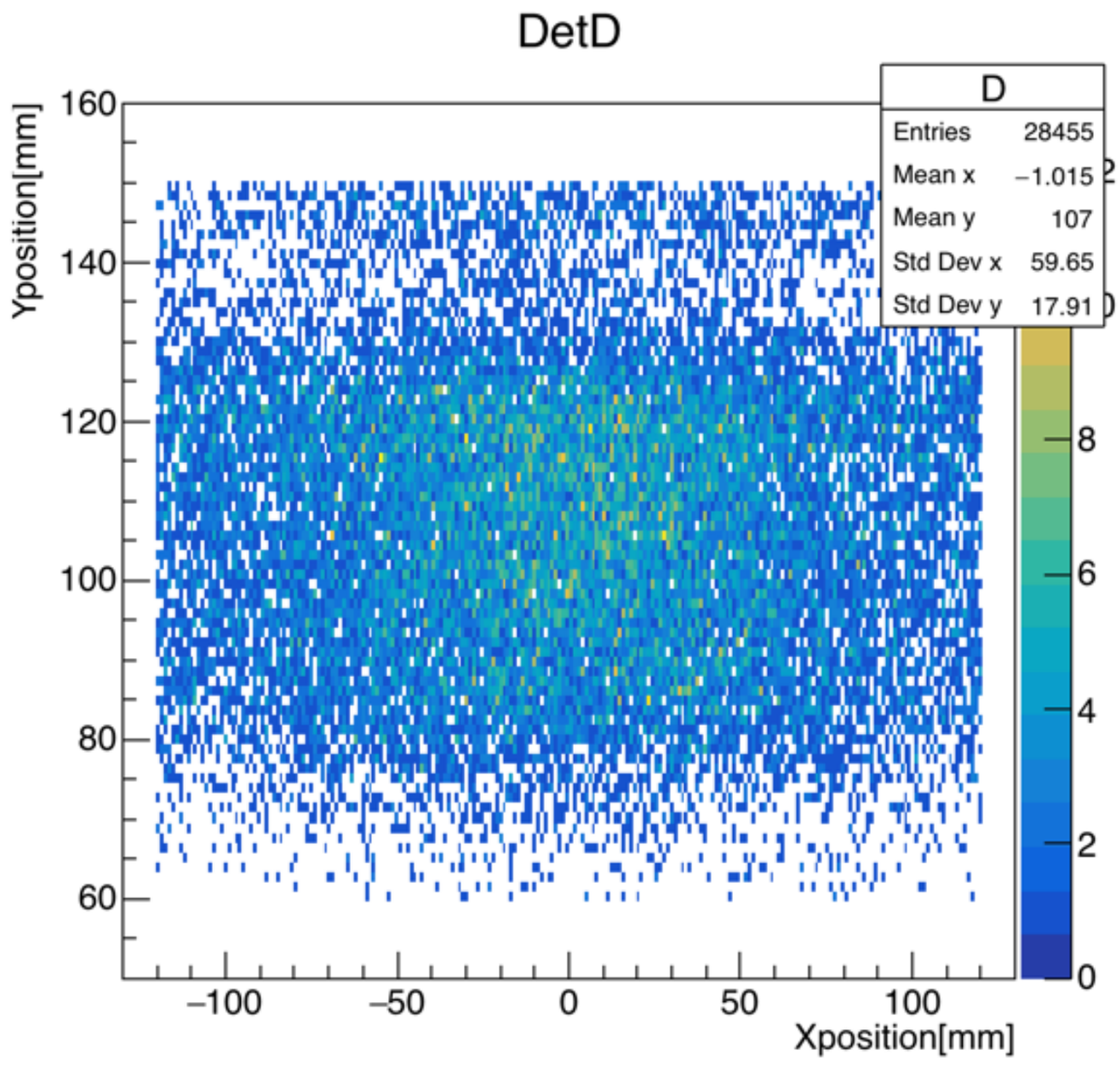
Result_wo_vmir



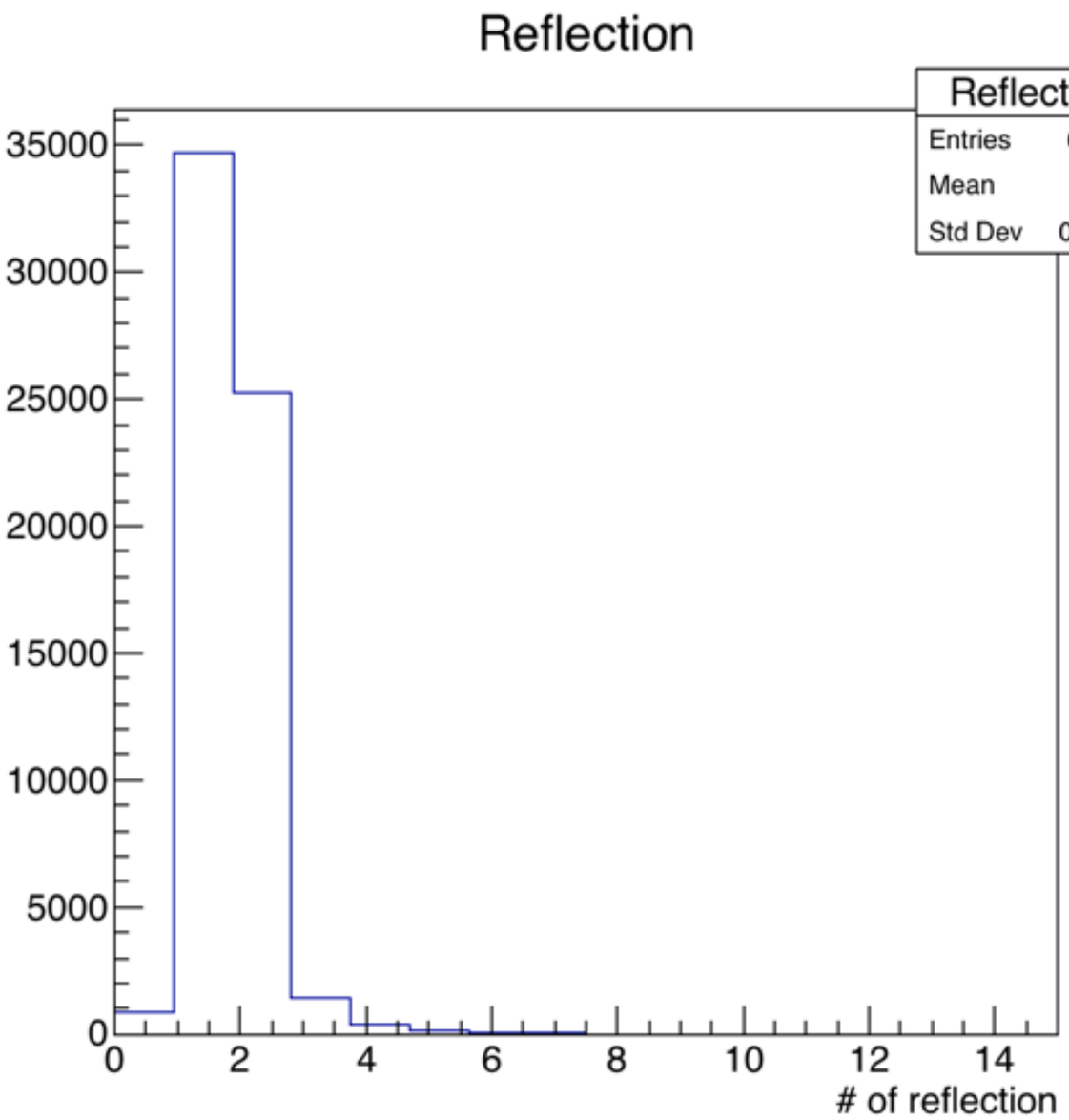


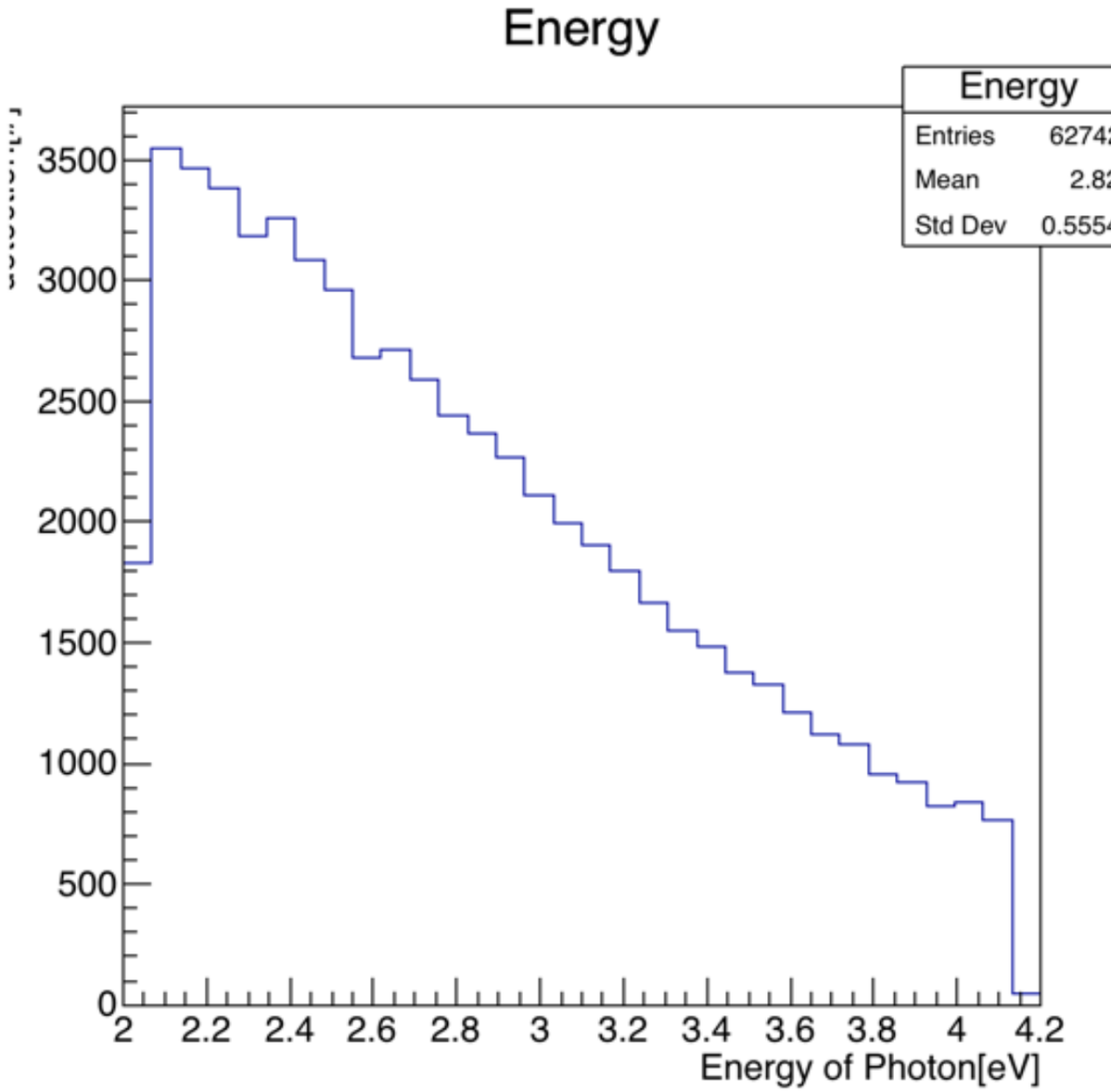
Result_wo_vmir





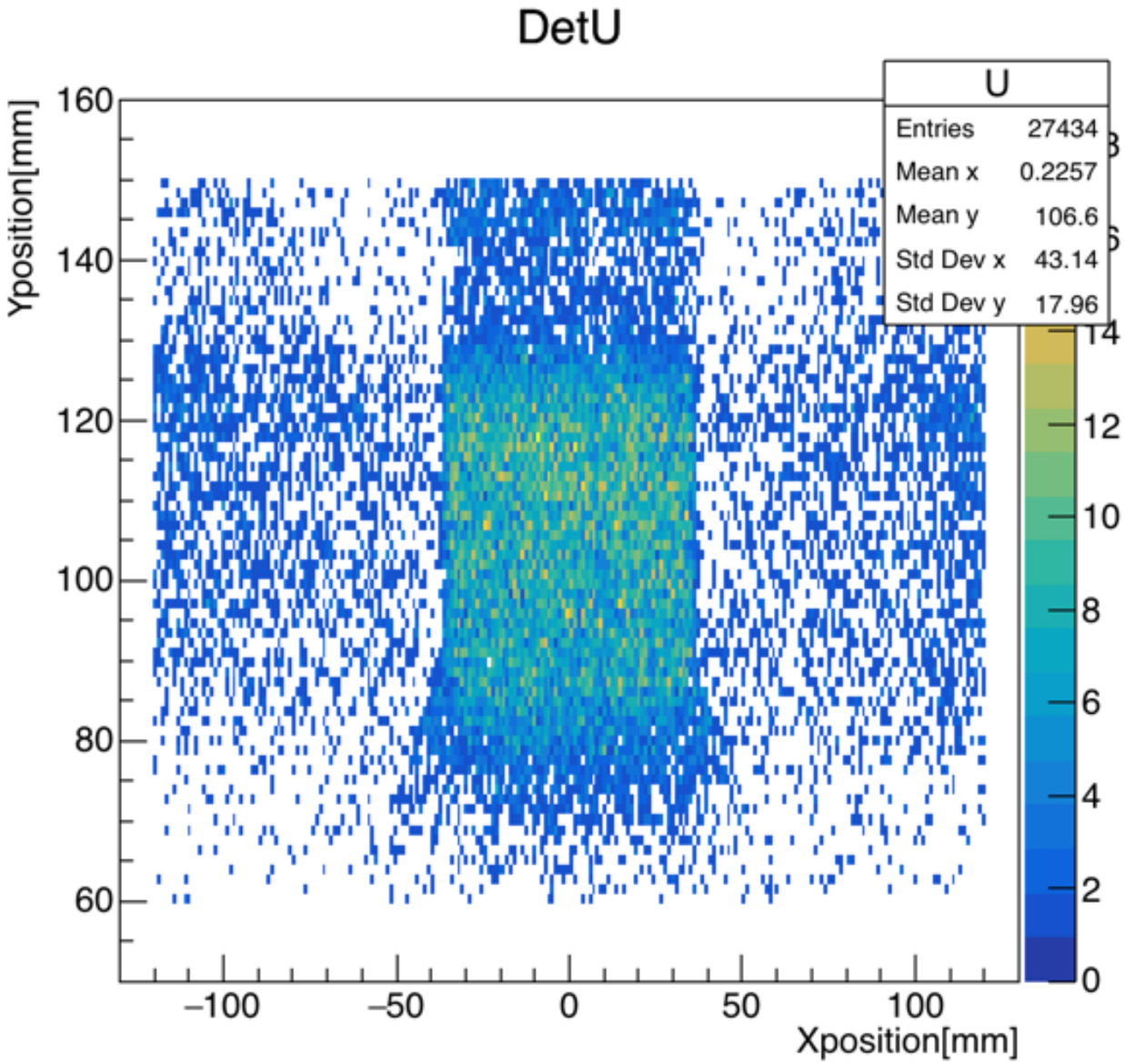
Result_w_vmir

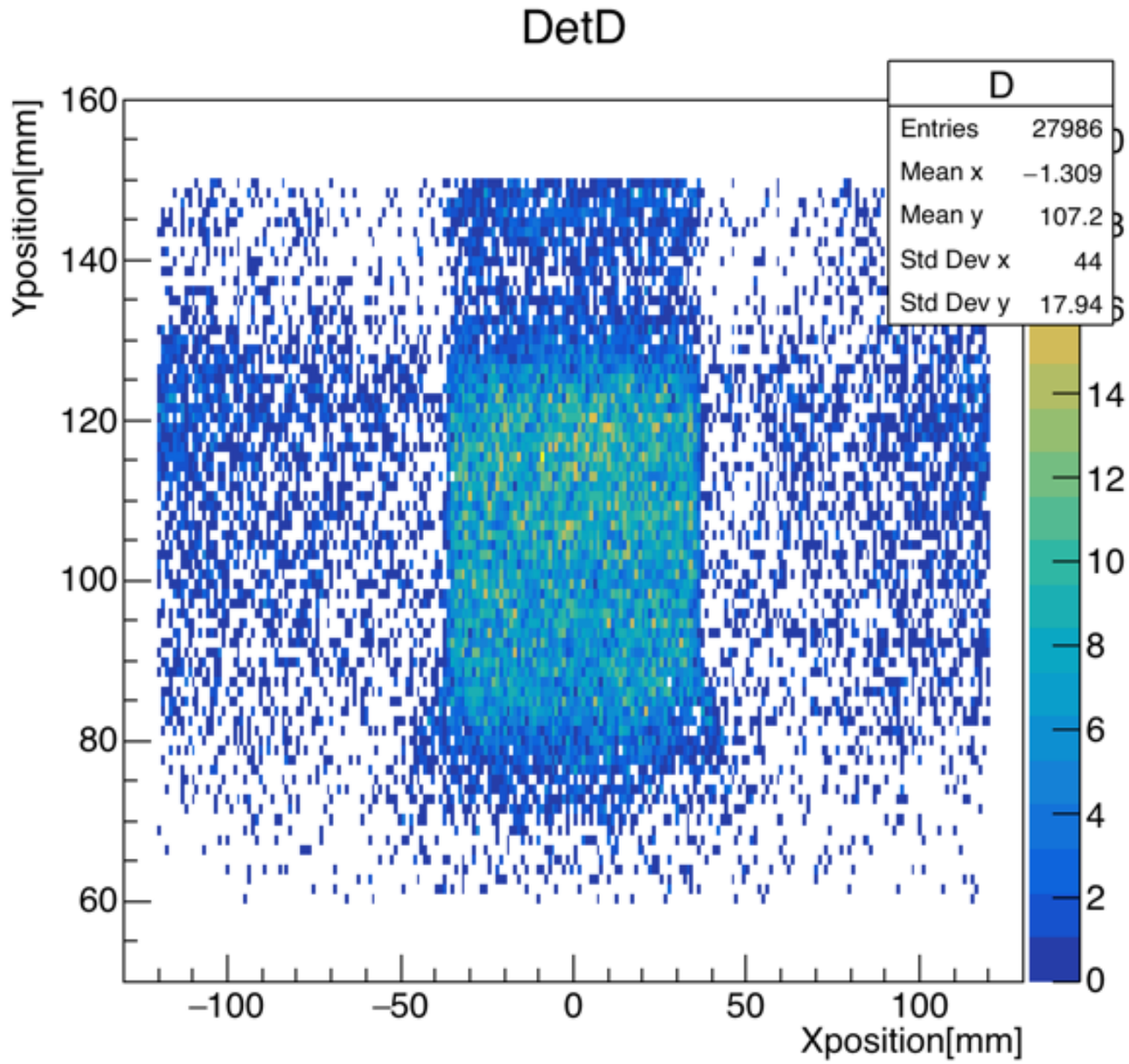




- Double-reflected events appear, as expected.

Result w vmir





- Central room takes most of the hit.