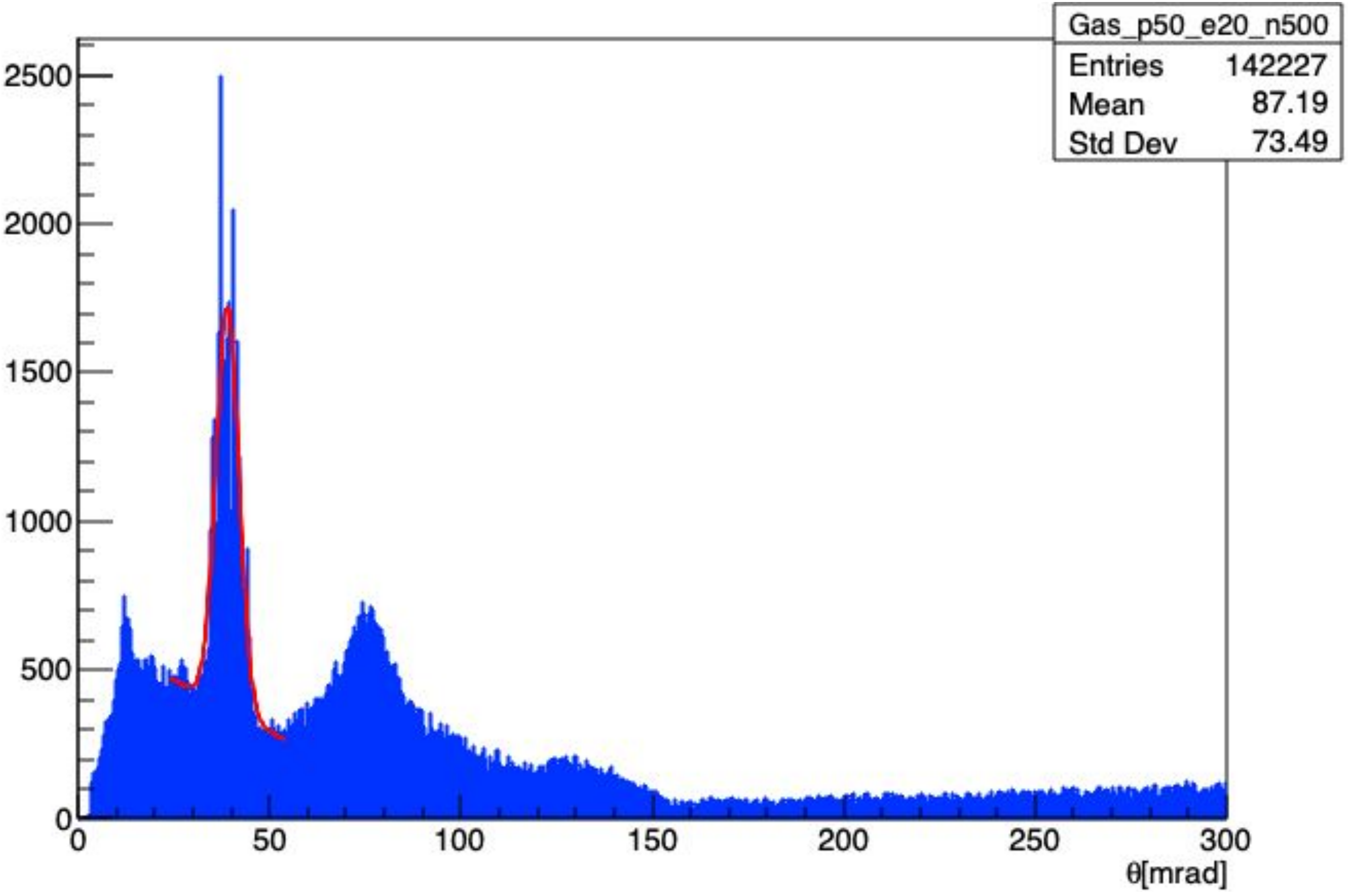
Studies on spe theta distribution with background noise

We are we seeing

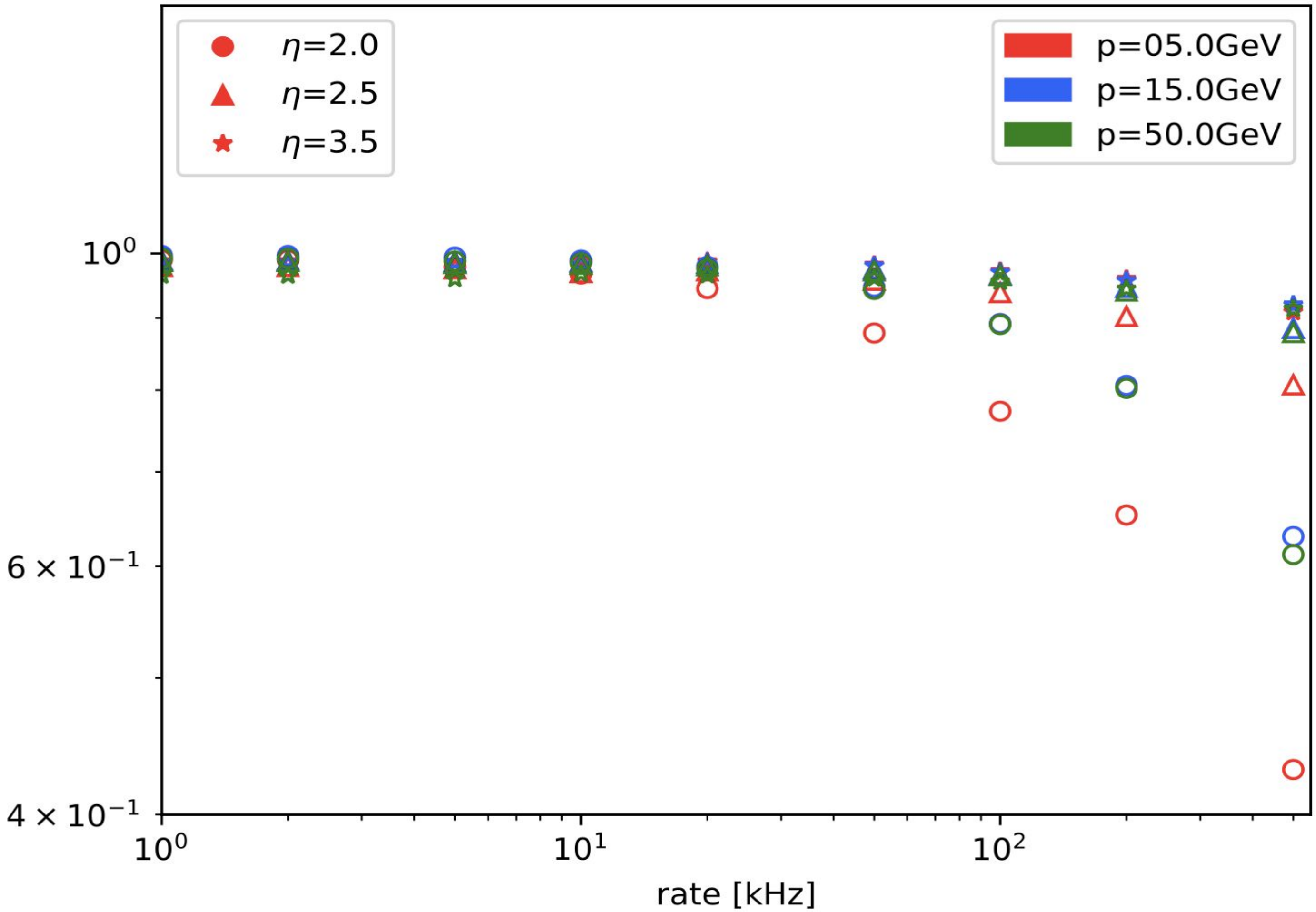
- pi+, 1000 single events
- on different radiators
- changing the noise rate
  - 1; 2; 5; 10; 20; 50; 100; 200; 500 kHz
- the fits were made using a gaussian and a first degree polynomial. The signal its computed subtracting the polynomial from the gaussian

Gas: p=50GeV, η=2.0, rate=500kHz



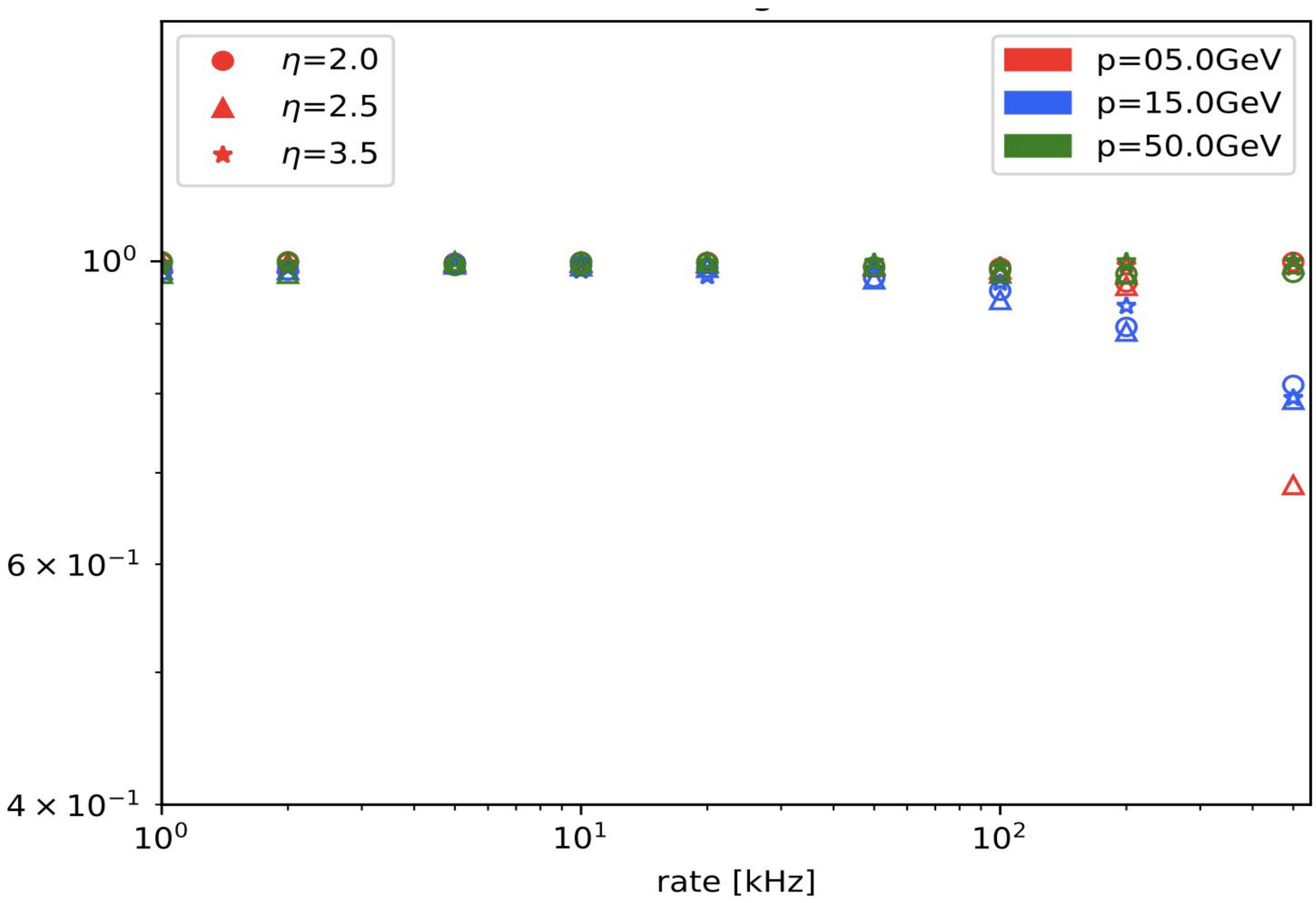
- we can see the polynomial and the gaussian
- why the noise have this shape?

Gas



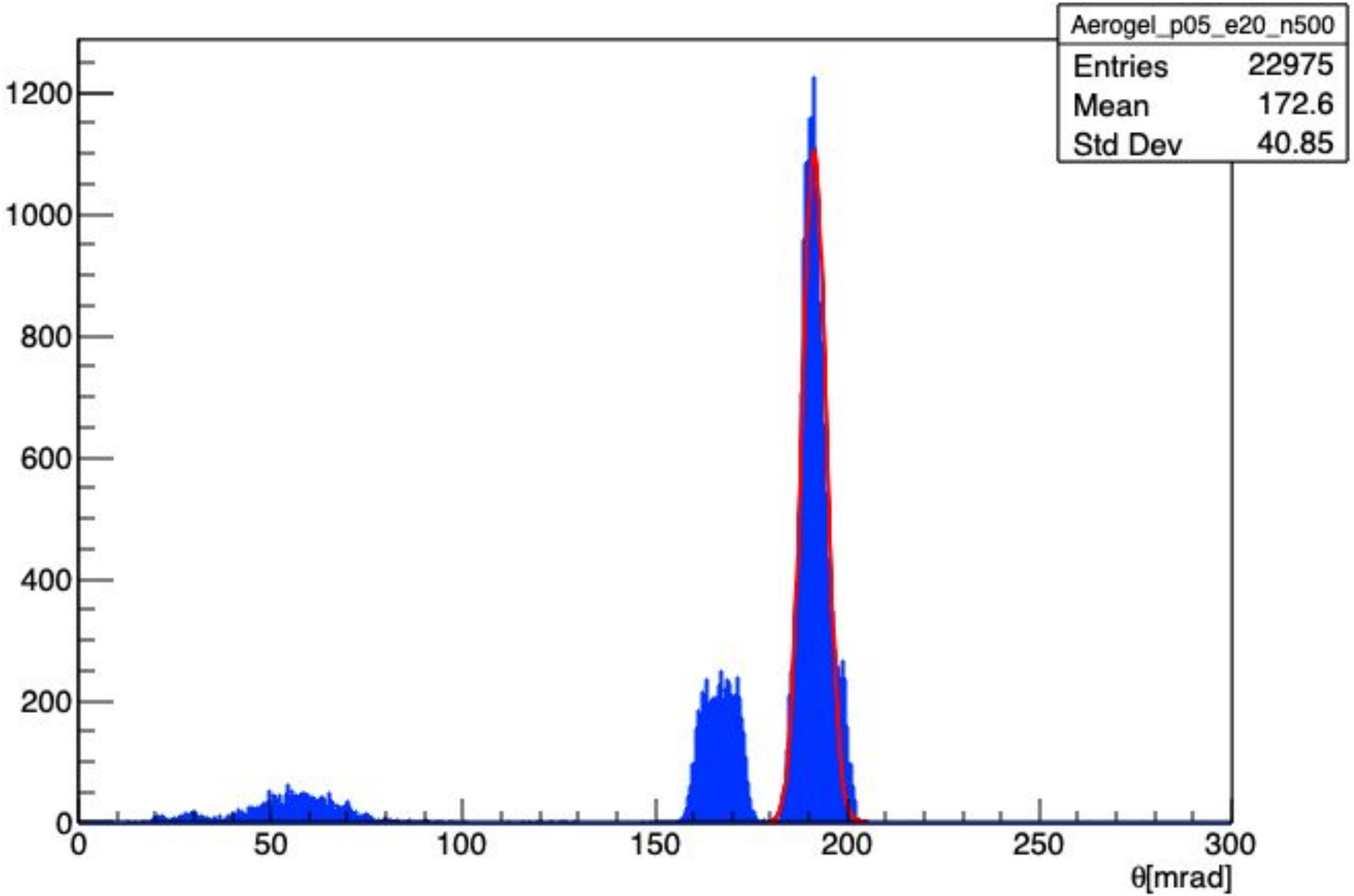
- y=signal/total
- at lower rates we don't see any change
- at higher rates it changes a lot with eta
- we will study with more point (different eta values)

Aerogel



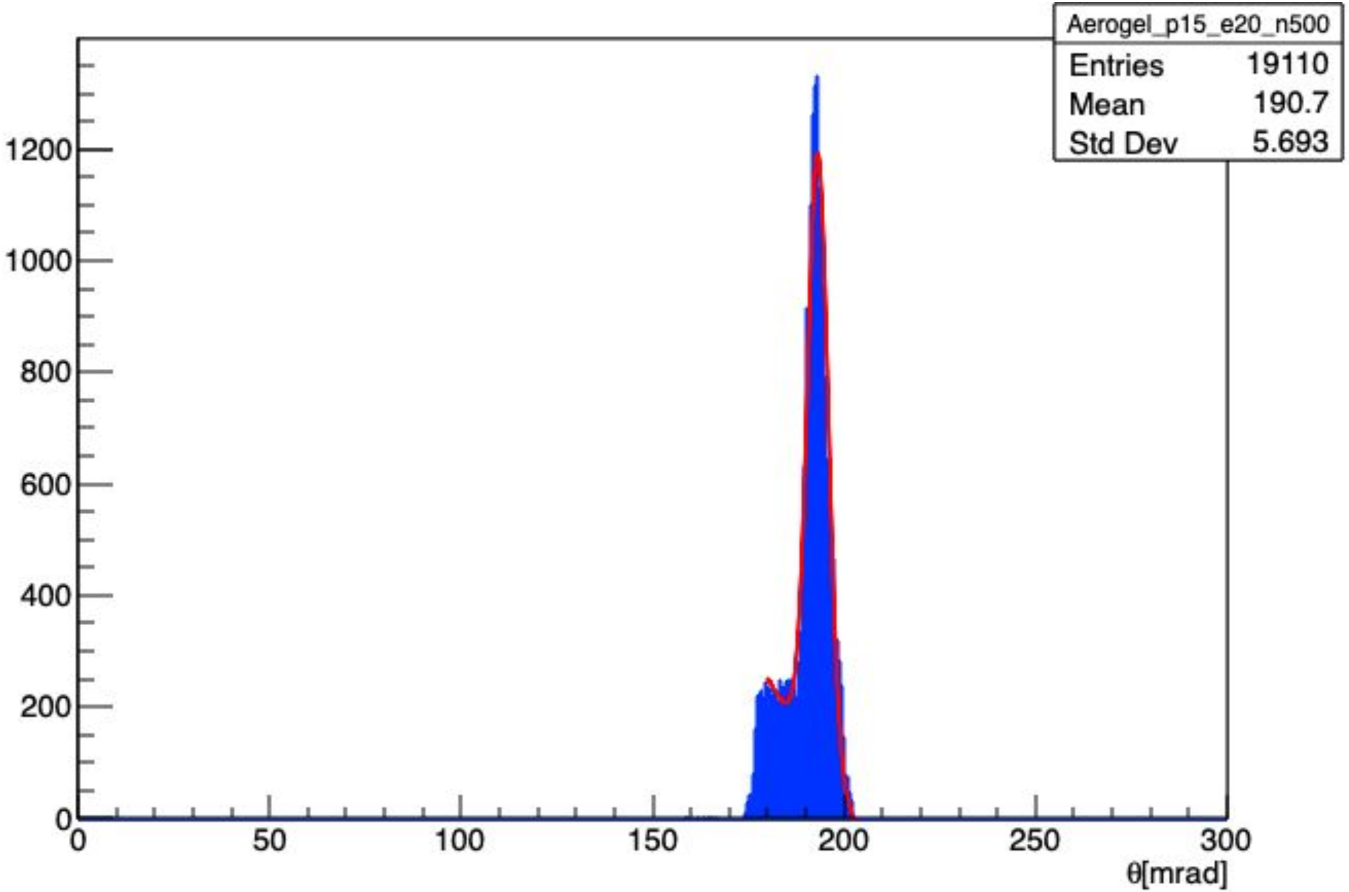
- y=signal/total
- the red triangle its a wrong point, it didn't fit. It will be fixed.
- how can the ratio be constant for 5 and 50 Gevs?

Aerogel, P=5 Gevs, η=2.0, rate= 500kHz



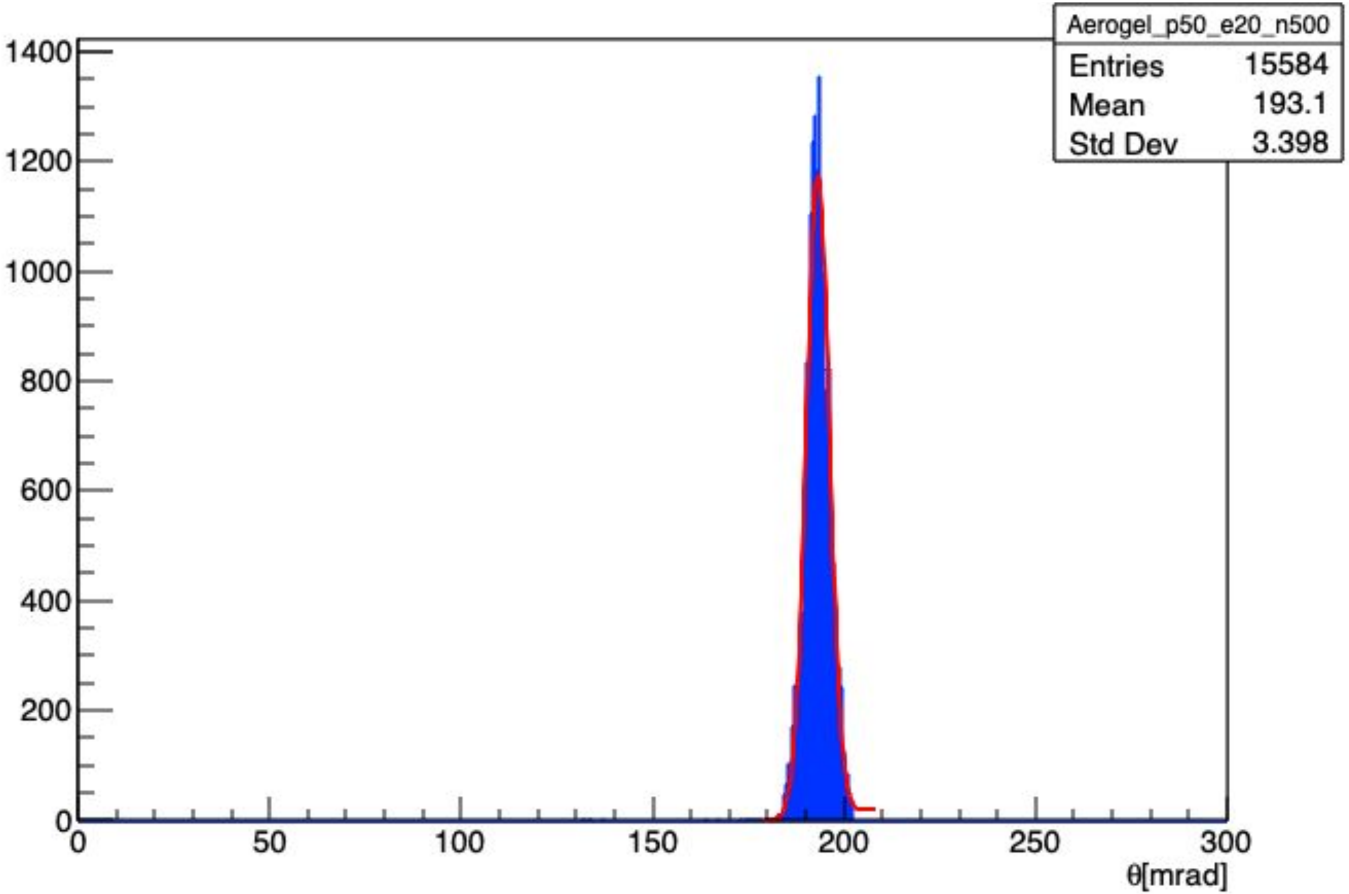
- spe Theta distribution
- the noise have a weird distribution. It’s the same shape with different etas and different rates (this will)

Aerogel, P=15 Gev, η=2.0, rate= 500kHz



- the noise is near the peak at 15GeV and this brings to the plots
- Same thing for different etas, the points at 15 GeV are the same

Aerogel, P=50 Gev, η=2.0, rate= 500kHz



- Again it doesn't find any noise around the peak at 50 GeV this distribution needs to be studied to understand what’s happening here

the noise its produced uniformly on the detector, the reconstruction algorithm it’s creating this distribution

changing the rate we can see that at 50 GeV we have the noise, but it’s under the peak and the polynomial doesn’t find it, but the sigma of the gaussian change (p2)

Aerogel_p50_e20_n005	
Entries	9591
Mean	193.1
Std Dev	2.187
χ^2 / ndf	292.5 / 22
Prob	0
p0	1066 ± 13.8
p1	193.1 ± 0.0
p2	2.067 ± 0.019

Aerogel_p50_e20_n500	
Entries	15584
Mean	193.1
Std Dev	3.398
χ^2 / ndf	469.7 / 32
Prob	0
p0	1164 ± 12.7
p1	193.2 ± 0.0
p2	3.043 ± 0.032

next steps

- check the merged spe distributions
- understand why this distribution