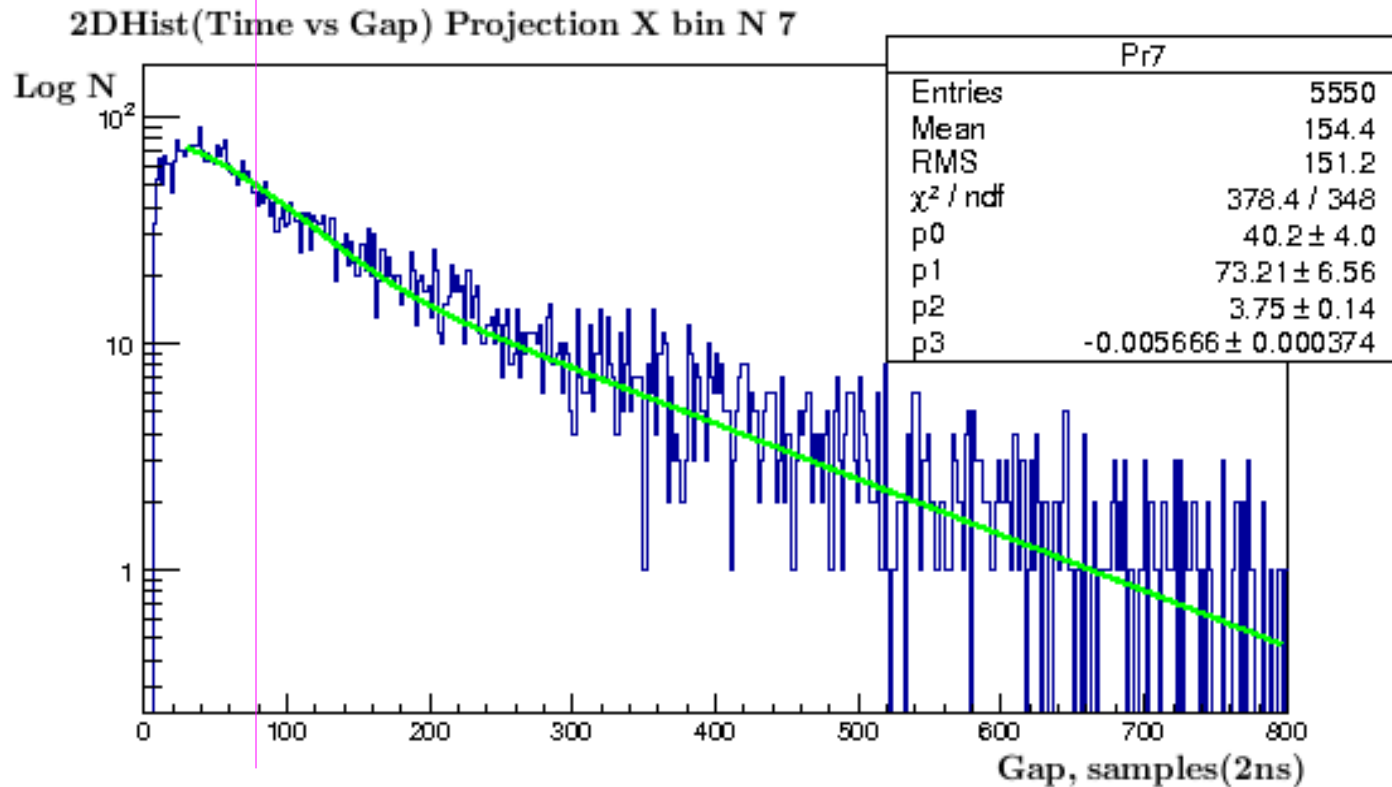


# Garfield simulation for cluster counting PID technique.

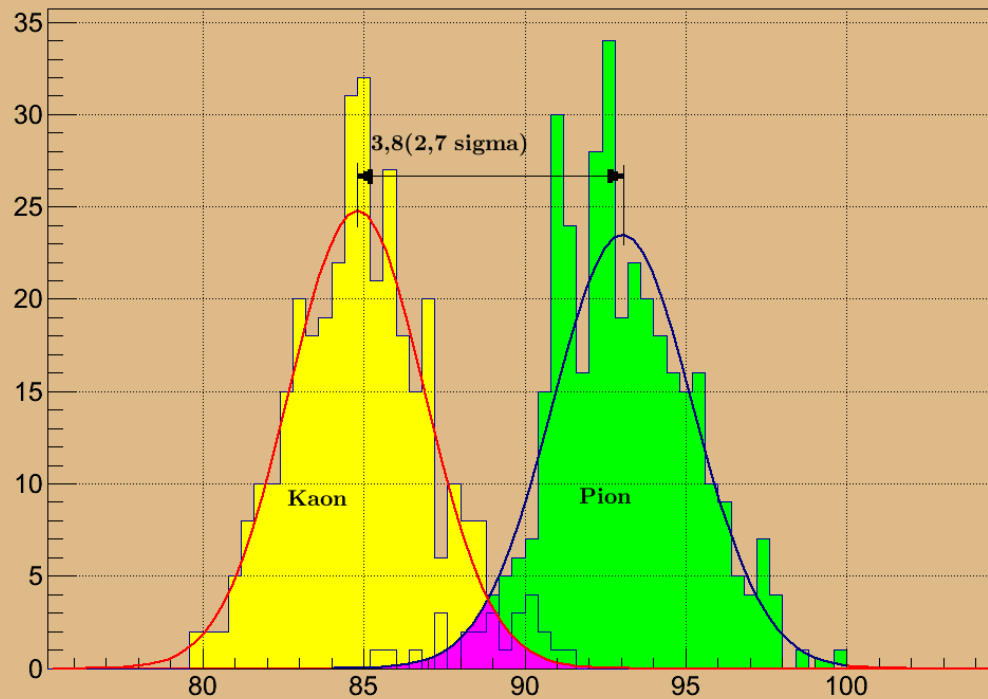
**Vladimir Berdnikov**

- 16 modified FDC chambers
- Ar/CO<sub>2</sub> 40/60 % gas mixture
- HV= 2100V
- Particles : Pions and Kaons
- Momentum range 1-8 GeV/c
- Angle range 1-22 degree
- Threshold 80ns

Threshold

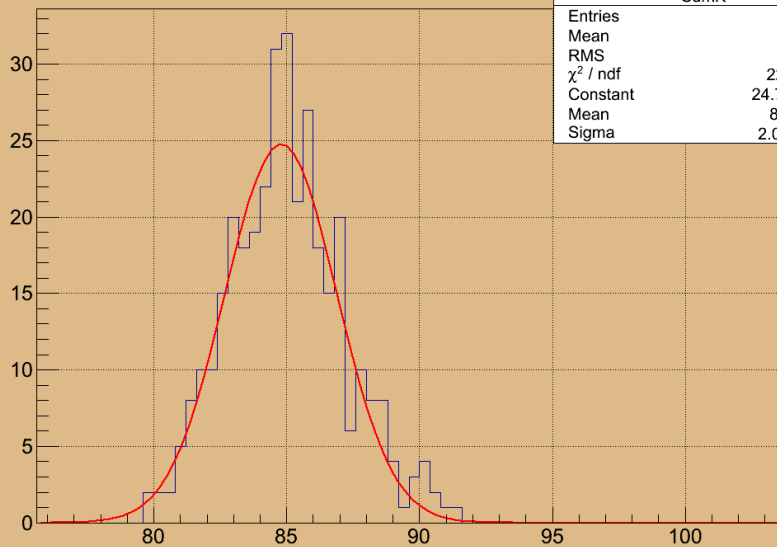


# N of clusters



## kaons

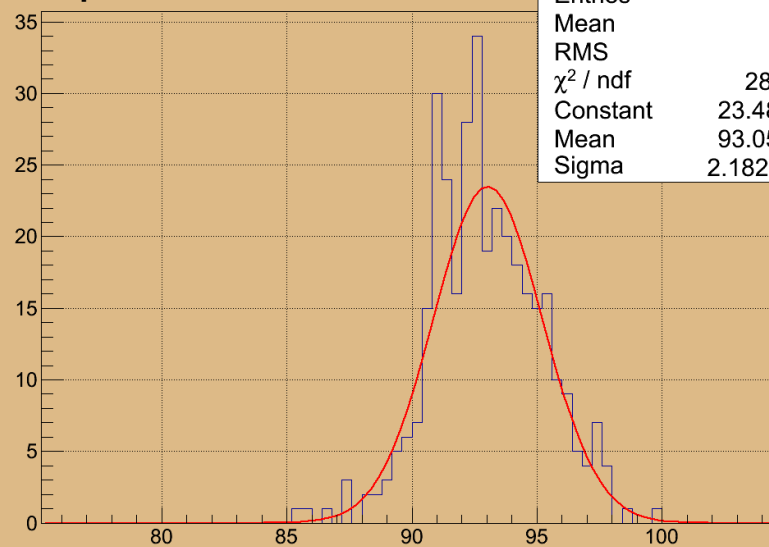
N of clusters



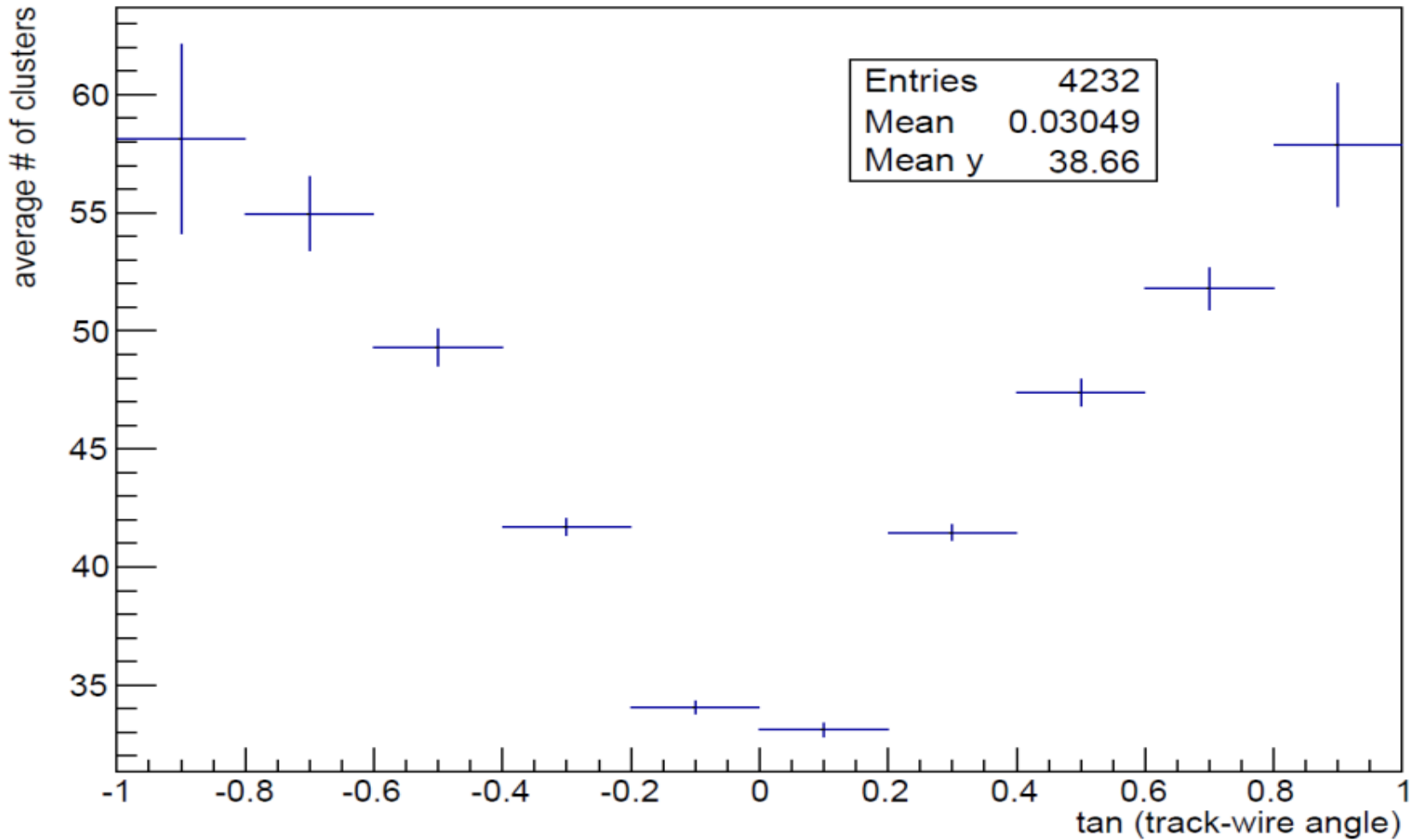
SumK	
Entries	345
Mean	84.99
RMS	2.171
$\chi^2 / \text{ndf}$	22.98 / 27
Constant	$24.75 \pm 1.81$
Mean	$84.8 \pm 0.1$
Sigma	$2.09 \pm 0.10$

## pions

N of clusters

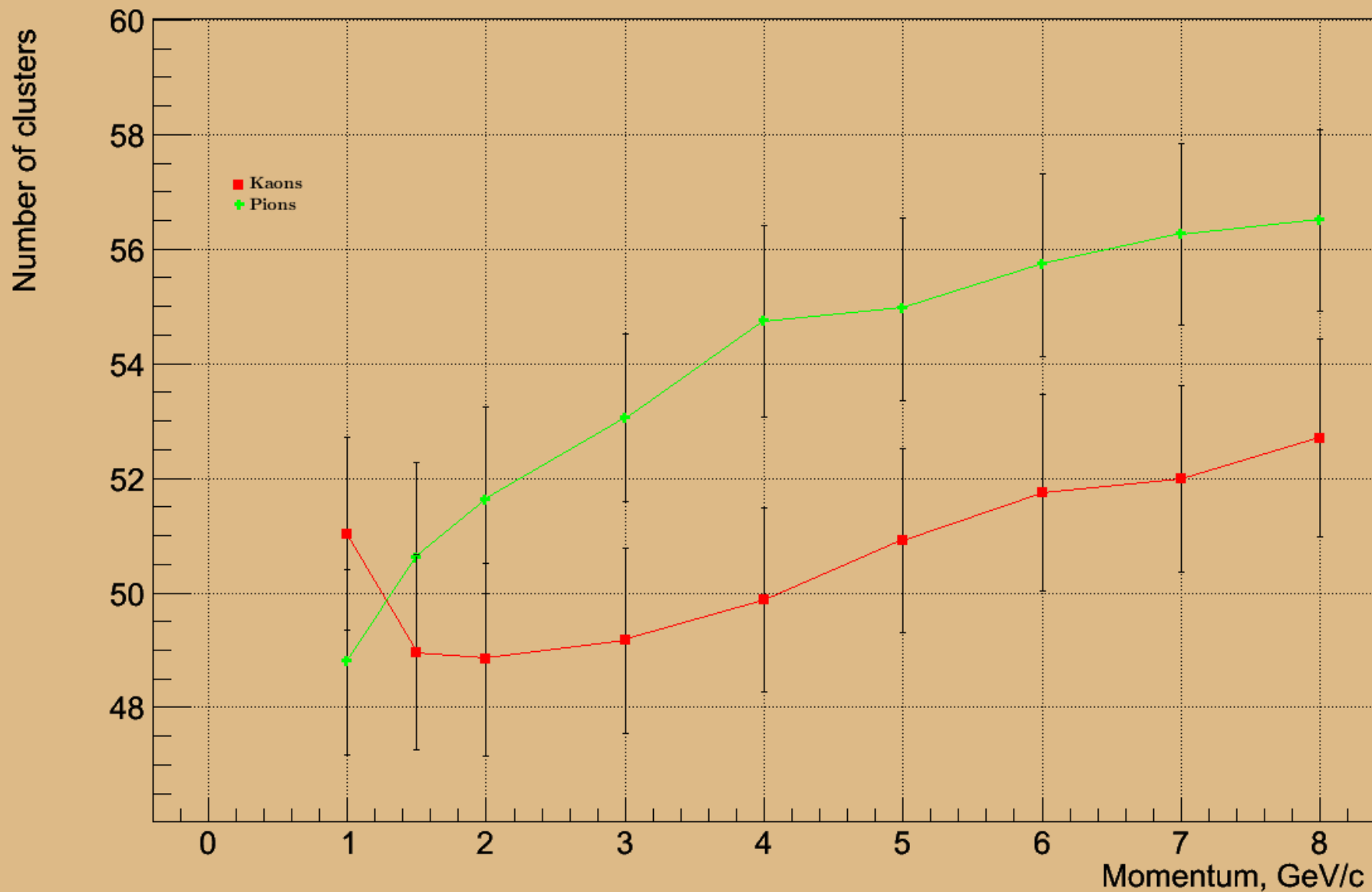


SumPi	
Entries	345
Mean	92.94
RMS	2.227
$\chi^2 / \text{ndf}$	28.58 / 28
Constant	$23.48 \pm 1.75$
Mean	$93.05 \pm 0.13$
Sigma	$2.182 \pm 0.117$



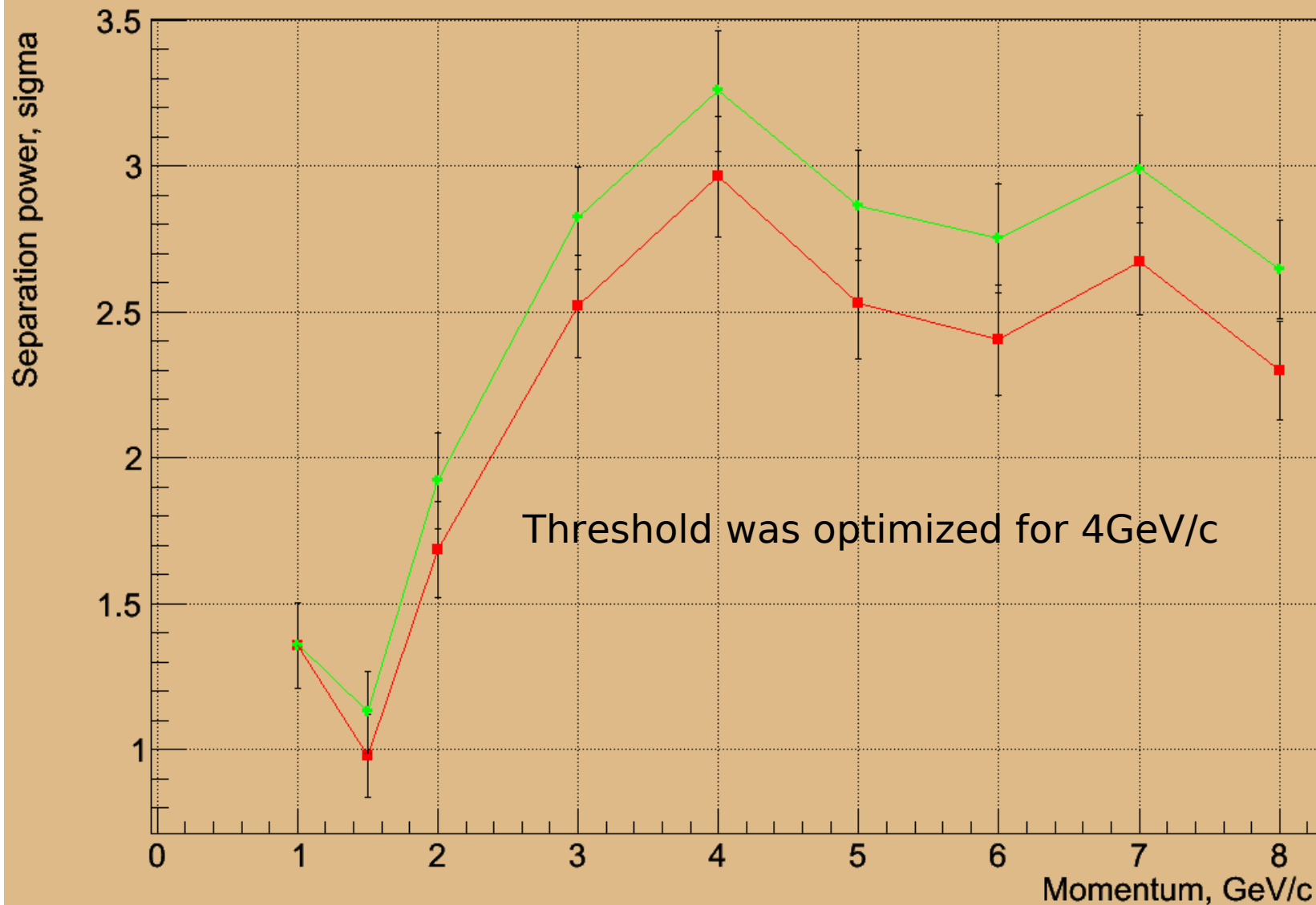
Drop of a **factor of 1.7** at small angles.  
**Can be improved** by optimizing gas mixture.

Number of clusters vs Momentum for Pions and Kaons



Separation power (Pions vs Kaons) vs momentum

—  $dE/dx$  FDC + cluster counting  
— cluster counting



Tables were prepared for angle ranges :

- 1-14.5 degree : two cluster counting packages.
- 14.5-18 degree : one cluster counting package + fractions of the second.
- 18-22 degree : fractions of one cluster counting package.

Numbers didn't include  $\{ 1/ \sqrt{\cos(\text{angle})} \}$  correction for trajectory path inside the chamber.

Future plans :

- 1)Threshold optimization for each momentum.
- 2)Working on prototype cosmic tests : gain calibration, threshold optimization, track reconstruction.
- 3)Discussions with specialists space charge effects and optimizing gas mixture.