Do Kaons Follow Poisson?

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Plan

Why?

How?

What we have got?

What do we plan?

How to get Poisson distribution

- Binomial d. converges to Poisson d. for $n \to \infty$ with np=const
- Particle number within grand canonical ansamble follows Poisson d.

  But is this the case for kaons? Strangeness is strictly conserved, charge-like!

  They should NOT be Poissonians!

Quest Leaders

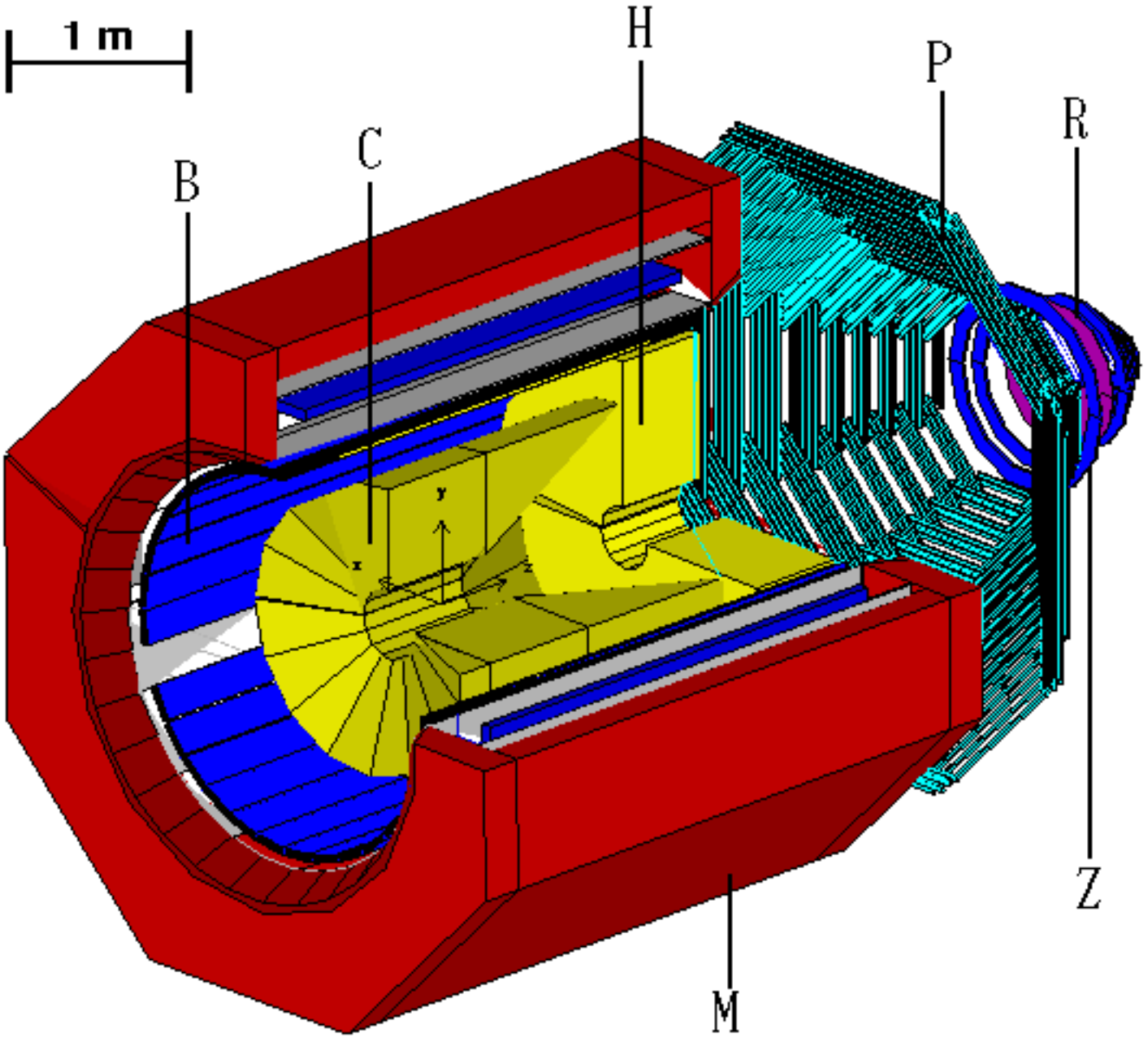
- Nucl. Phys. A 697 (2002) 546-562

  In this paper we [S. Jeon, V. Koch, K. Redlich, and X.-N. Wang] will demonstrate that the fluctuations of rare particles is a very sensitive probe of the degree of equilibration reached in these [heavy ion] collisions.

Scaled Factorial Moment

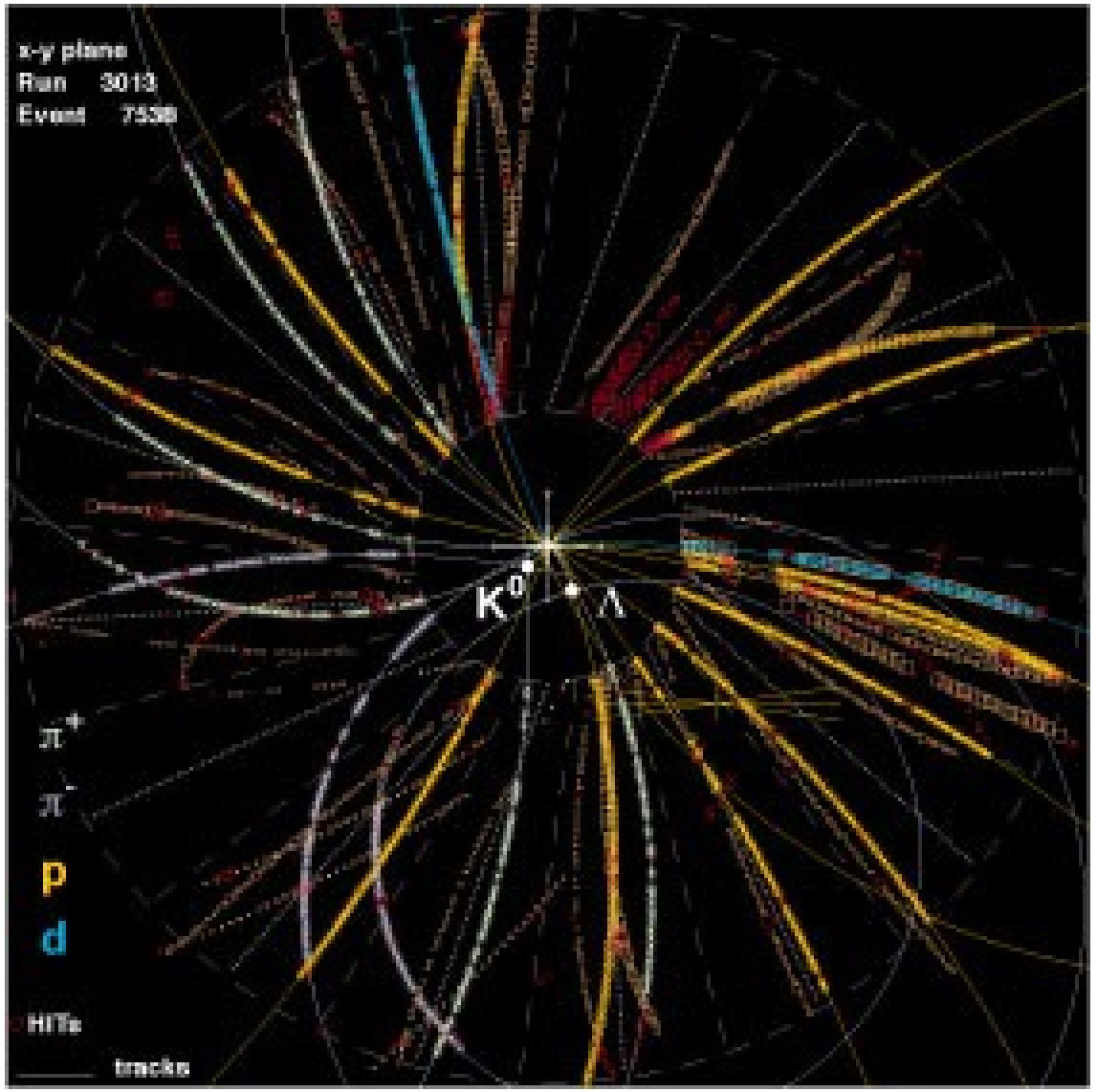
- Definition (rank 2): $$F_2 = \frac{\langle N(N-1) \rangle}{\langle N^2 \rangle}$$
- F_2 (Poisson d.) = 1
- F_2 (chemical equilibrium for ‚charge'-conserving particles) = 1/2
- F_2 (0 or 1) = 0
- F_2 does not change if d. is folded with binomial

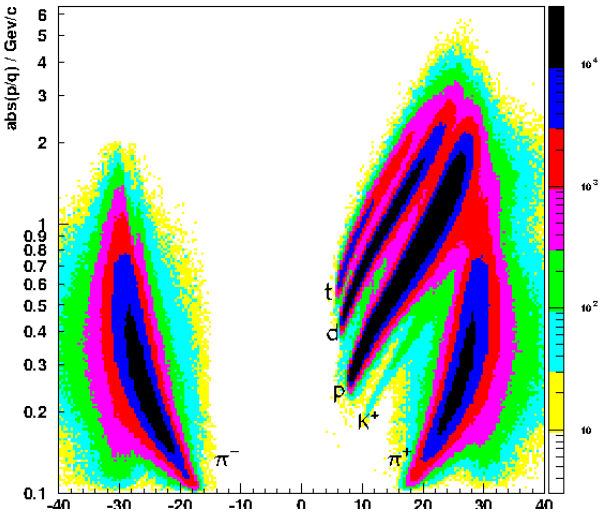
How? FOPI detector

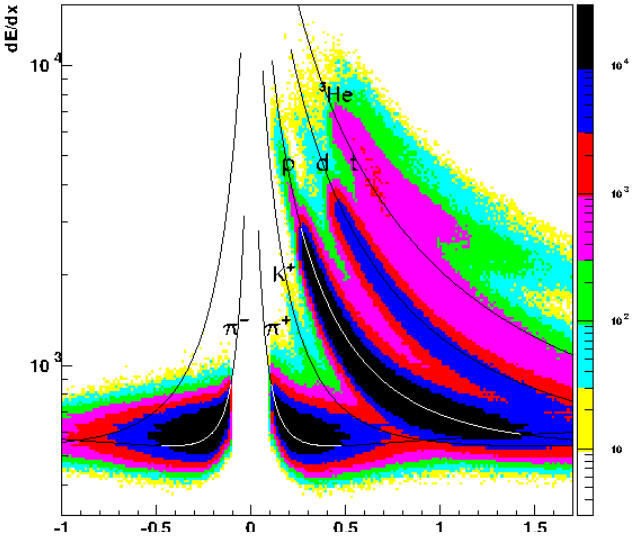


3 weeks of beam
^{56}Ni+^{56}Ni
1.93AGeV
~300 MEvnts

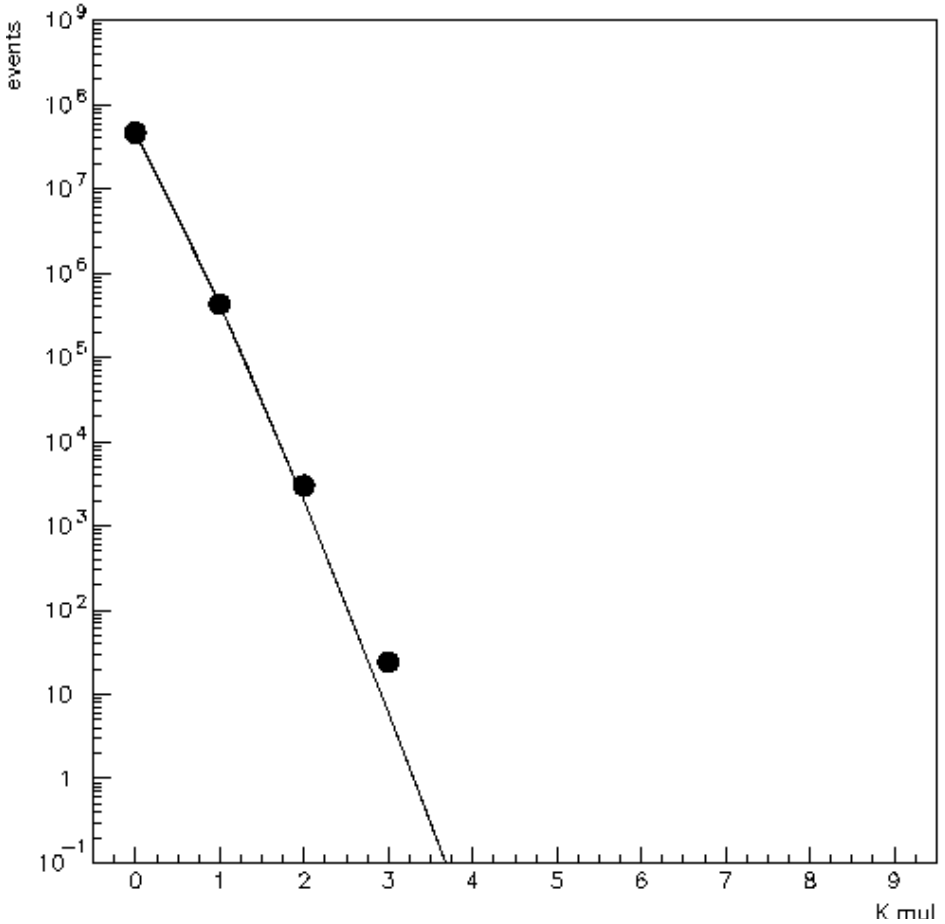
Event, id


x-y plane
Run 3013
Event 7538
K0
Λ
π+
π−
p
d
HITs
tracks


abs(p/q) / Gev/c
π−
t
d
p
K+
π+


dE/dx
3He
p
d
t
K+
π−
π+

What we got...

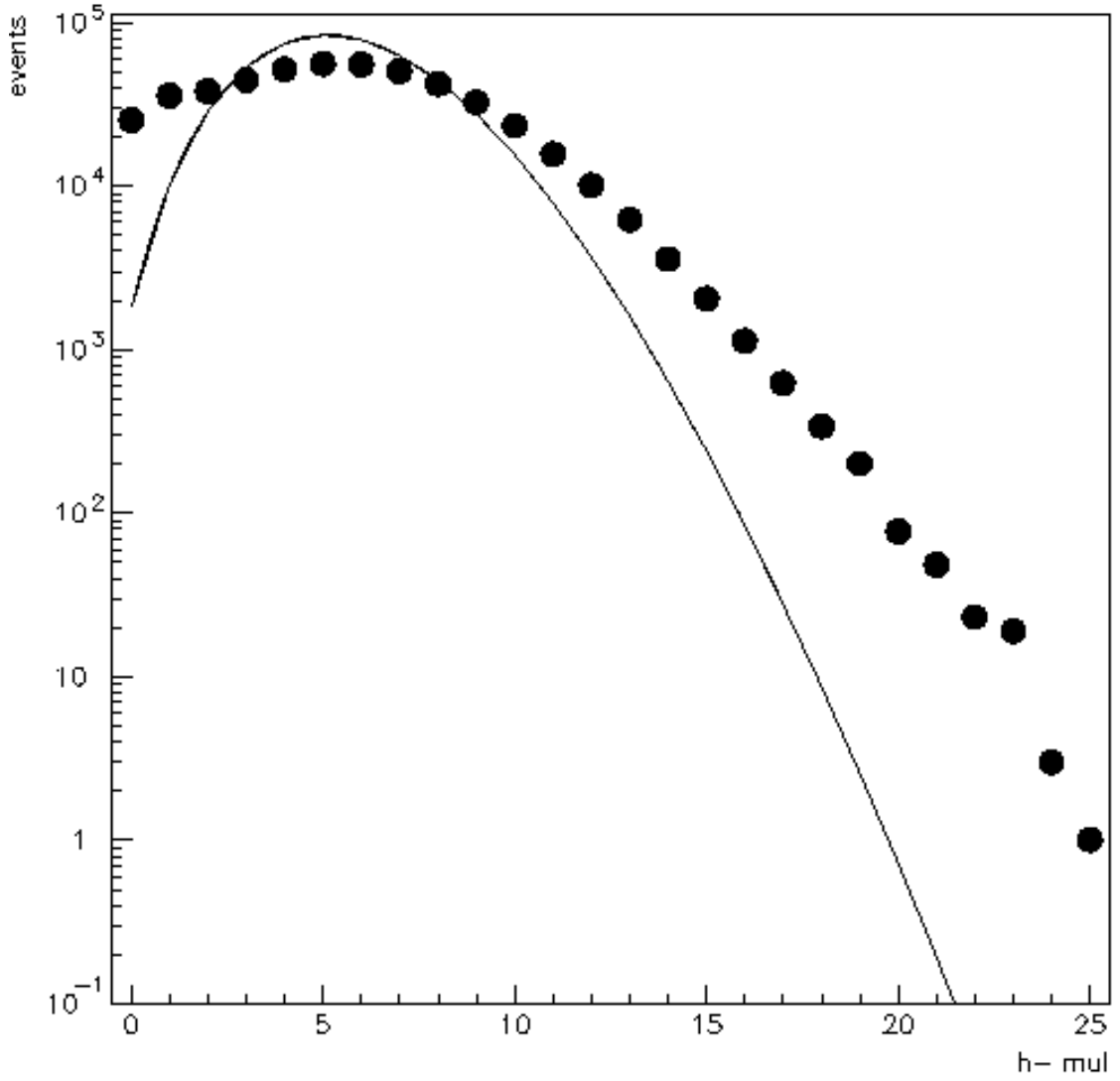


- $F_2 = 1.55 \pm 0.12$

  error estimate: sample split

- F_2 greater then 1 is not good...

Work in progress: h^- case



- Distribution of negative pion multiplicity is wider then Poisson as well...
- Perhaps we have got mixed sources (centralities)

Todo list

- Redo the analysis for the separate centralities
- Try to add K^0s
- Estimate the influence of mis-identified K

Thank you

Danke

Dziękuję

Grazie

Спасибо

Hvala

谢谢

Merci

Dankon

고맙습니다

Gratias

Mulțumesc

Дякую

Köszönöm