

Andrei Bialas and High Energy Hadronic Collisions (especially with Nuclei)

Physics I learned from Andrzej

Limiting fragmentation

The wounded nucleon model (N
participant scaling)

Formation time in hadron nucleus
interactions

Intermittancy



Limiting Fragmentation:



Benecke, Bialas, de Groot,
Phys. Lett. B57, 447

As a function of x , multiplicity distributions are independent of energy in the fragmentation region

Scaling relation was important for cosmic ray physics

Perhaps understood at very high energy:

Projectile scatter off of dark target: all its partons are liberated, so that multiplicity is proportional to quark and gluon distribution functions at saturation momentum of target.

Limiting fragmentation leads to the idea of a wounded nucleon

Wounded Nucleon Model:

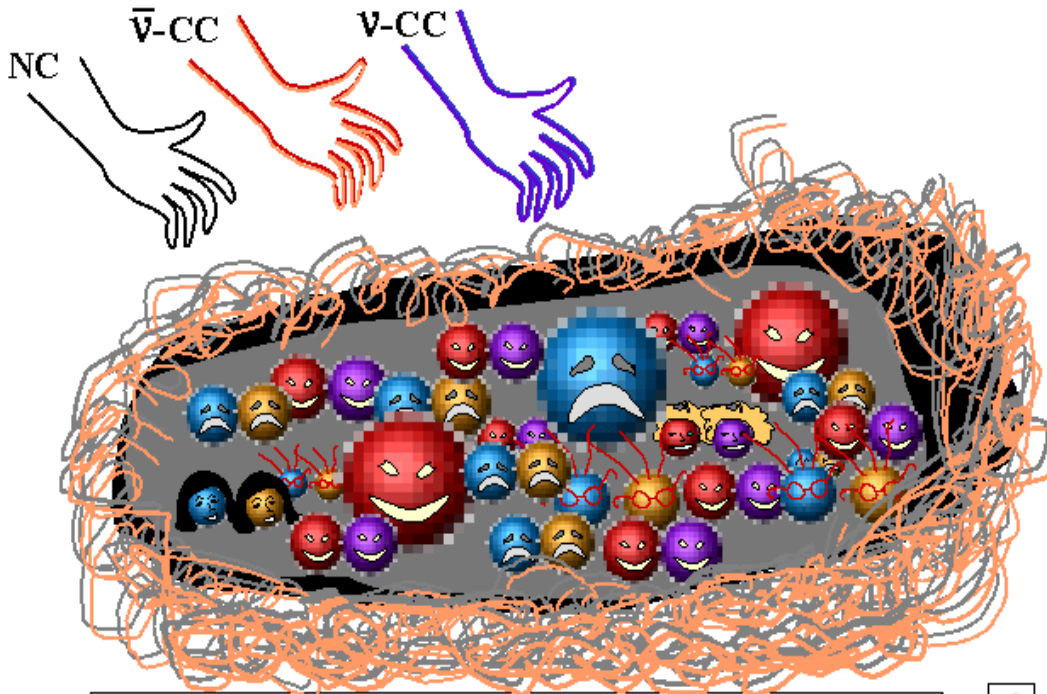
Each struck nucleon in a hadron-nucleus or hadron-hadron collision contributes independently to the multiplicity

N participant scaling, as seen over and over again at RHIC

Bialas, Bleszinski and Czyz, Nuc. Phys. B111, 461 (for nuclei)

Bials, Czyz and Furmanski, Acta. Phys. Polon. B8, 585

Nucleon "Critters"



Simple observation has profound implications for multiplicity distributions

(Perhaps the high energy N participant scaling is understood in color glass, but there is something deeper and more general going on)

Formation Time:



Landau-Pomeranchuk-Migdal effect:

It takes an intrinsic time to radiate a particle.

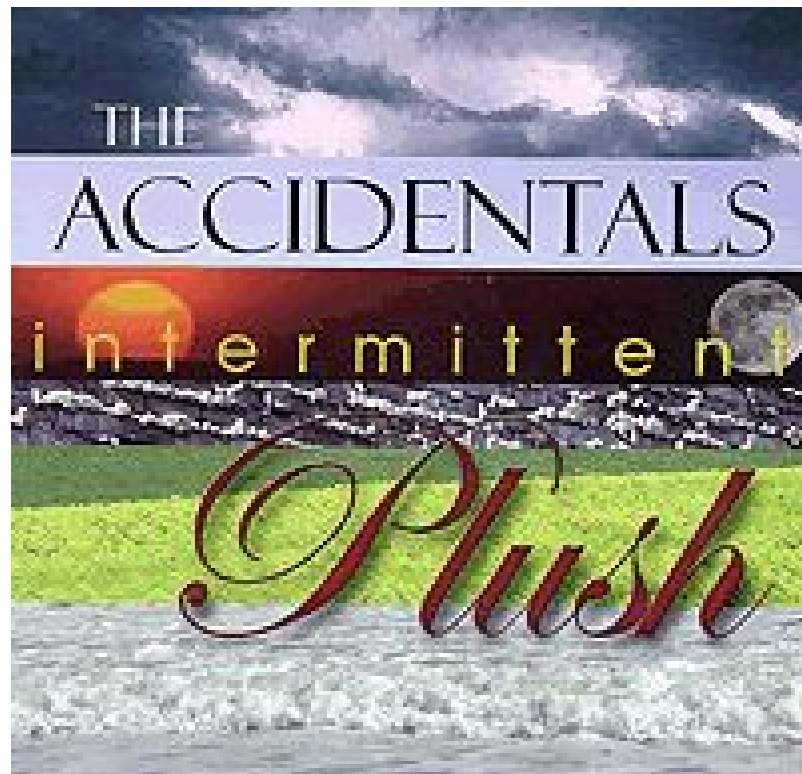
Multiple scatterings during an emission process do not (greatly) increase the multiplicity

Bialas and his group were the first to argue for measurements of this effect in hadron-nucleus collisions

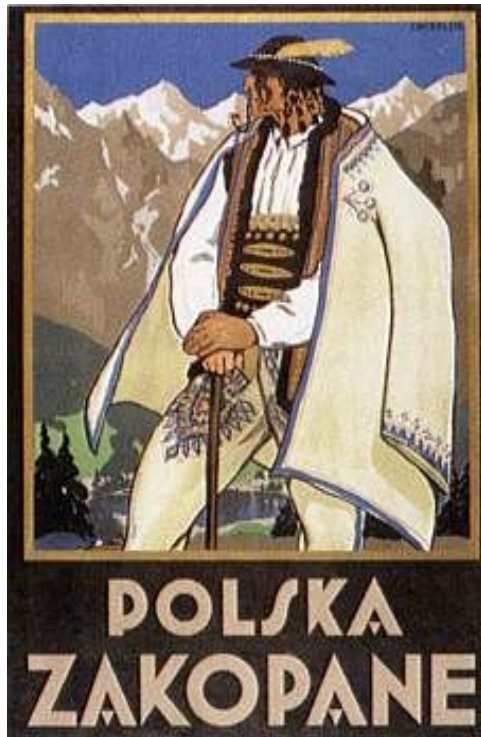
Extremely important for the first pictures of ultra-relativistic nuclear collisions, inside outside cascade, baryon free central region

Intermittency:

Should be a spectrum of fluctuations extending to all scales, similar to that seen in turbulence



Bialas and Peschanski,
Nucl. Phys. B273,
703;
B308, 657



Thanks!
For the
many years
of
Zakopane,
and the
great
friendships I
have made
at this
meeting.

