GDR physics case in Paris simulation software

Michał Ciemała

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GDR measurements are one of the main PARIS goals.

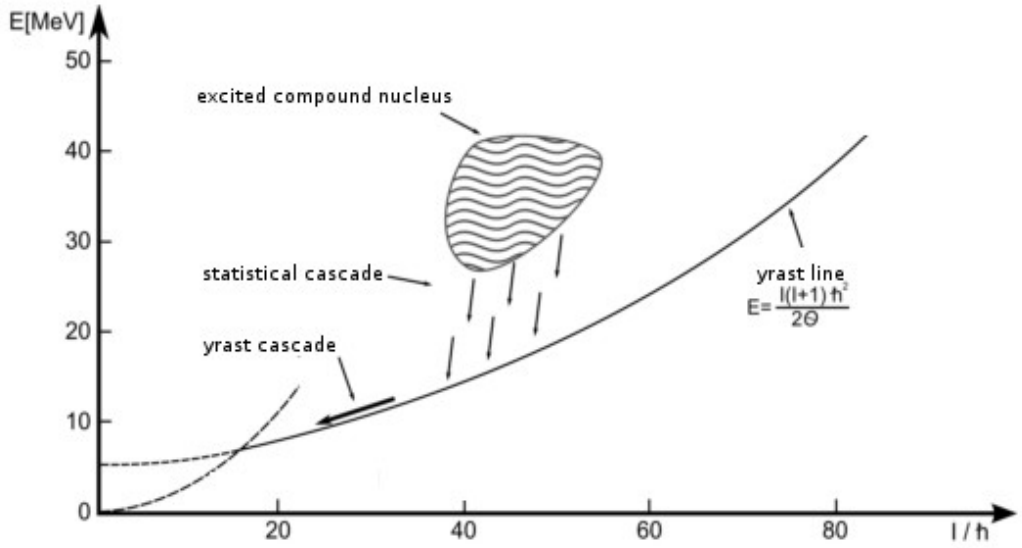
Up to now there was only ParisGDRPrimaryGeneratorAction (not realistic one)

So it was necessary to create new input into Paris simulation software.

How it works?

Monte Carlo CASCADE code → output → creating root tree → input to Paris software

In output of MC CASCADE we obtain:
-spin of compound nucleus, its excitation energy,
-for each step: emitted particle type, its energy, excitation energy left, spin left.



New class (ParisCascadeGenerator) read events from file (root tree) and need information about:
- energy of emitted particle (in CM),
- type of particle (n,p,alpha,gamma,residues),
- A,Z of compound and its energy,

In the class we recalculate energy into LAB, (isotropic distribution).

It was necessary to change output format → PDGcode of particle for each energy deposit.

What is possible?

„Experimental" like simulations of GDR including setting different gates on multiplicity of particles or their energy.

What can be added?

Physics lists are up to now not including interaction of neutrons in matter.
Testing energy loses of particles in the target.

How to use?

Making TTree with makecascadeTree.C in root :

root [0] .L makecascadeTree.C++
root [1] makecascadeTree("input.dat",$number)

The $number should be the maximum number of particles by event

In the input.dat there should be events generated by MC CASCADE

After checking A,Z,E distribution etc.

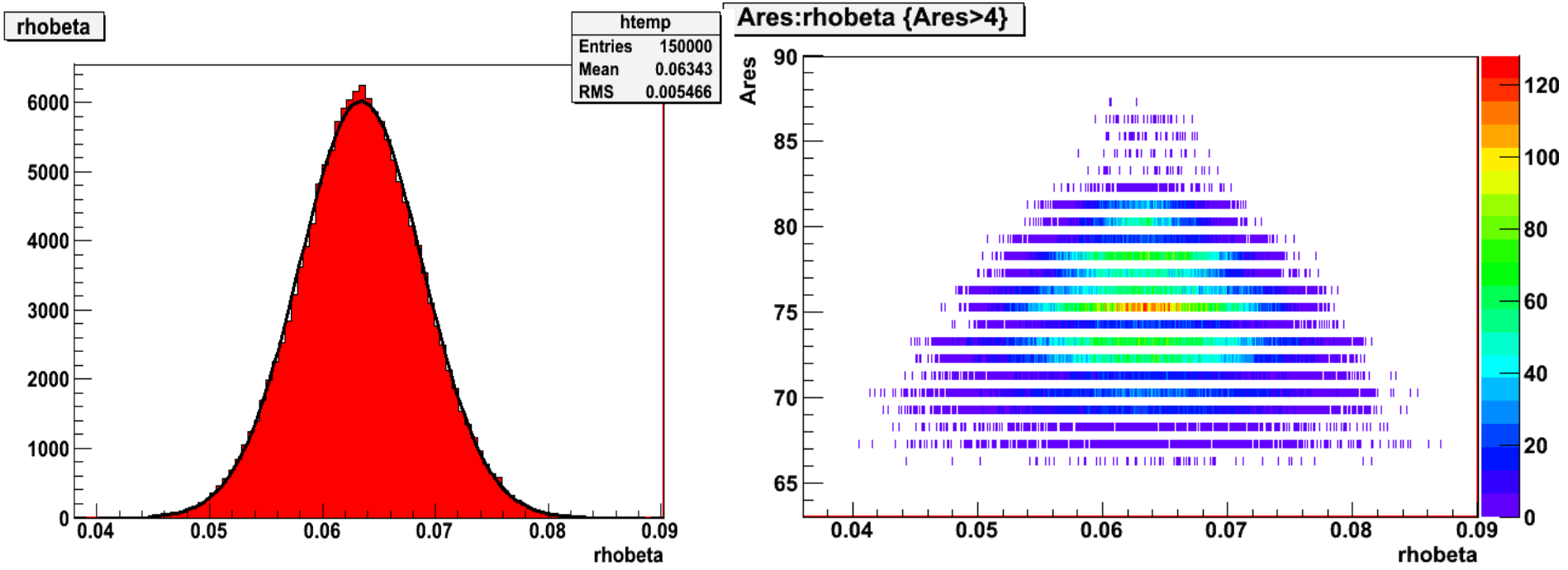
Copy cascade.root into ./setup directory of PARIS.

Choose paris cascade geneator

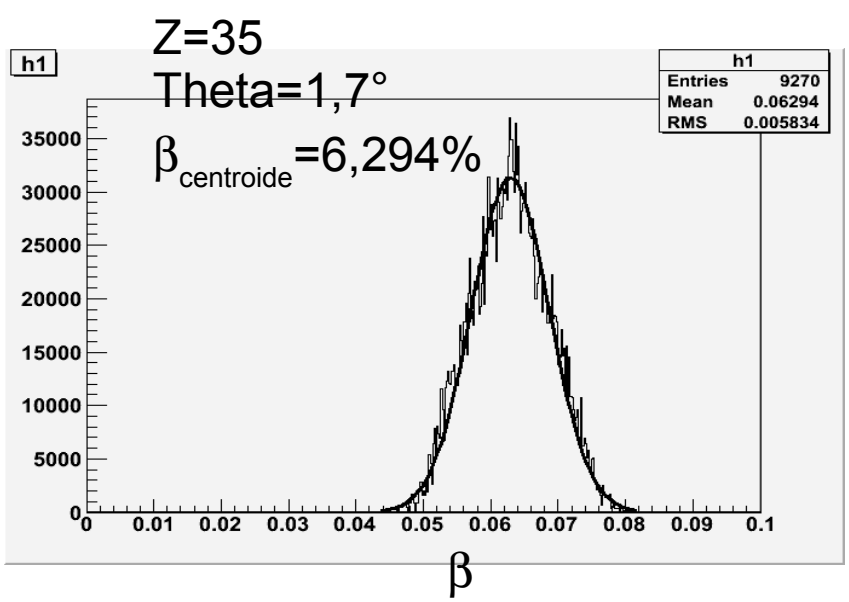
Example:

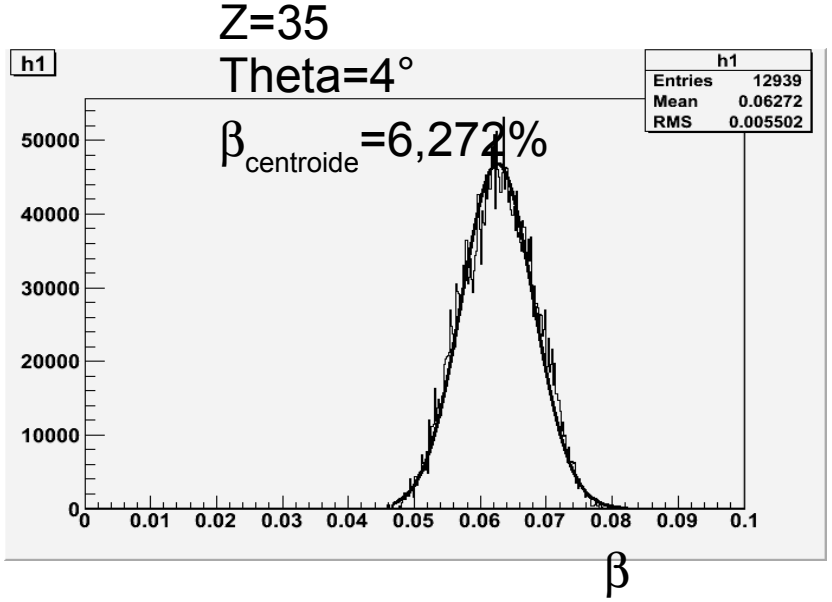
$^{48}Ti + {}^{40}Ca \rightarrow {}^{88}Mo$

E_{beam}=300 MeV, $\beta_{Comp.}$=6,3%

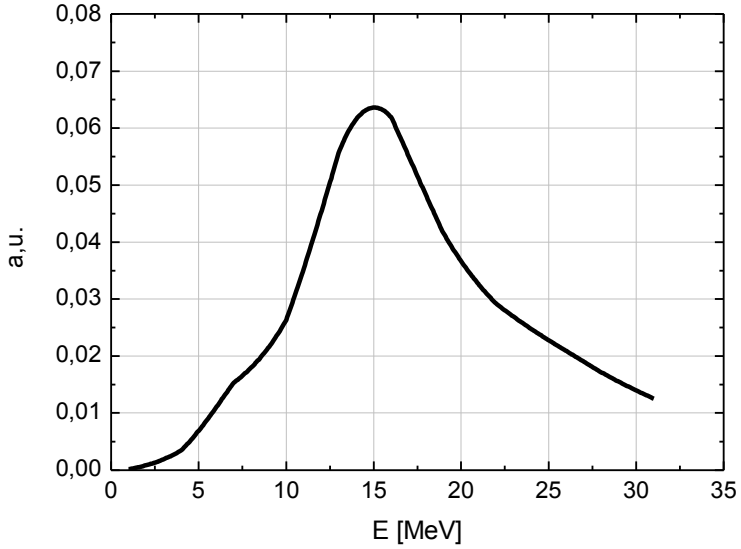


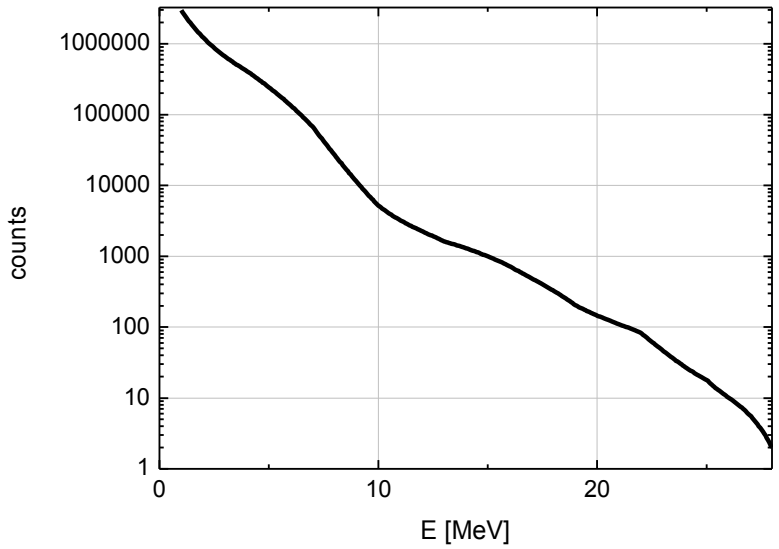
<beta> distribution close to be gaussian, and mean value close to 6,3%
The center of the distribution is not shifted with the mass of the residue, only the width change as it is expected since for heavier residue less particles are emited



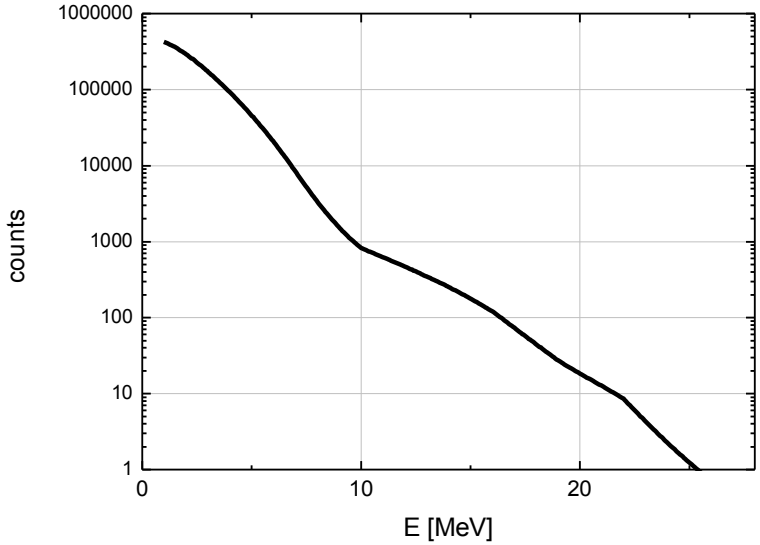


We have really gausian like behaviour for the distribution as expected.
The centoide of the distrisbution is maximum for low angle (close to the coumpound velocity β=6,3%) .





Linescape of GDR on the top, energy deposited in paris below



Thank you for your attention.