

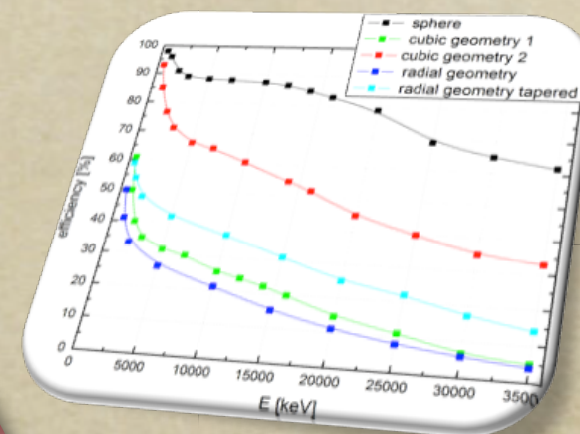
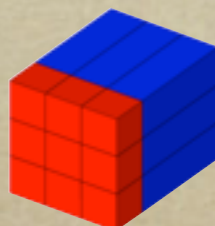
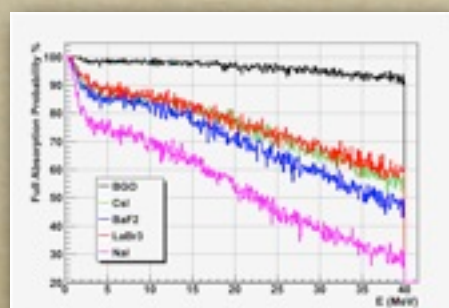
Simulation Working Group

Status and Perspectives

O. Stézowski - Bormio - 02/2012



Simulation in Paris : **uses**

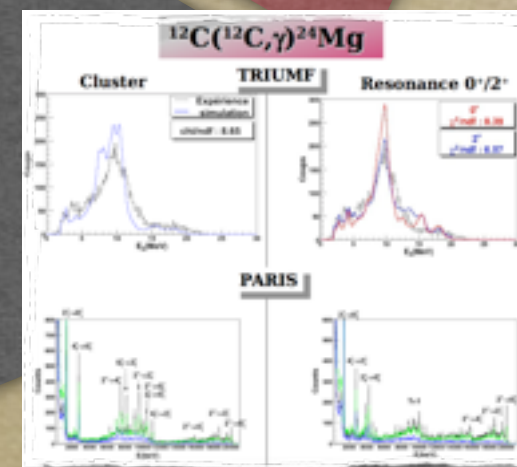


*Detector
design*

*Response
function*


Geant 4

*Real
experiments*





Simulation in Paris : **uses**



- Test new ideas/concepts
- Complex setup

*Detector
design*

- global performances
- reconstruction algorithms
 - PARIS : clusterisation
 - $\sum e_i, M_\gamma \rightarrow \sum e_i, I$
 - GDR spectrum
 - $\{e_i\}$ discrete spectro.

*Re
fu*


Geant 4

- to optimise setups (ancillaries)
- to prepare 'real' experiments
- to study physics generators



Simulation in Paris : *need*



- Required G4:Sources
- Required to control in G4 interactions particles/matter
- ...

ector
sign

Re
fu

- Required to extract from G4 output of the detector
→ ROOT
- To 'easily' build arrays ...
- ...



- Physics generators !
in/out Geant4
- built easily various setup
- run 'real' experiment (out/stats)

} future developments in PARIS/G4



Simulation in Paris : **done**



- efficiency ✓
- Cells 2" ✓
- Cluster of PW :
reasonable angular precision ✓
- ...

ector
sign

- efficiency @ $M_\gamma = 1$
- reconstruction algorithms
basic ones used
preliminary studies on more
- ...

Re
fu



- Mainly Physics generator
- DRAGON versus PARIS



Simulation in Paris : **new**



✓ *Second party of this talk*

- neutrons
- optical photons
i.e. signal generation

✓ *Marc's talk*

"What gamma-ray array for GASPARD ?"

✓ *Mateusz's talk*

"Simulations of Possible Application of Recoil Filter Detector in Nuclear Structure's Studies with Radioactive Beams"

✓ *Michal's talk*

"Monte-Carlo CASCADE based event generator of fusion-evaporation reactions for GEANT4 software"

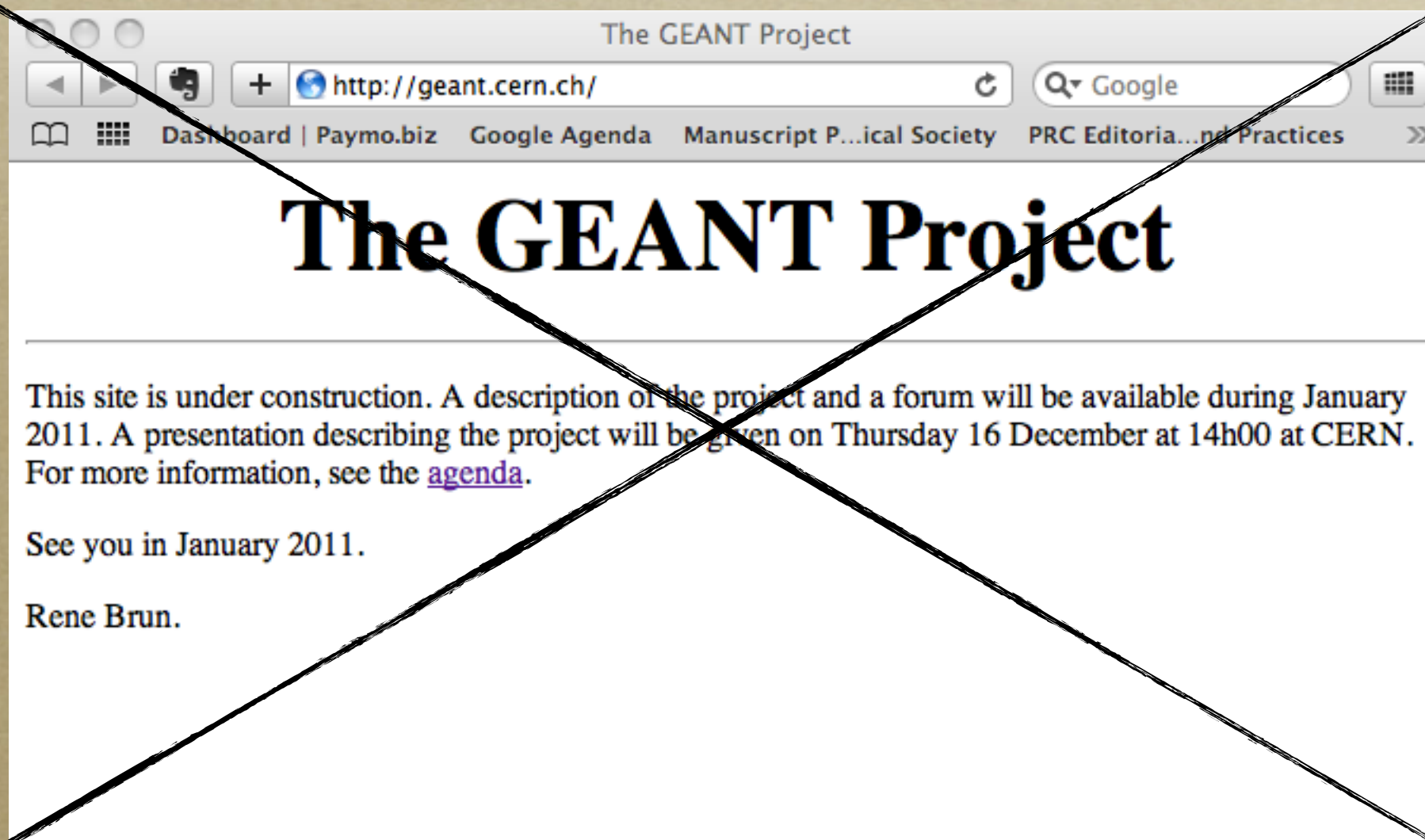

Geant 4



Paris G4 package



Situation one year ago ... wait for :





Paris G4 package



Two major modifications in Geant4 :

- *new building system (cmake)*
- *new approach of the physics lists*

➡ *porting cmake almost done, old building system still operational*
[new directory (csrc) in svn]

➡ *porting physics lists done, except for ions*

➡ *new possibilities added*

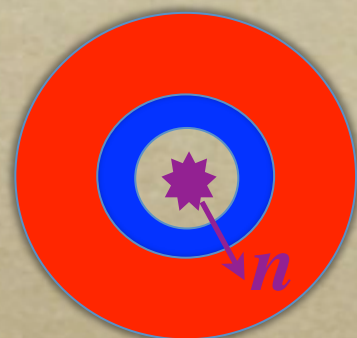
GPS, G4 general source facility, added ➡ neutrons

Optical Photons

(generation, collection, coincidence with n , γ in TTree)



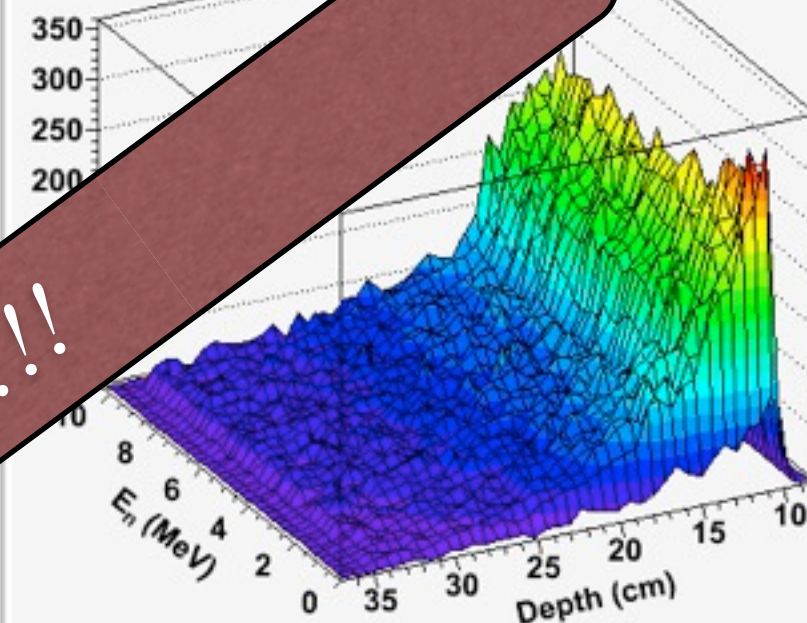
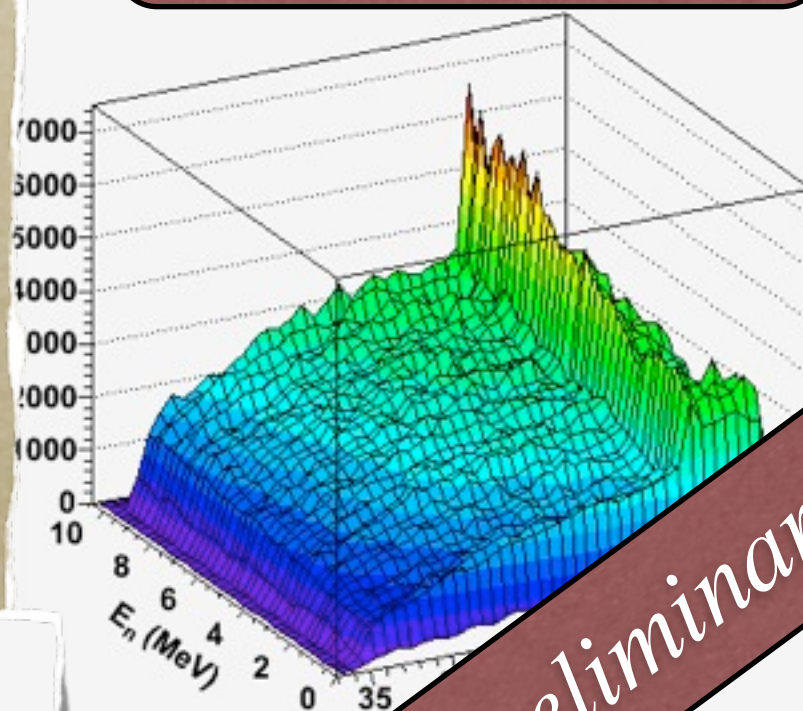
Neutrons in Paris



all interaction points

first interaction point

of hits

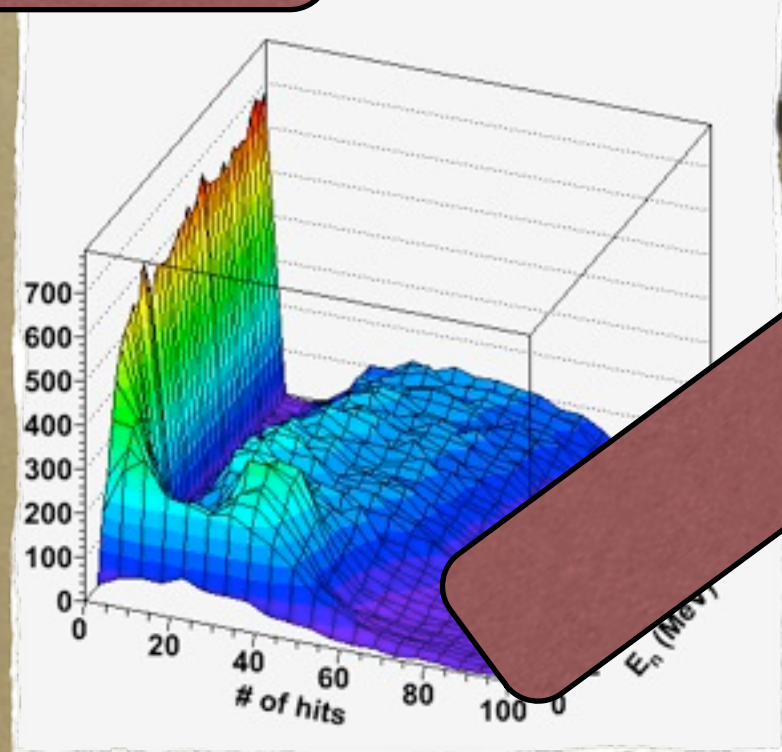


Very preliminary !!!

Has to be checked carefully ...

➡ *Tests to come important !*

➡ *Paris package ready*



Note : last versions of G4 supposed to be better for neutrons

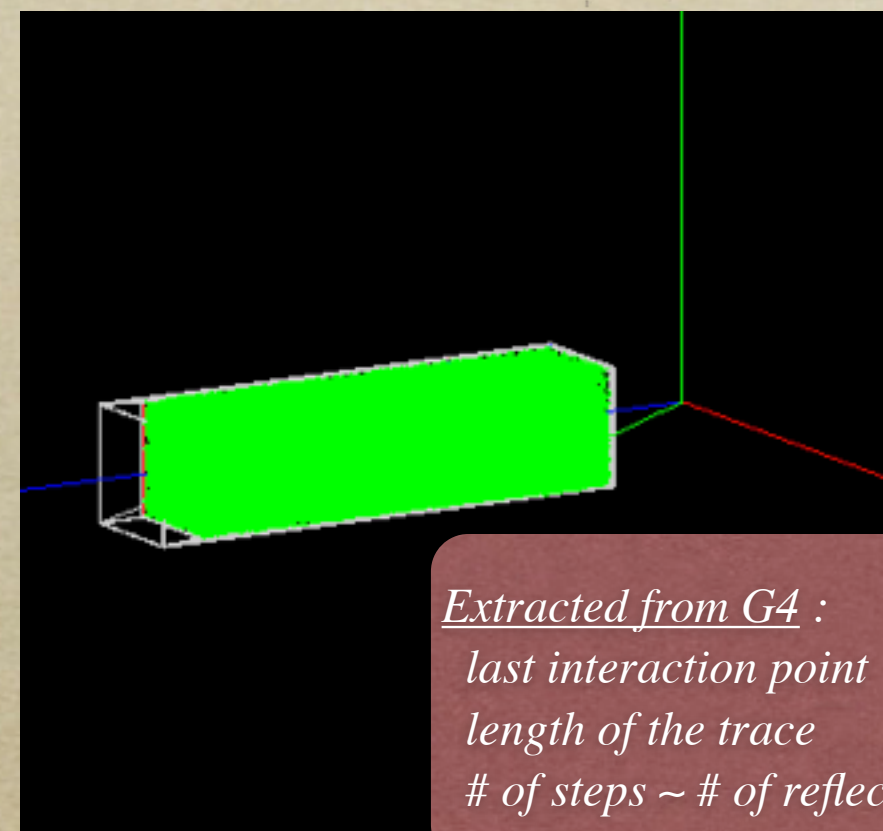
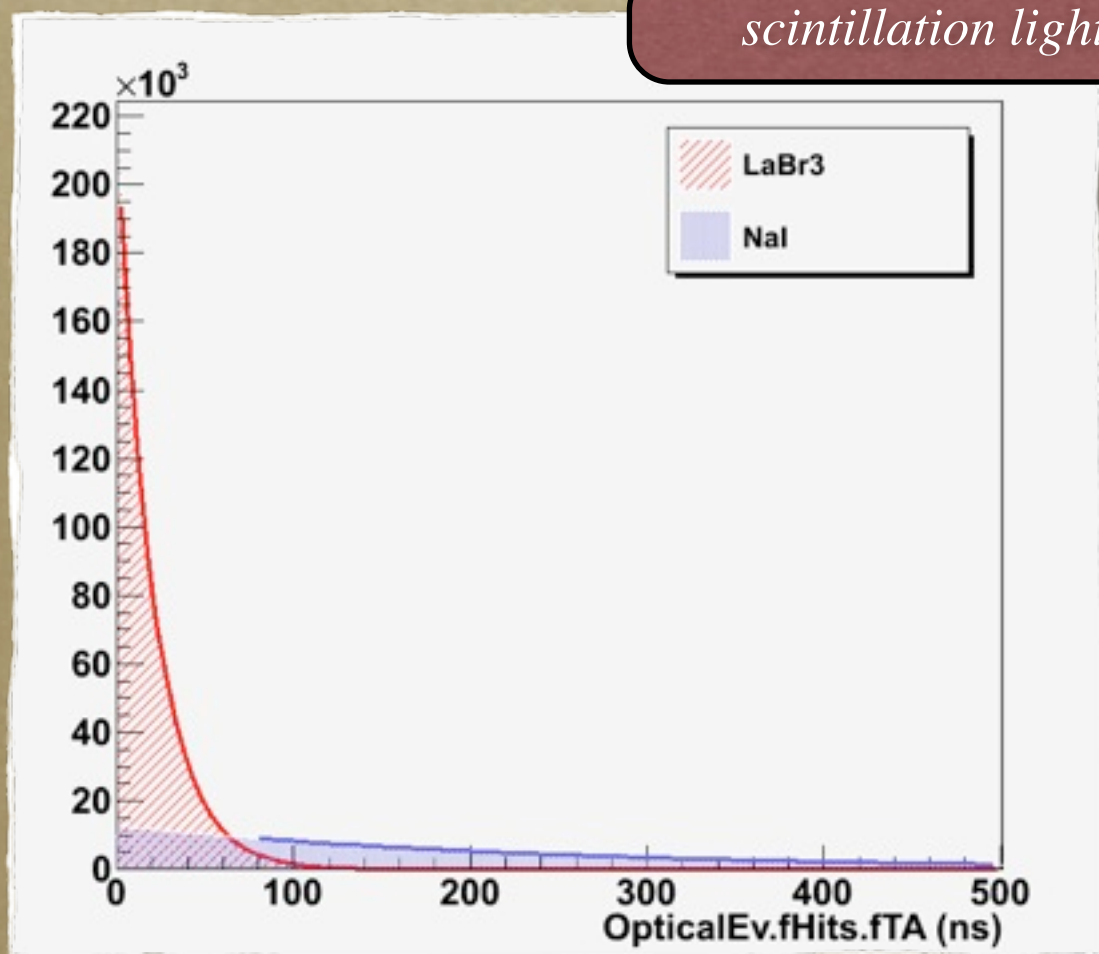


Optical photons in Paris



*1 MeV γ -rays $\rightarrow$ 63000 Optical photons !
(another scale in simulations !)*

scintillation light



*Extracted from G4 :
last interaction point
length of the trace
of steps $\sim$ # of reflections*

*First steps ... not yet fully controlled :
Physics at the surface complex
Materials properties not all known
(absorption, as function of doping ?)
(Scattering : Rayleigh, Mie)*

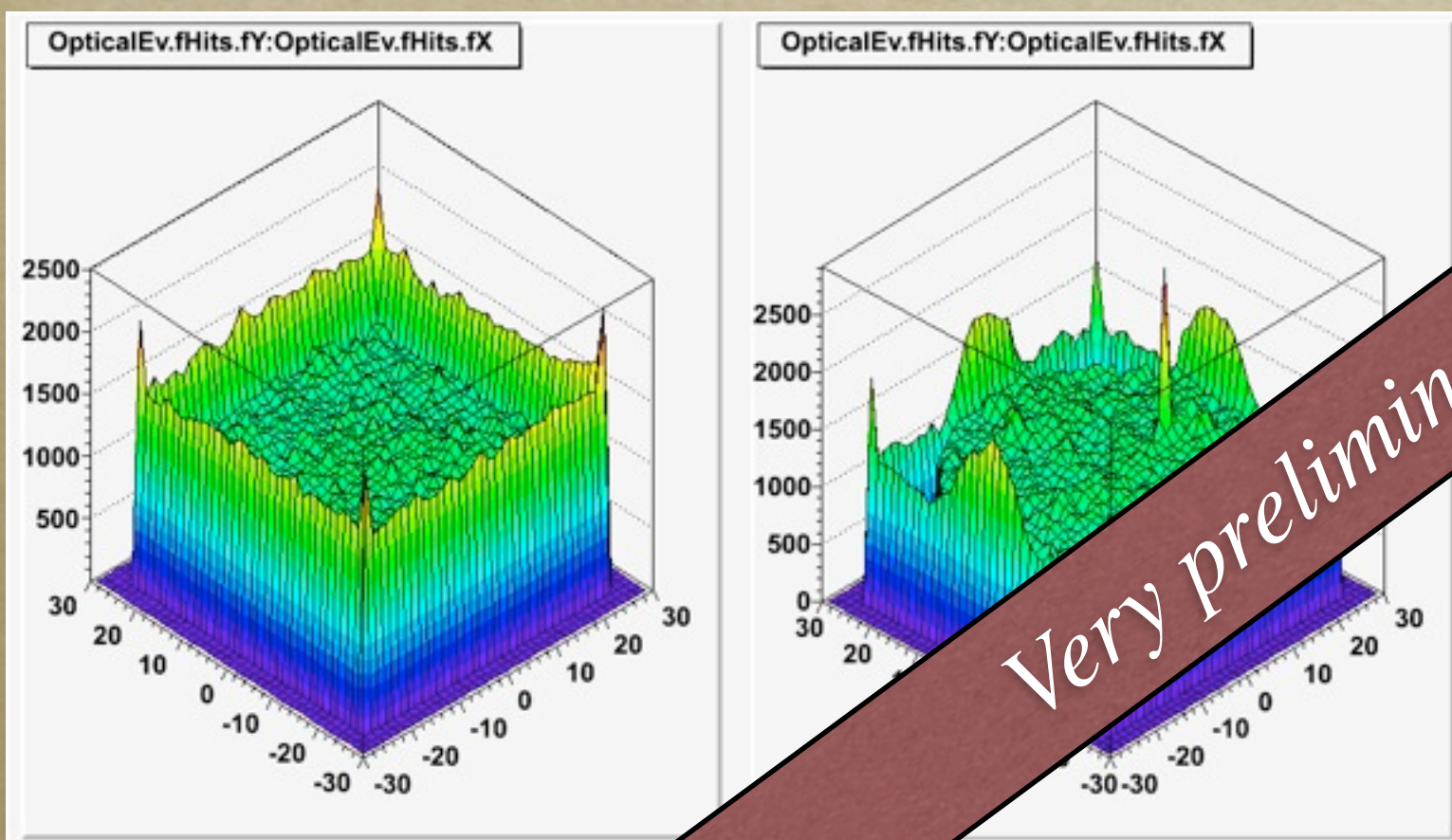


Optical photons in Paris



Example of studies :

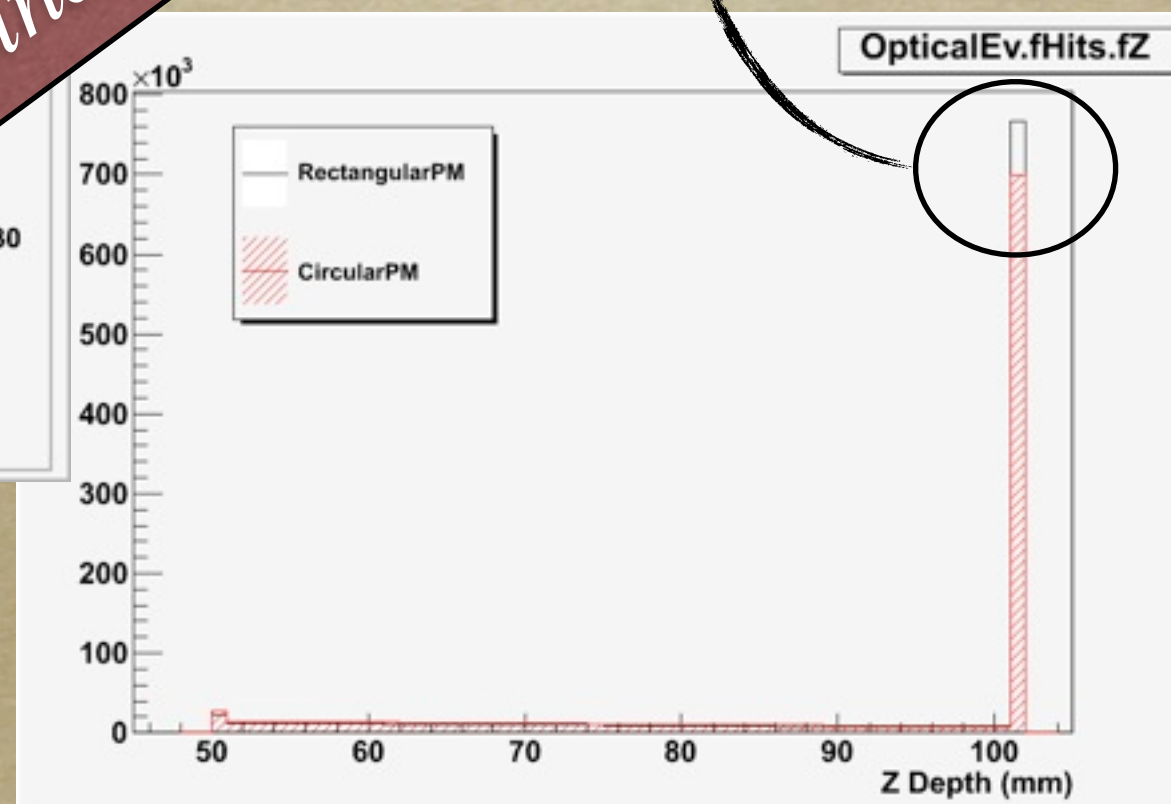
single LaBr3 crystal, full output versus cylindrical



x:y distributi

Very preliminary !!!

due to 'corners'

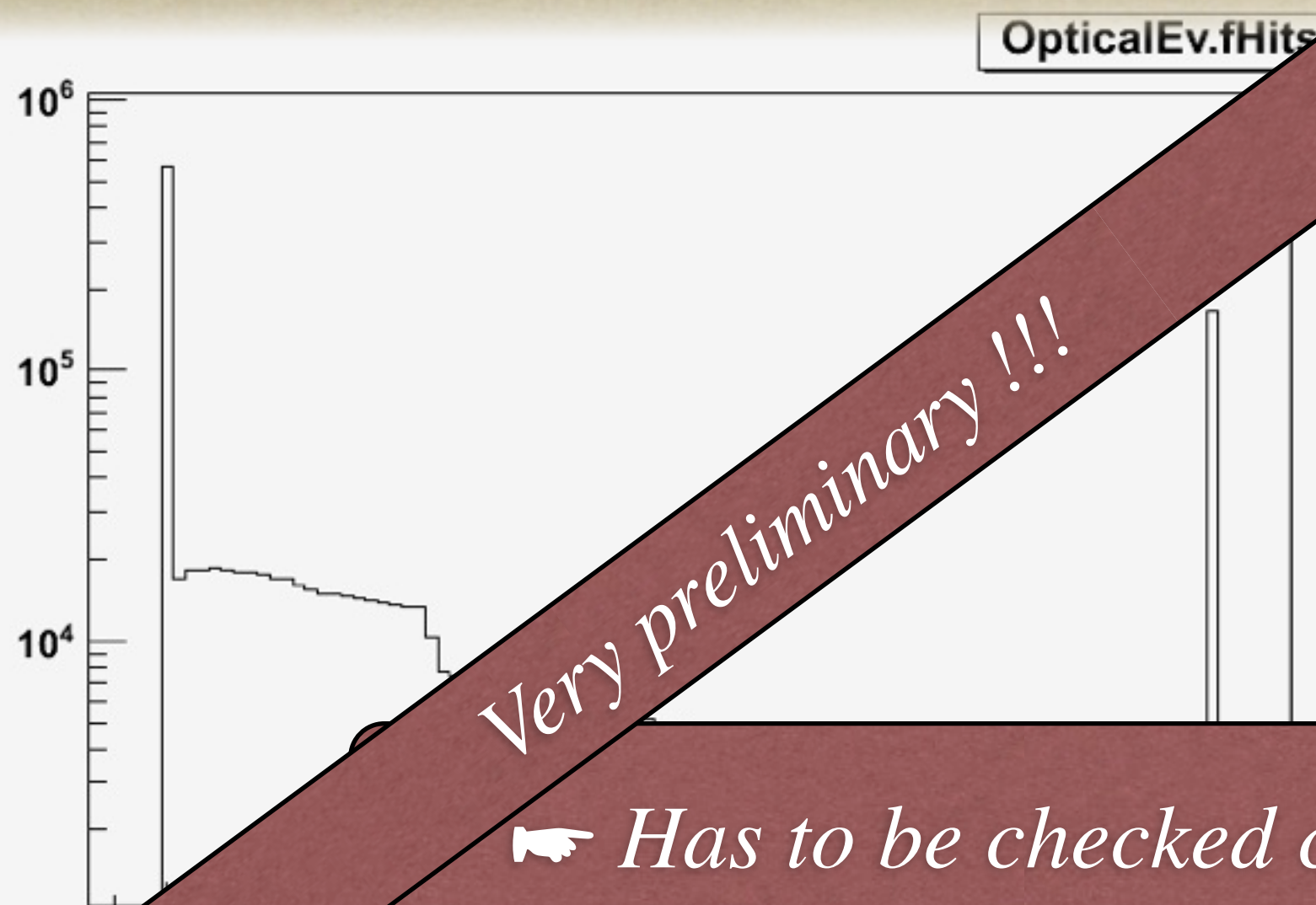




Optical photons in Paris



z position of the last optical photons



Very preliminary !!!

➡ *Has to be checked carefully !*

➡ *Tests to come important !*

➡ *Paris package ready*

➡ *not realistic*



Conclusions/perspectives



Activities since the beginning ...

- *may required a synthesis ... already last year ...*
- *some studies are probably to 'light'*
- *maybe much more work required NOW !*

Lyon, 1 student for 5 months :

- *tests of PW/Clusters, comparisons experiments/simulations*

New developments foreseen for the PARIS/G4 package :

- *cmake/physics lists to be finished (ions/radioactivity)*
- *next steps toward a more user friendly platform :*
 - easy way to build array/setups/couplings*
 - concept of factory of detectors*
- *tests of the PARIS package*
 - with Geant4-MT, use G4 facilities to speed up processes, GRID*