Status & Prospects of Backgrounds studies with BRUNO

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Present status

- Annecy data set produced with Bruno release r356 (tag V00-01-12)
- Caltech data set produced with Bruno release r393 (tag V00-01-15). This last version
  - can use both Geant 4.9.2 and 4.9.3
  - can simulate the old machine layout (i.e. I.R. P3)
  - can simulate the new machine layout (i.e. I.R. SF10 with machine parameters V12)

Data sets

	Bruno r356		Bruno r393	
	Geant 4.9.2	Geant 4.9.3	Geant 4.9.2	Geant 4.9.3
Layout P3	Done	feasible	Done	feasible
Layout SF10 machine V12	Unfeasible		Done	Done

Data sets

	Bruno r356		Bruno r393	
	Geant 4.9.2	Geant 4.9.3	Geant 4.9.2	Geant 4.9.3
Layout P3	Done	Code Ok	Done	feasible
Layout SF10 machine V12	Unfeasible		Done	Done

Data sets

	Bruno r356		Bruno r393	
	Geant 4.9.2	Geant 4.9.3	Geant 4.9.2	Geant 4.9.3
Layout P3	Done	feasible	Done	feasible
Layout SF10 machine V12	Unfeasible		Done	Done

Code Ok

Geant Ok

Outcomes of the simulations

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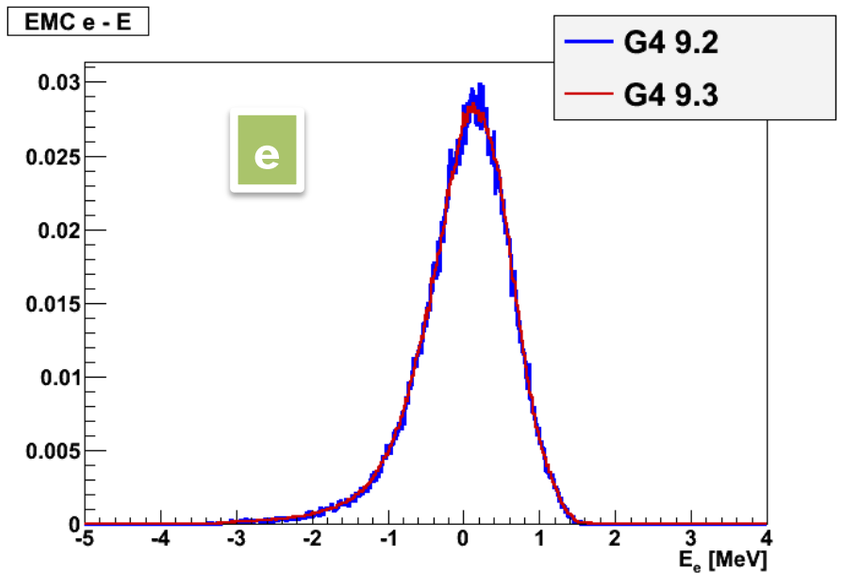
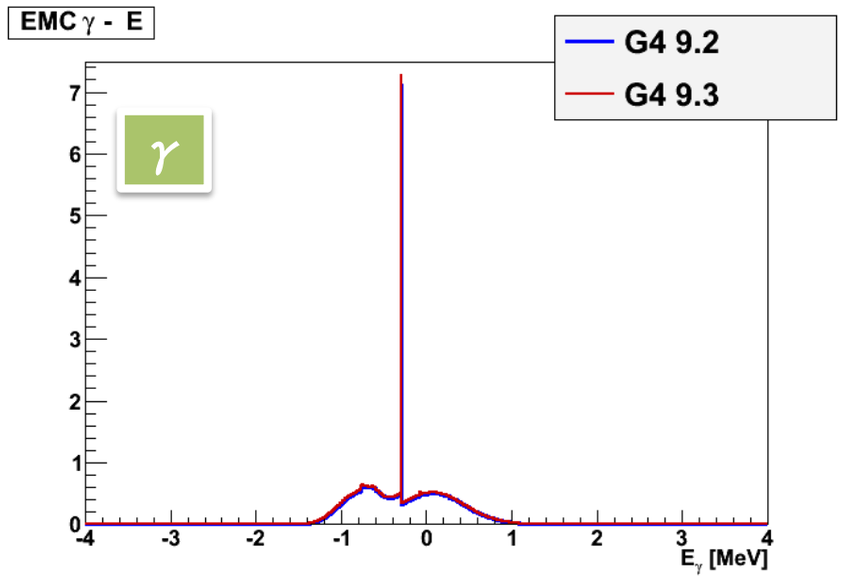
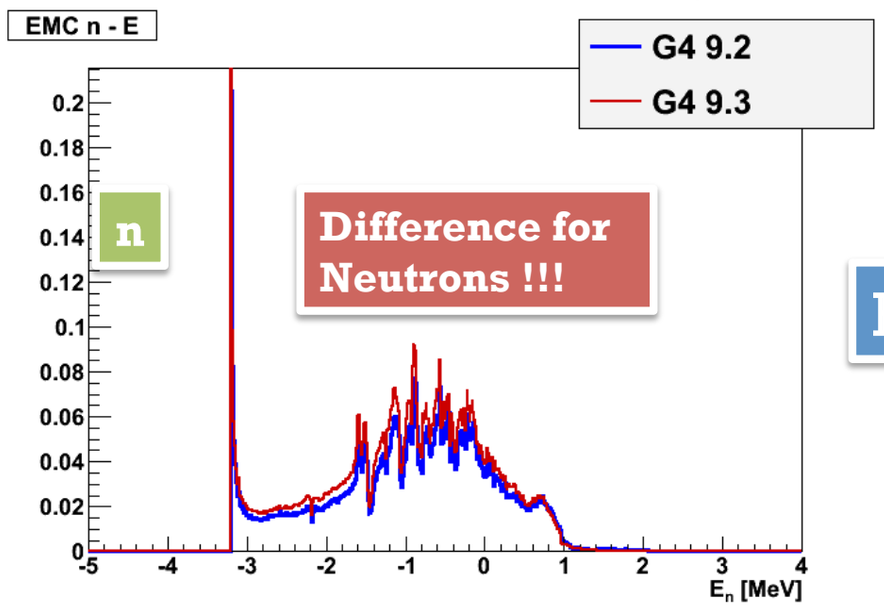
- EMC first comparisons indicate that
- the latest software developments of Bruno does not affects their rates
- Geant 4.9.3 is almost identical to Geant 4.9.2

Geant 4.9.2 vs 4.9.3

Particles Energy at EMC boundary



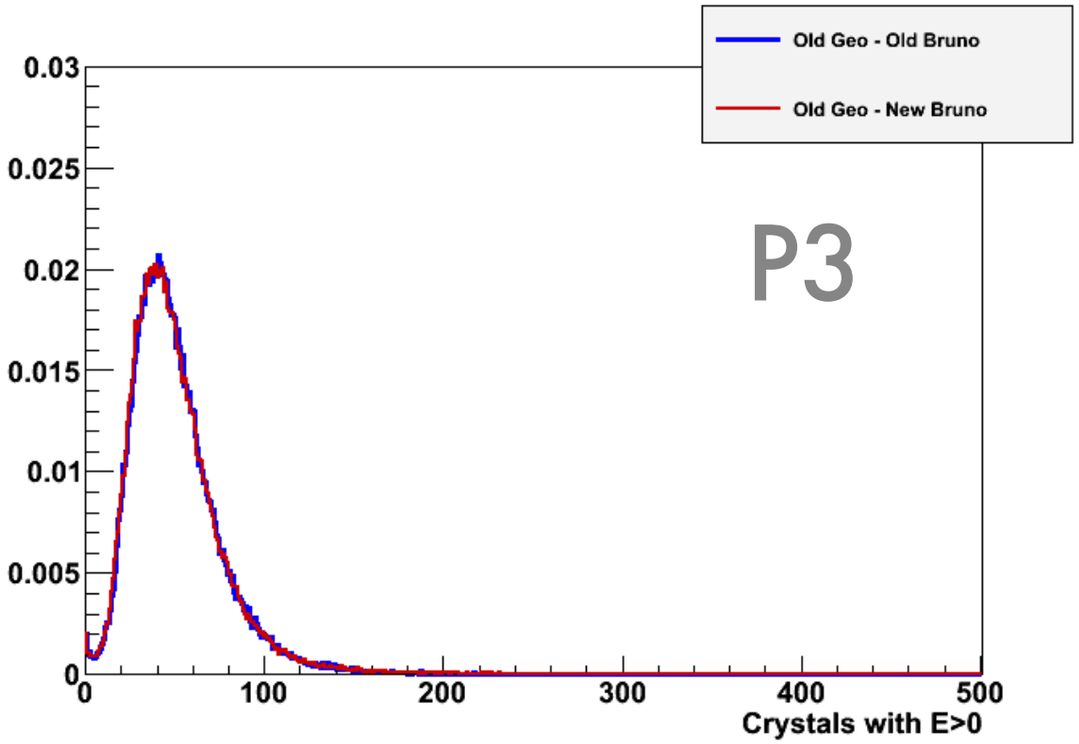


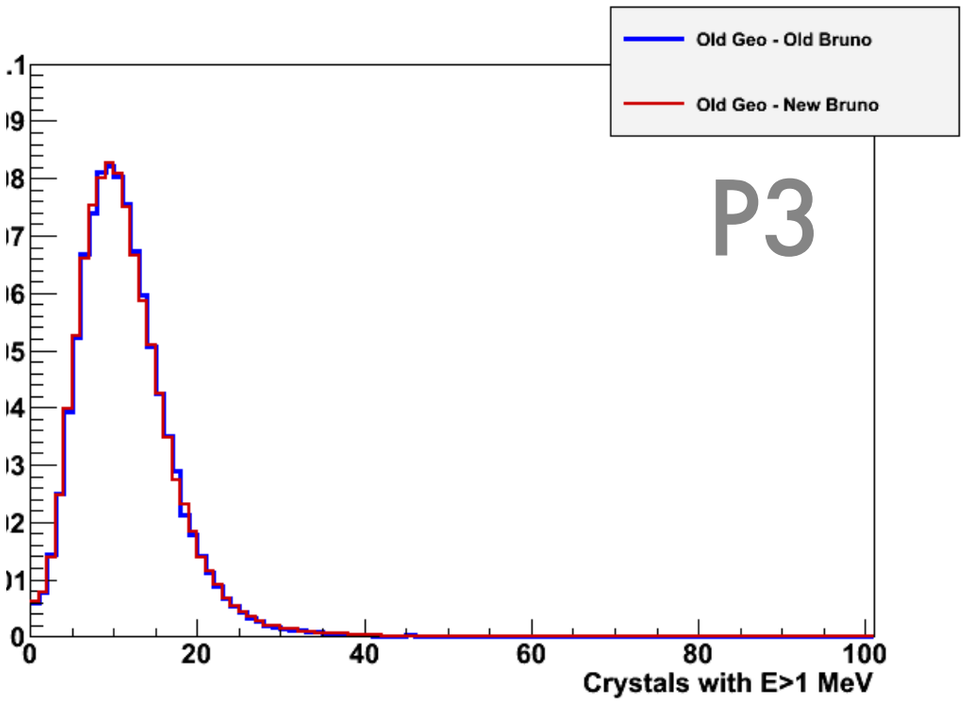


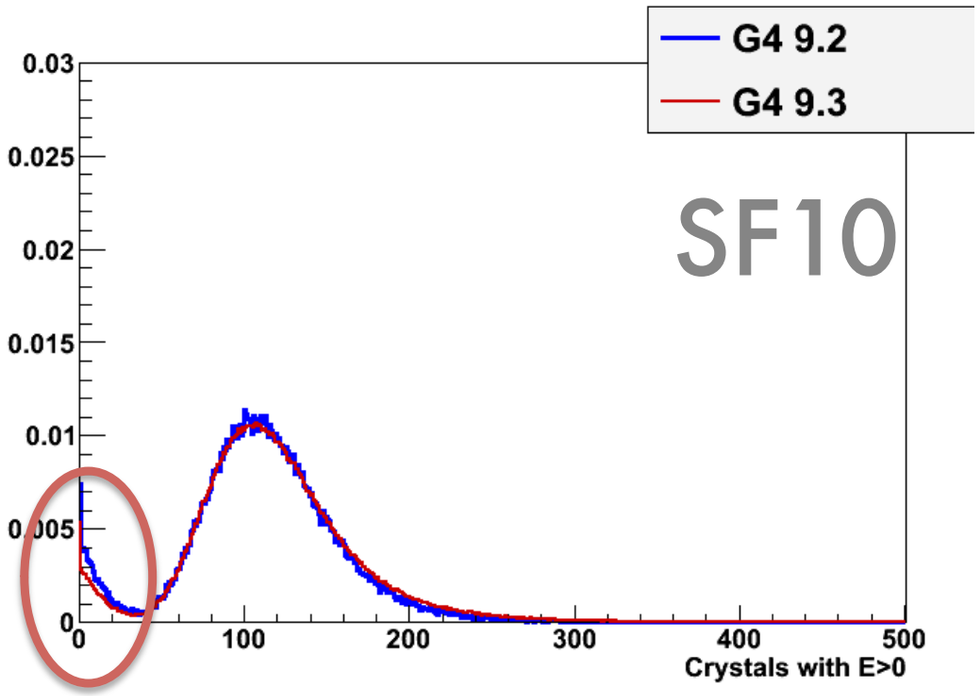
Higher Neutron flux for G4 9.3 !!!

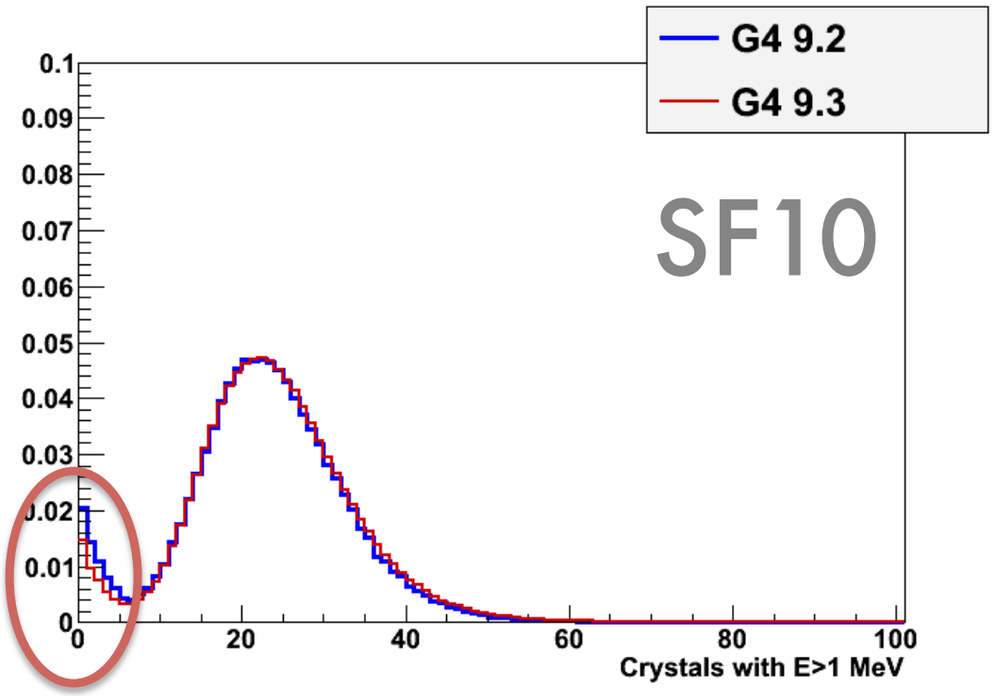
Courtesy Stefano Germani

P3 vs SF10

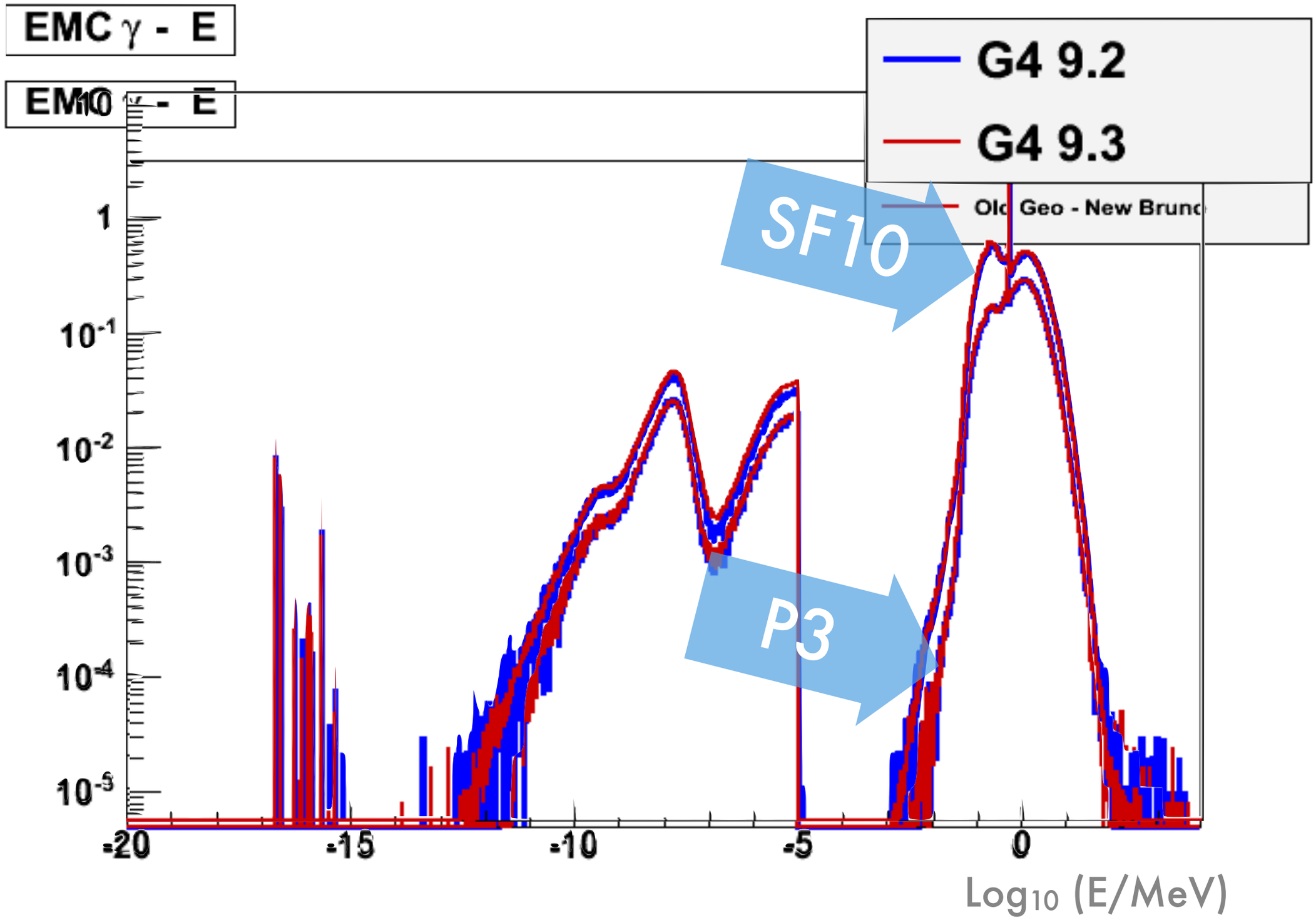

Old Geo - Old Bruno
Old Geo - New Bruno
P3
Crystals with E>0


Old Geo - Old Bruno
Old Geo - New Bruno
P3
Crystals with E>1 MeV

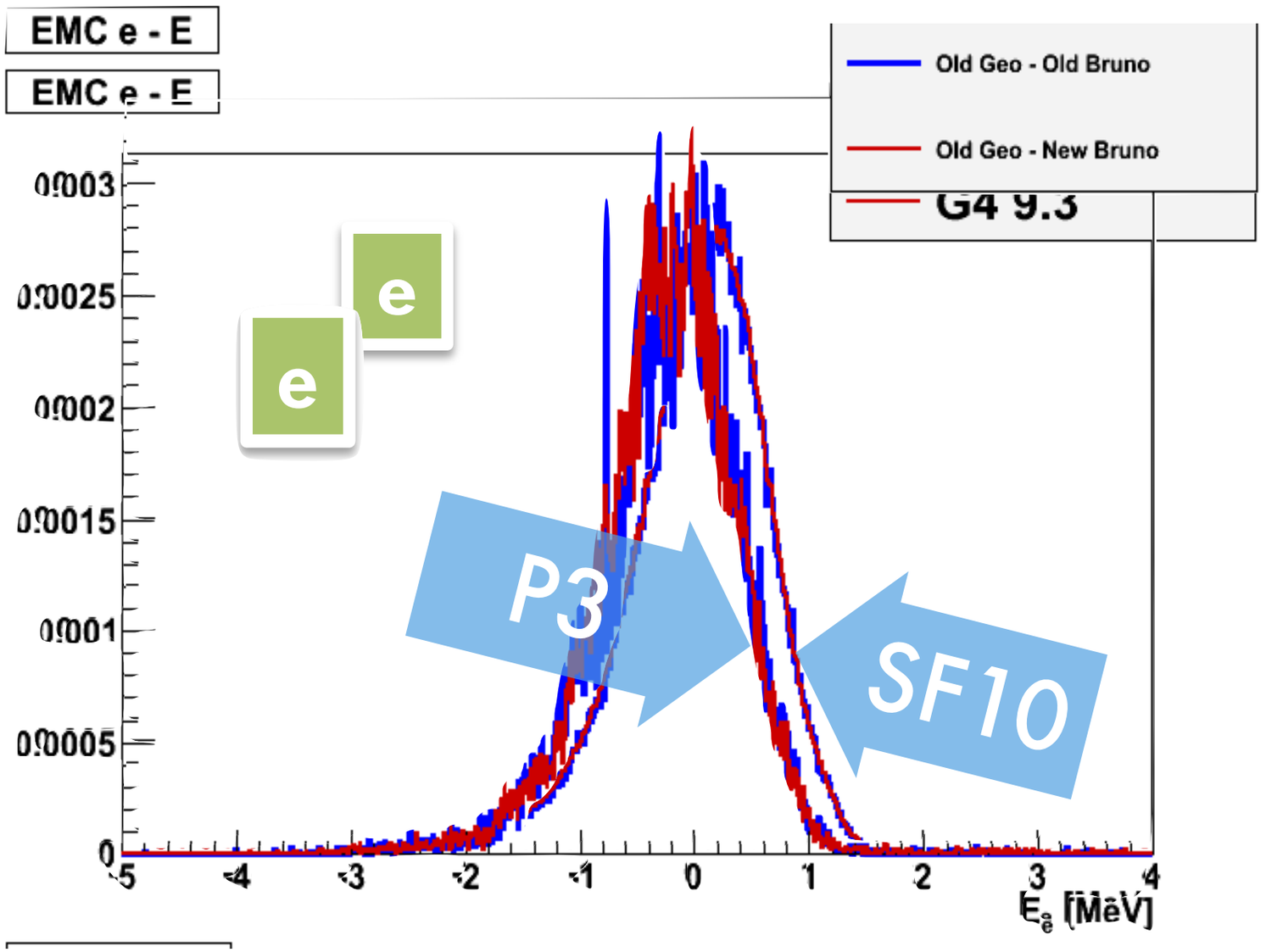

G4 9.2
G4 9.3
SF10
Crystals with E>0


G4 9.2
G4 9.3
SF10
Crystals with E>1 MeV

P3 vs SF10 @ EMC



P3 vs SF10 @ EMC



Log_{10} (E/MeV)

P3vsSF10 Comparisons outcomes

- EMC observes a cluster rate higher by a factor two
- The e^+e^- energy spectrum @ the EMC boundary is higher and stiffer
- The photon energy spectrum @ the EMC boundary is higher by a factor five in the 10 keV - 100 keV energy range

Conclusions

- The main suspect is the IR layout we can improve it, but we cannot back step to P3 (energies, machine parameters, feasibility...)
- Alejandro is looking at the primaries hitting the beam pipe to find where is advisable to increase the beam pipe aperture
- Data is looking at the secondaries emerging from the shield to find where is advisable to increase their thickness