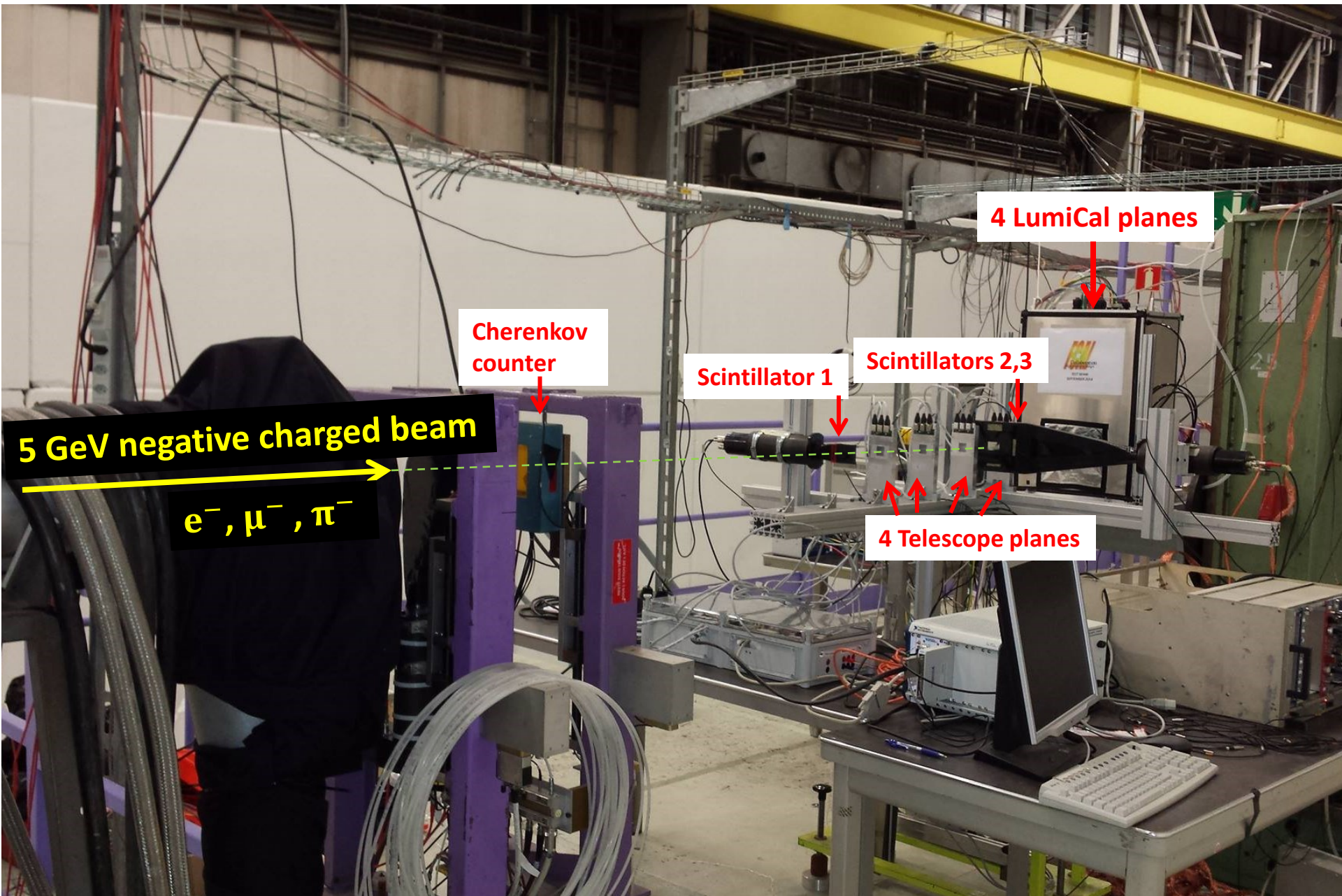


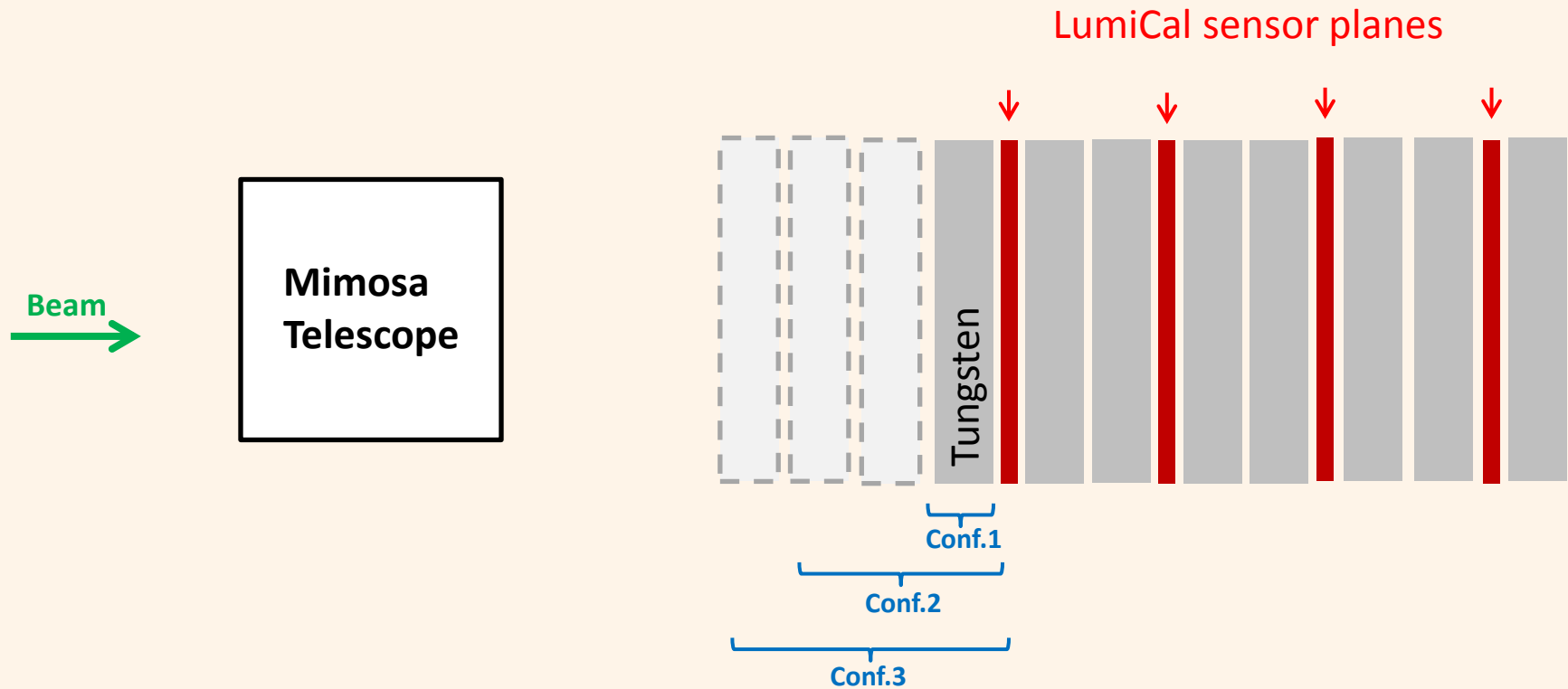
TB DATA ANALYSIS

TB SETUP



TB was held in CERN 22-28 October 2014 on T9 TB area

Configurations under the test



For each configuration 3 types of run were taken:

- Electrons and Muons with rate restriction (1 particle per trigger)
- Electrons and Muons without rate restriction
- Hadrons

Software for Analysis

People currently doing analysis: Telescope -> Sasha & Veta
LumiCal -> Itamar & Lucia

For the LumiCal analysis EUDAQ software is needed.

This software requires a certain parameters of the operation system and strongly depend on the version of supplement programs.

On just recently gotten from Olga laptop I installed the newest version of Ubuntu 14.04.1 LTS (64-bit), but during installing following programs I run into conflict between software, which couldn't be easily solved.

Then I reinstalled system to Ubuntu 12.04 LTS (64-bit)

For the work with EUDAQ next programs are needed:

- Compiler GCC 4.6
- Set of libraries for C++ BOOST 1.40
- ICU libraries (Unicode support)
- ROOT

This and other small programs were successfully installed
Then EUDAQ itself was installed and successfully compiled

Software for Analysis

Thanks to Itamar, he added file “writer” to EUDAQ to convert .raw files to .root files

I chose few random files for conversion them and during processing there were messages about mismatch between signal from FCAL boards and FcalAUX device. Itamar said that they are working on this currently.

Anyway the root files were converted correctly and I could read trees from TBrowser

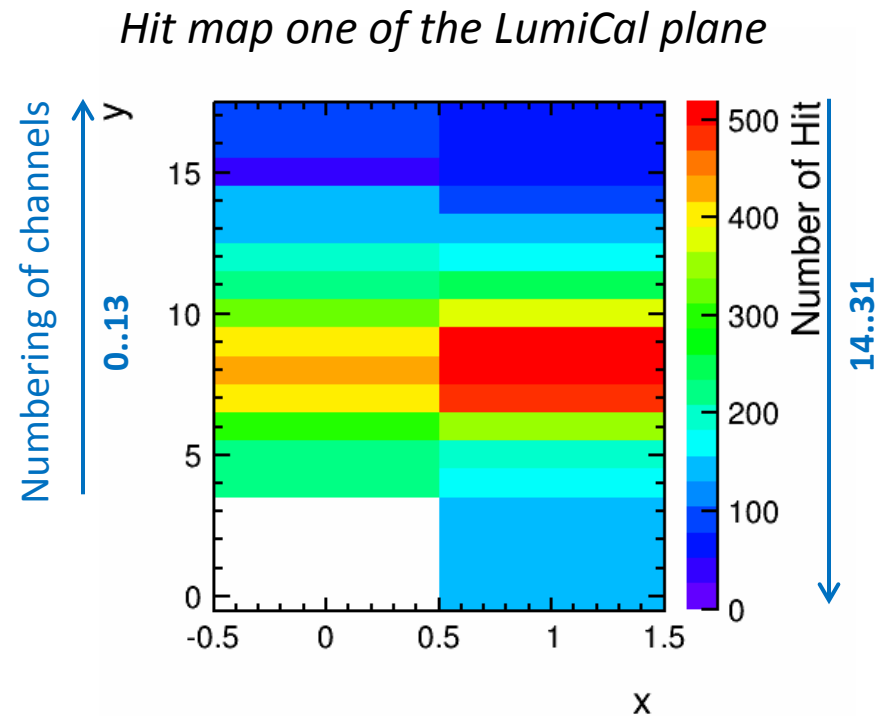
The next what is needed – the program, which will read trees and make calculations with data.

ROOT file

Each entry in the root file is 1 channel (1 pad), so 128 entries are 1 trigger.

The Root file contains :

- Plane (0-4)
- Channel (0-31)
- X (0-1)
- Y(0-17)
- Time stamp
- Tlu number from fcal
- Tlu number from AUX
- Is sync?
- Run number
- Data array of 32 samples
- Frame counter (for sync with MIMOSA)



1 event

Each event need to be process in several steps:

1. Base line removing and pre-signal RMS calculating
2. extract the average CMN (Common Mode Noise) from each 8 channels (1 chip) without signals.
3. Remove CMN.
4. Using Deconvolution.

Next steps

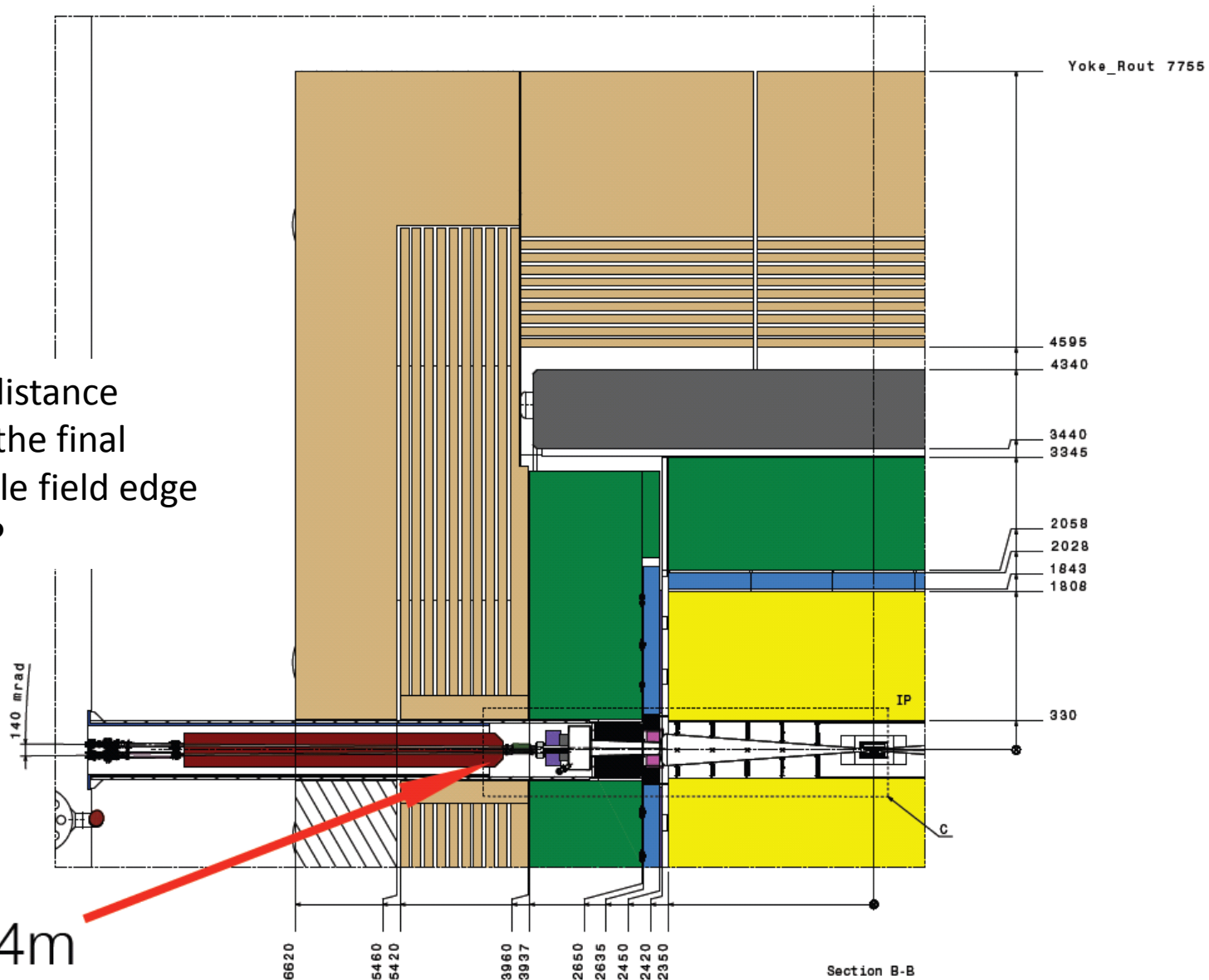
- Itamar and Sasha working on synchronization between Telescope and LumiCal
- Get a program for reading trees in root files and to get signal distributions, also mismatch between fcal and aux tlu numbers needs to be fixed.

BG in BeamCal SIMULATIONS
– changed DISTANCE to IP

ILD Dimensions

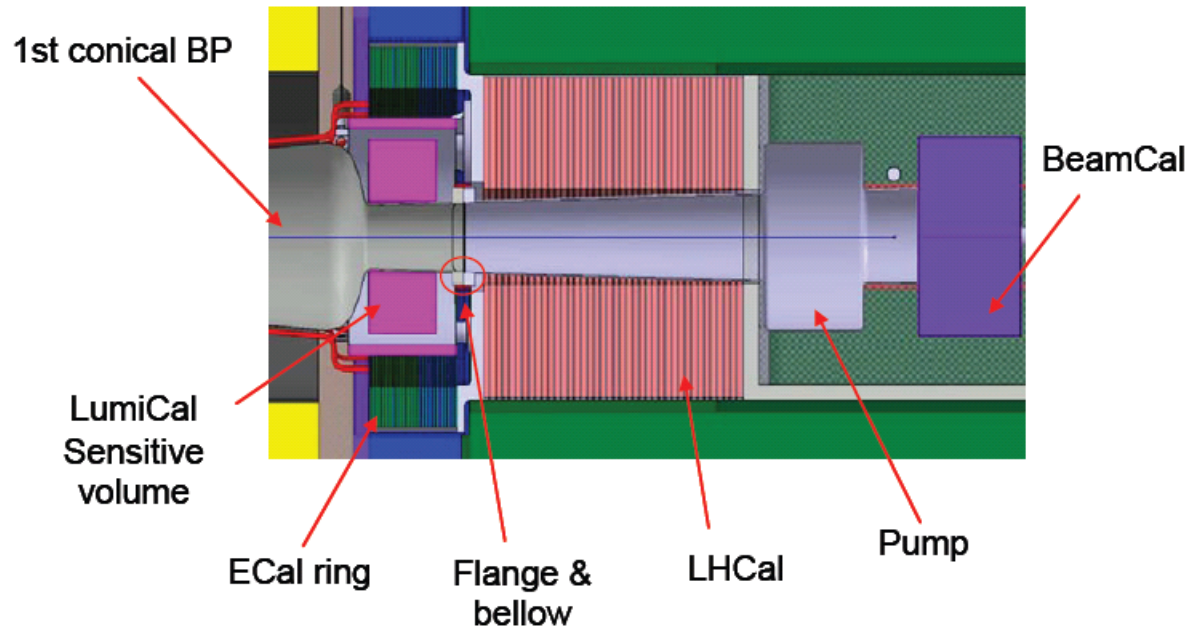


L^* is the distance between the final quadrupole field edge and the IP



$$L^* = 4.4\text{m}$$

Forward Region - possible changes towards $L^*=4\text{m}$



- Need to find ~40cm in current design
- Look into design optimisations of all structures
 - maybe find some 10cm there, but more?
- Biggest devices:
 - Pump in front of BeamCal (30cm)
 - LHCAL (~50cm)

Software issues

VERTEX and TPC is most sensitive to BG changes and it needs to make simulations for whole ILD for new configuration, but one should understand that it is very capacious work. So as a first step I suggested to look on BG distribution in BeamCal while moving it 40 cm closer to IP.

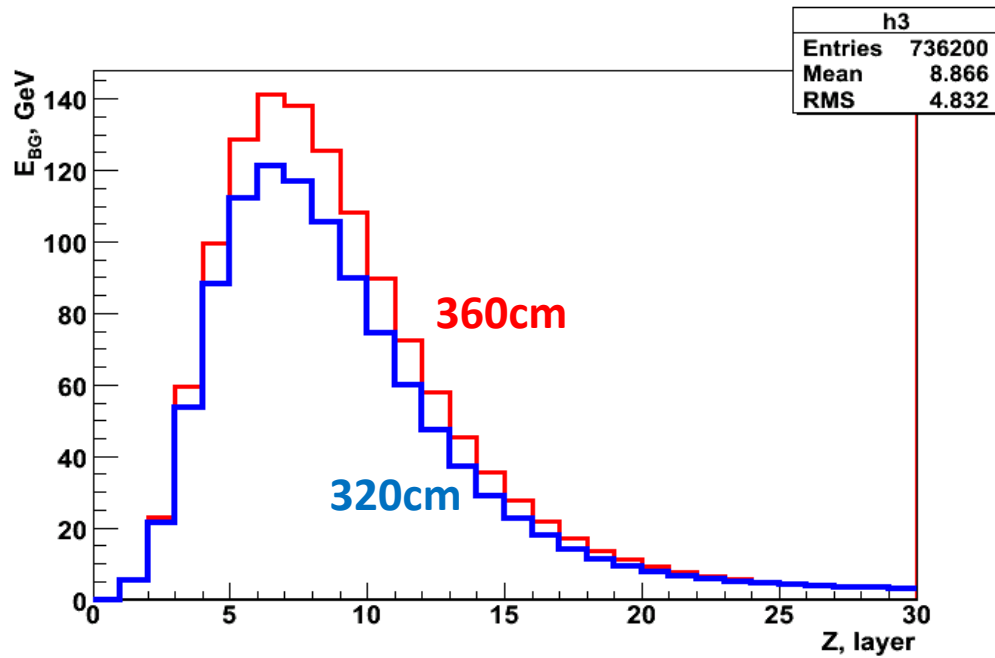
To make simulations I was needed to run jobs on the FARM.

Arised errors during runs:

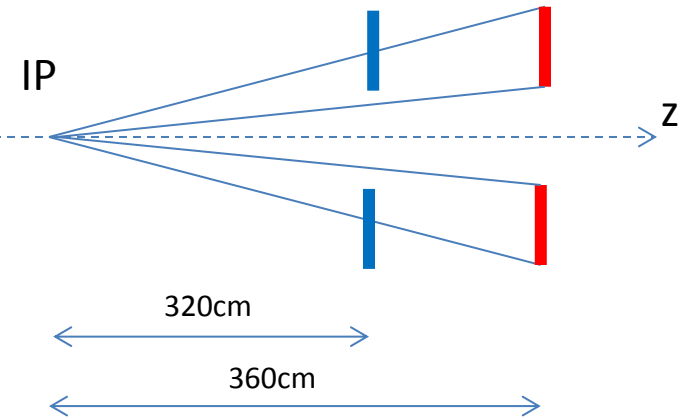
- NAF2-Hamburg: jobs doesn't run, because of missing libraries
- Zeithen FARM: there was an update from GEANT 4.9 to GEANT 4.10, and it caused problems for BeCaS compilation and running

Thanks to Fatima, she helped to solve it first on NAF, and then on Zn FARM.

BG energy distribution along Z

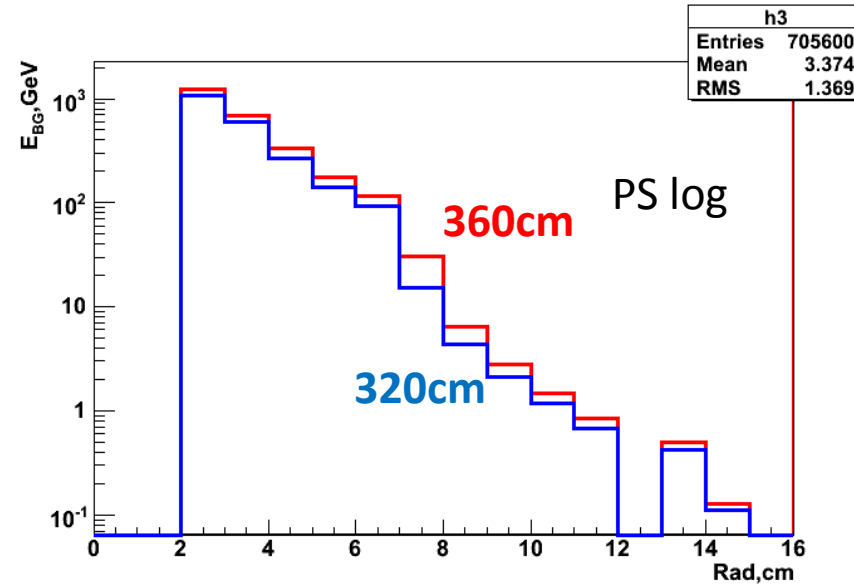
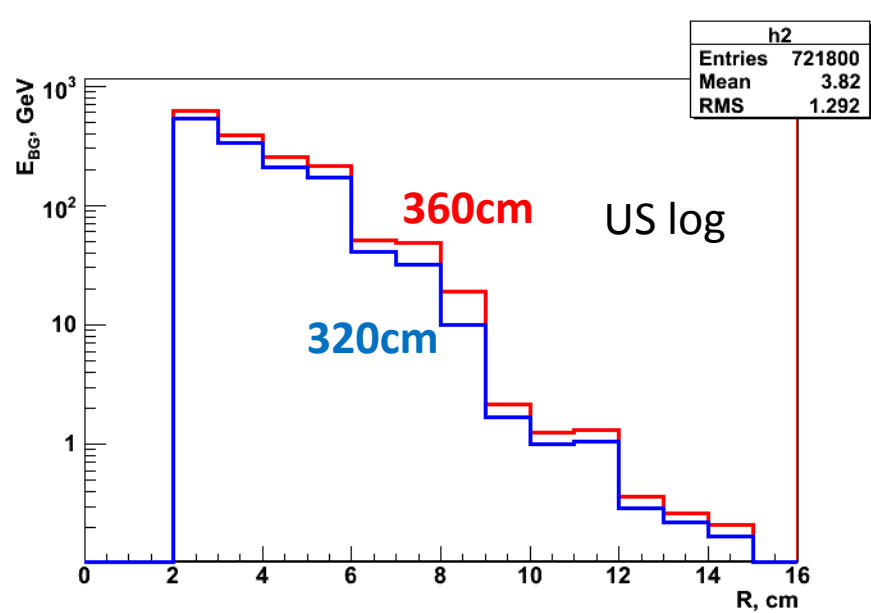
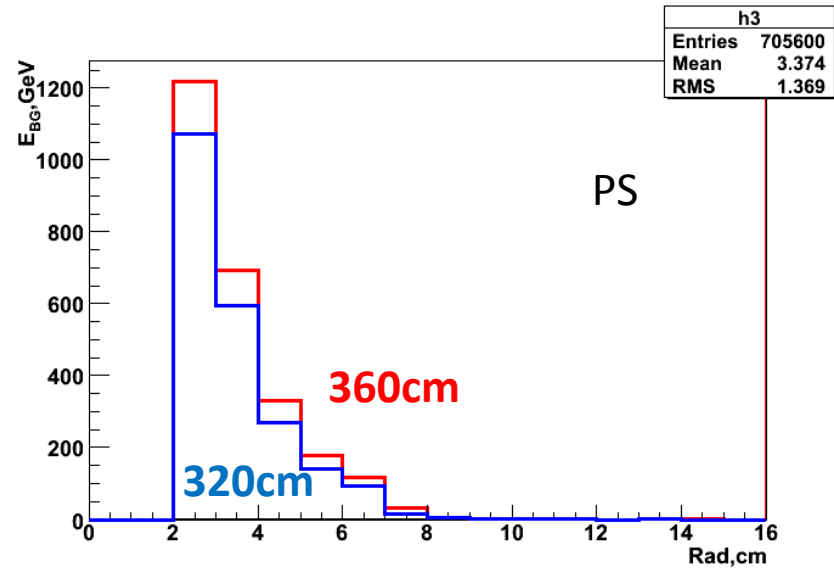
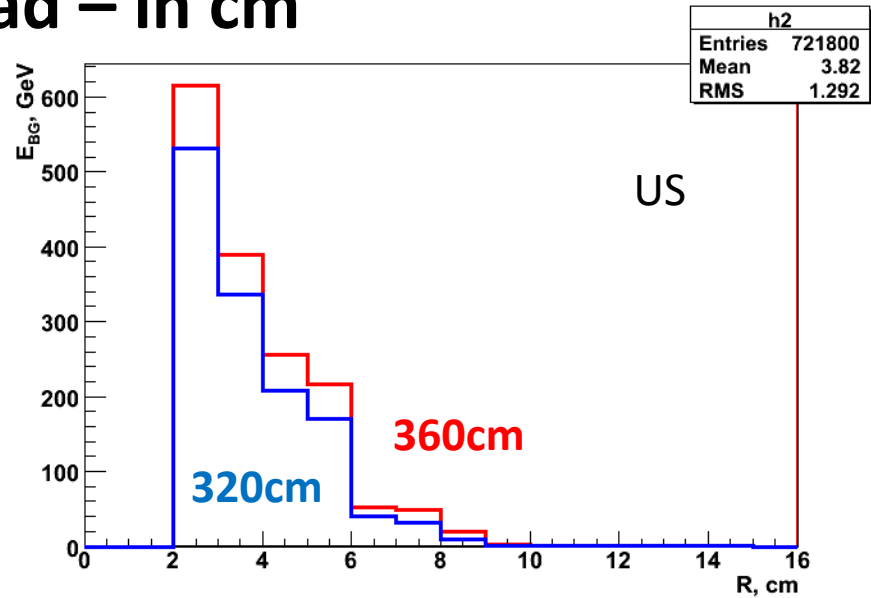


US 320 vs 360 cm



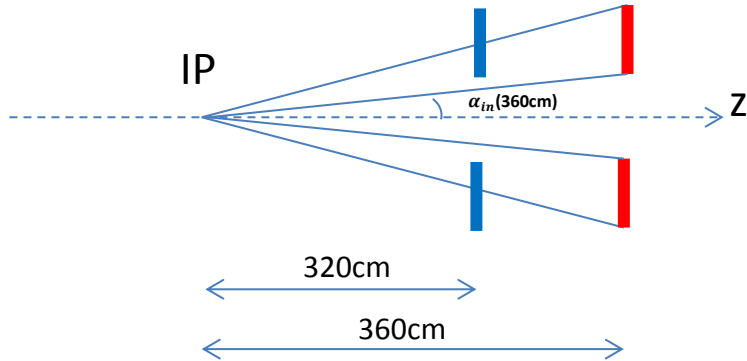
BG energy vs Radius of BeamCal on 320 and 360cm from IP

Rad – in cm



BG energy vs Radius of BeamCal on 320 and 360cm from IP

Rad – in rings



$$\frac{\alpha_{in}(360cm)}{\alpha_{in}(320cm)} = \frac{6.2 \text{ mrad}}{5.5 \text{ mrad}} \sim 1.13$$

$\Rightarrow$ To cover same α_{in}
as on 360cm, Rin should be
1.78cm instead 2cm

Ratio ~ 1.14

