

# Generation of customized (to the data) MC runs

## Outlook

Differences data-MC in beam characteristics

Proposal to facilitate data-mc comparisons

Macro to estimate beam characteristics

Output on selected SPS runs

Output for all SPS and PS runs

Production of MC runs matching some SPS data runs

# Differences between MC beam and Experimental beam

**The MC beam does not match (exactly) the profile of the Experimental beam; neither in beam dimensions nor in beam impact point and incoming angle. There are two reasons for that:**

**1 - The experimental particle beam is very sensitive to the machine settings (magnetic fields, collimators), which will change when changing particle energy**

**2 - Uncertainty in the movement/position of the CU table, which will introduce an effect any time we change the impact point or the incoming angle**

This implies that it is not possible to know (with accuracy) in advanced the beam characteristics to be used in the MC simulations.

In SPS beam test (at CERN) we quantified somewhat the differences for some data and MC runs, which were compared at that moment.

```
Quick comparisons of some selected data-mc runs.

Table relating MC with Data runs:
-----
```

Energy(GeV)	Position	Angle	MC Run	Data Run
282	201,40,-47	0	166	1922
282	idem	30	167	1944
200	idem	0	164	1911
200	idem	30	168	1902
100	idem	0	162	1981
100	idem	30	169	1999
50	idem	0	172	2039
50	idem	30	173	2054
20	idem	0	176	2082
20	idem	30	177	2096

(see full details of this comparison topic at **High-energy electrons at SPS**, at <https://confluence.slac.stanford.edu/display/BeamTest/List+of+Data+Analysis>)

A much more detailed quantification of general MC-data beam incoming angle and impact position differences was performed by Johan Bregeon:

<https://confluence.slac.stanford.edu/display/BeamTest/PS+Table+Position>

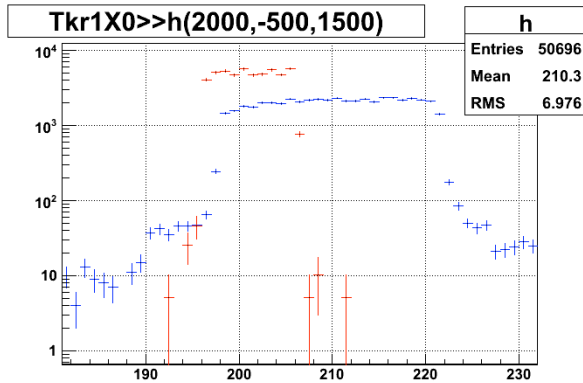
<https://confluence.slac.stanford.edu/display/BeamTest/SPS+Table+Position>

# Impact point and beam width in X direction (few plots)

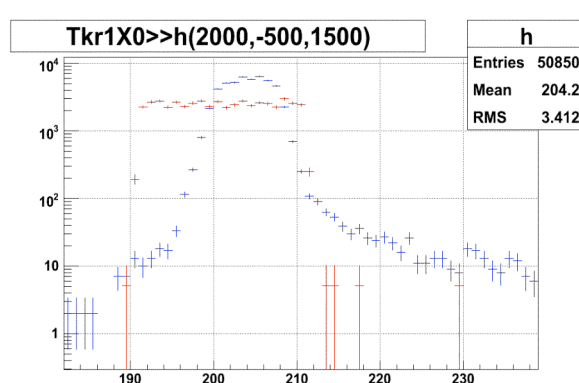
Incidence angle, 00 deg

MC in red; Data in blue

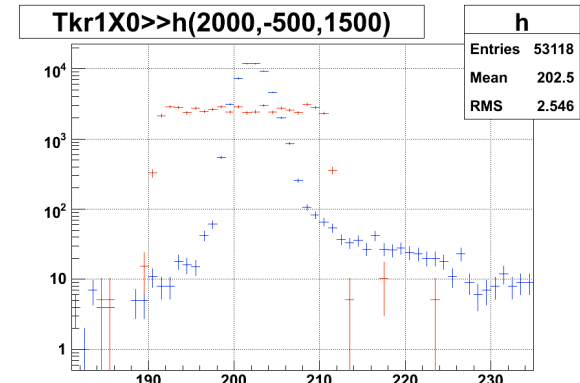
E = 282 GeV



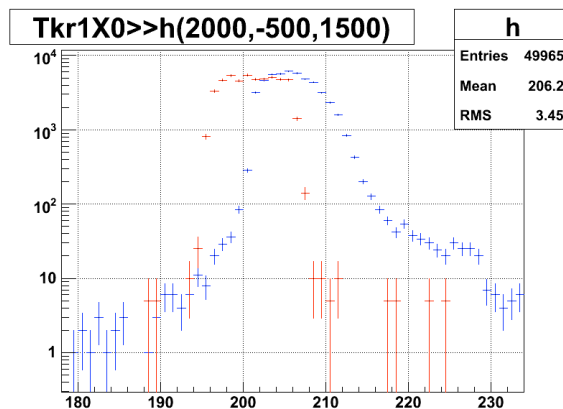
E = 200 GeV



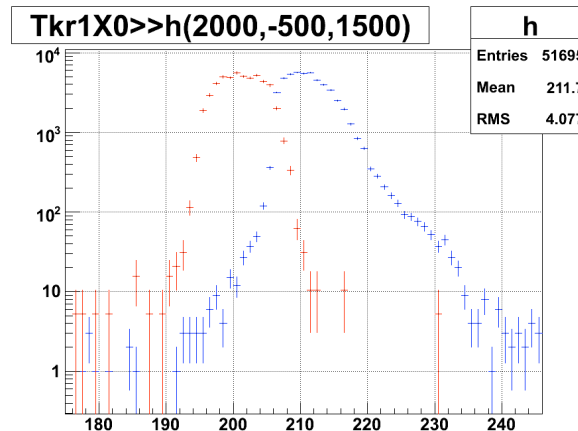
E = 100 GeV



E = 50 GeV



E = 20 GeV



There is disagreement in both, beam profile and impact point in the CU

Depending on the issue under study, this disagreement might cause significant effects... specially if beam close to a dead area...

I initially planned to performed my own MC simulations that fulfill the requirements to perform some of the studies I am involved, like the evaluation of agreement in PSF (and errors estimated for the incoming photon direction), and agreement in other quantities like CalTwrEdge and CalTwrEdgeCntr...

Since I had to do some systematic studies, and write some macros to achieve that, and since other people will face also this “situation”; I thought I could do it in a more general way, so that others can also use it

# PROPOSAL:

- 1 - Estimate the beam profile, impact point and incidence angles for all DATA runs (SPS and PS)
- 2 - Put this info in a web page
- 3 - Produce customized (for the individual data runs) MC runs, and link them to the web page

Ej:

Data Run	Date	Ener(GeV)	Angle(deg)	Width(X, Y in mm)	Impact (X,Y at Z =-47)	Max Beam Div.	CustomMC
1902	2006/09/07	200	29.8	2.6, 2.7	207.9, 37.8	0.1 deg	Not yet
1911	2006/09/07	200	0.5	3.1, 2.8	208.2, 39.0	0.03 deg	Not yet
2082	2006/09/10	20	0.8	3.4, 7.0	203.4, 34.7	0.05 deg	Not yet
2096	2006/09/10	20	30.3	3.6, 7.1	197.0, 34.1	0.09 deg	Not yet

....

Numbers estimated from real data runs

Note the substantial change in beam dimensions and position...

**Point 1** is already done (see later)

**Point 2**, not yet started, but I could take care of it.

**Point 3**, many ways of proceeding... it needs to be discussed.

Not all data runs will be used, and thus, it is NOT necessary to produce MC runs for all data runs.

As people use the data runs, the MC runs will be needed. At that moment, they could be produced and linked to the web page, so that, other people can use them too...

**Questions:**

**1-Are the “official MC runs” produced only with the pipeline ?**

**2-Should only one person (Francesco) or few people be responsible for the “official MC” production? Or should everybody be allowed to produce MC ?**

**pros of centralization-**

**It decreases probability of making errors**

**contras of centralization -**

**If there are errors, centralization decreases the probability of finding them**

**This person might get overloaded, trying to satisfy the wishes of all others**

**3- Is there any Quality control of the produced MC runs ? We could run the macros that estimate beam profile and check that it is what we wanted... <sup>7</sup>**

# Simple macro to estimate beam characteristics

How does it work (just few words...)

Essentially, the macro gets parameters from Merit root file (like Tkr1X0, Tkr1ZDir...), and computes Means and RMSs

Before computing these quantities:

1 - Filter cut is applied to clean up the sample

2 - Outliers are removed (in several iterations) removing events located outside range Mean +/- N\*RMS

3 - Optional; a gauss fit can be performed (in region of interest) to estimate Mean and Sigma.

Goodness of fit is typically not good (statistically speaking)

Yet “visually” one can see that the differences are not “substantial”, and a gaussian function is not a “very bad” approximation.

The advantage of the FIT is that the estimated quantity is NOT affected by potential (few) events located “in the region of interest”, but which cannot be part of the “beam which interest us” (outside trigger region defined by scintillators, for instance...); probably **mis-reconstructed events**



Macro arguments;

```
Int_t EstimateBeamProfile_FromOneRun_v4(TString inrootfile, // MeritRootFile,
                                         TString runnumber, // RunNumber,
                                         TString filtercut, // FilterCut,
                                         TString outrootfile, // OutRootFile,
                                         TString outasciifile, // Ascii file with detailed report
                                         TString outasciifile_short) // Ascii file with short report (Table)
```

Function returns 0 if successful, a number otherwise (with hopefully an explanation)

Whitin the macro there are many knobs that one can play with: *number of iterations and RMS cut for outliers, using Gauss fit or not, make or not gif plots with the distributions, histogram bins ...*

The macro can be dynamically compiled for faster execution:

```
root [0] .L EstimateBeamProfile_FromOneRun_v4.C++
```

Then you get a library (EstimateBeamProfile\_FromOneRun\_v4\_C.so), which you can include in your customized macro. Ej:

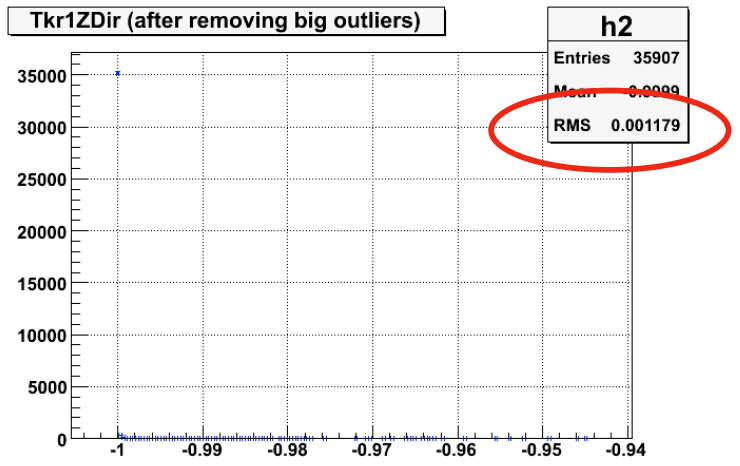
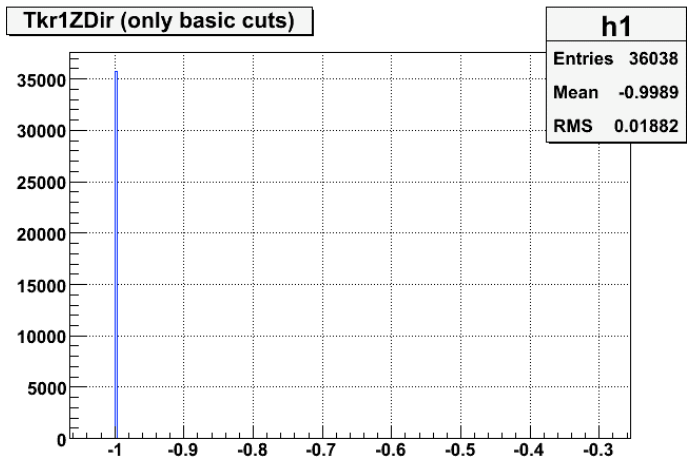
```
gSystem->Load("EstimateBeamProfile_FromOneRun_v4_C.so");
```

After that, you can use the function in your macro...

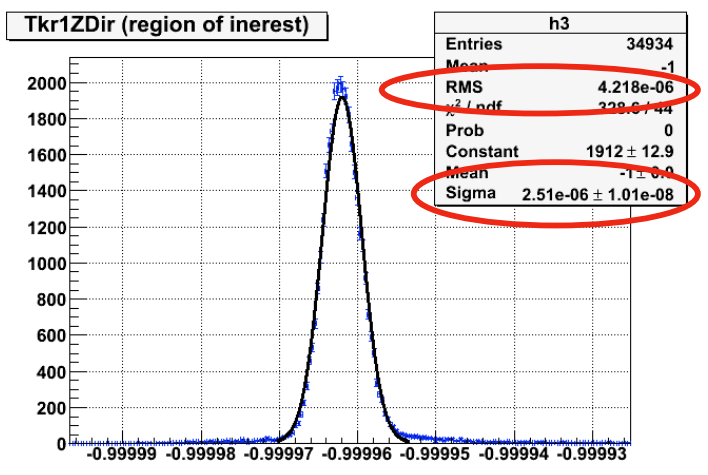
# Output rootfile from macro

The root file contains TCanvas objects with the distributions of parameters. This is just for inspection... to have a feeling of what is going on...

Ej, Run 1911 (200 GeV, 0 incidence angle): **Tkr1ZDir**



0.001

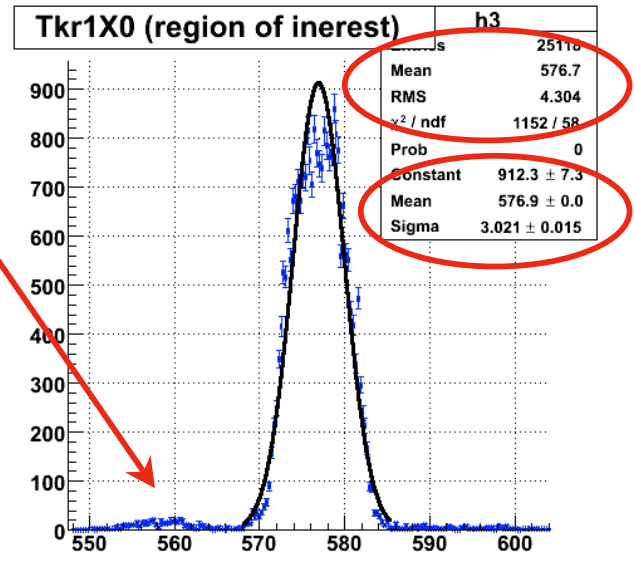
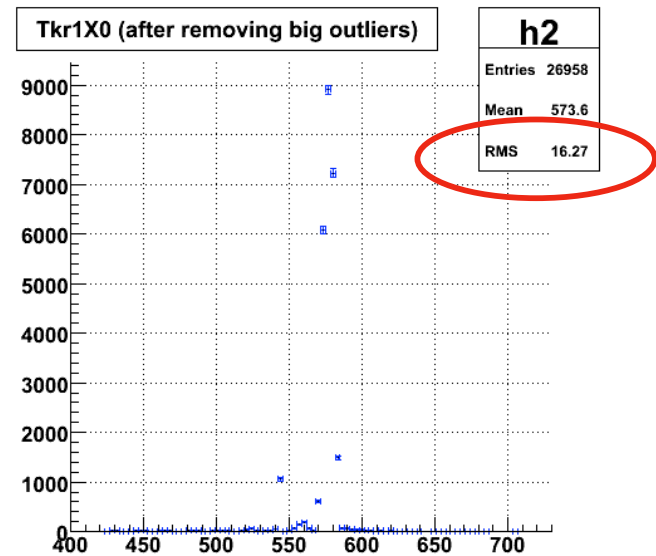
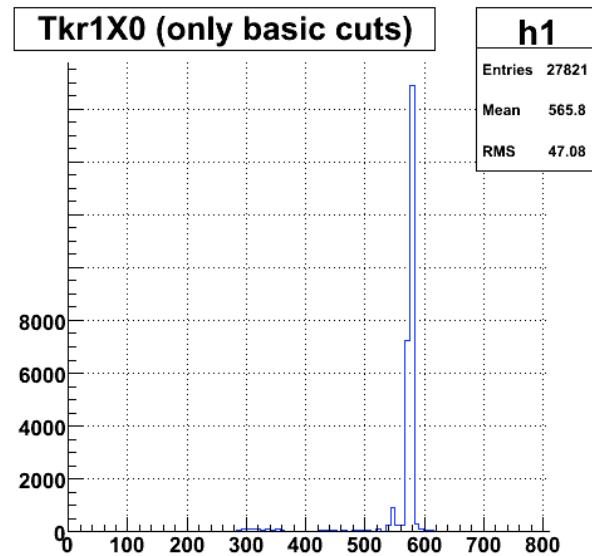


4.e-6

2. e-6

Choosing the right region of interest, and fitting has an impact on the RMS

Ej, Run 1902 (200 GeV, 30 incidence angle): **Tkr1X0**



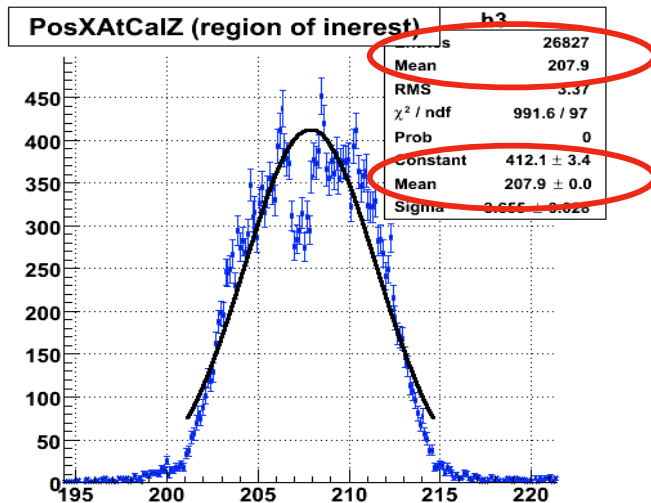
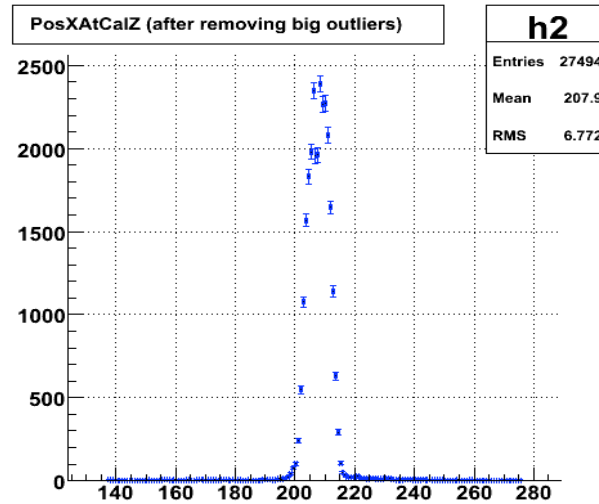
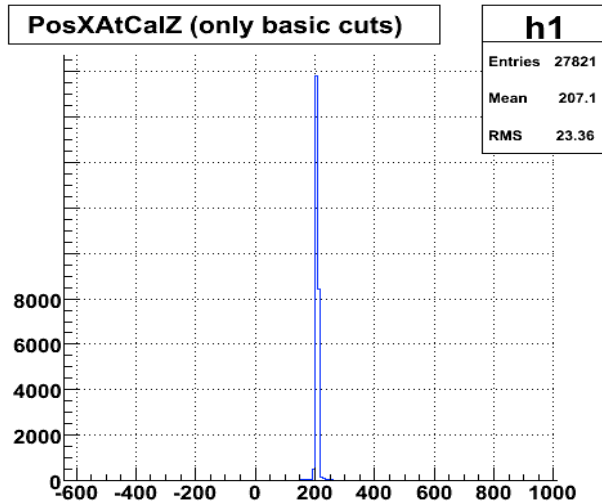
Fitting allows us to “remove” the effect of things which we still do not understand; but which should not be part of the main beam of electrons...

Mean (in this case impact point on X at Tkr1Z0) is NOT affected, but RMS (in this case the beam width in X, before correction for the incidence angle) is very much affected.

Ej, Run 1902 (200 GeV, 30 incidence angle): **PosXatCalZ**

CalZ = -47 mm

$$\text{PosZatCalZ} = \text{"Tkr1X0} + (\text{Tkr1XDir} * ((\text{Tkr1Z0} - \text{CalZ}) / \text{sqrt}(1 - (\text{Tkr1XDir} * \text{Tkr1XDir}))))\text{"}$$



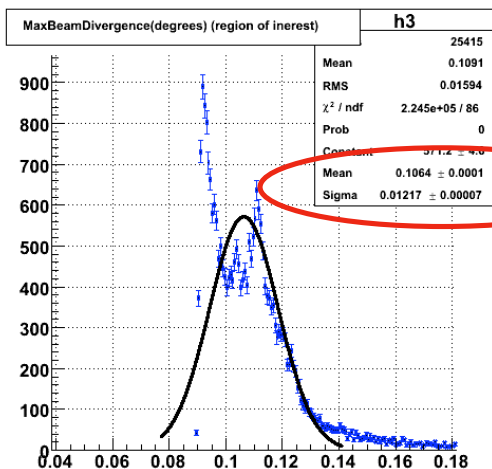
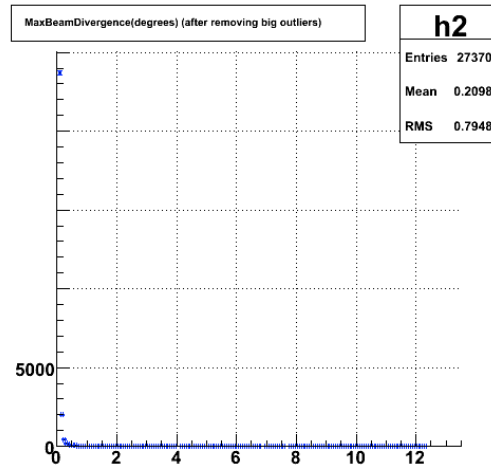
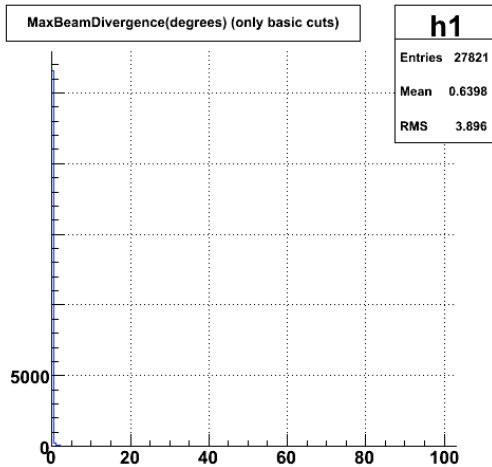
This is the “position” we were setting in the CU table... and the “one used” in the MC runs table from confluence page

*Actually... in the MC from confluence page we are using 201.17*

Ej, Run 1902 (200 GeV, 30 incidence angle): **MaxBeamDivergence**

Actually, what is computed is  $\text{Sqrt}(\text{BeamDivergence}^2 + \text{CU\_AngularResolution}^2)$

" $\text{acos}(\langle \text{Tkr1ZDir} \rangle * \text{Tkr1ZDir} + \langle \text{Tkr1XDir} \rangle * \text{Tkr1XDir} + \langle \text{Tkr1YDir} \rangle * \text{Tkr1YDir}) / 3.14159 * 180.$ "



0.1 deg

We want to make sure that beam was NOT too divergent... in general it is NOT

Note that, since PSF deteriorates with decreasing energy, the upper limit gets less meaningful at the lowest energies... but at 1 GeV PSF should be still less than 1 deg

## Output ascii files from macro

There are two ascii files:

### 1 - Detailed ascii file (Plenty of info):

- Mean, RMS and “related” errors for all distributions, before and after projection
- Warnings with checks for differences between (gaus) fit function and distribution
- Report about errors during execution (i.e. too few events...)
- Print out the filter cuts applied in that execution

### 2 - Short ascii file

Only relevant info for the MC simulation.

```
Beam characteristics for RUN NUMBER 1902
*****
Beam incoming direction (cosinus directors):
  Tkr1ZDir =   -0.867399864
  Tkr1XDir =   -0.497593766
  Tkr1YDir =    0.003926879373

Beam impact point on Calorimeter input (CalZ = -47 mm):
  PosXAtCalZ (mm) =    207.8792706
  PosYAtCalZ (mm) =    37.80050175

Beam width (RMS or Sigma) estimated from projected beam width (X,Y)
on the first hit height, and incoming beam direction:
Beam Width (Sigma) in X direction (mm) = 2.620157343
Beam Width (Sigma) in Y direction (mm) = 2.702856174

Upper limit for Beam divergence:
  CosMaxBeamDivergence() =    0.9999981834
  MaxBeamDivergence(degrees) =    0.1063984533
```

200 GeV,  
30 degrees

## Output ascii files from macro

There are two ascii files:

### 1 - Detailed ascii file (Plenty of info):

- Mean, RMS and “related” errors for all distributions, before and after projection
- Warnings with checks for differences between (gaus) fit function and distribution
- Report about errors during execution (i.e. too few events...)
- Print out the filter cuts applied in that execution

### 2 - Short ascii file

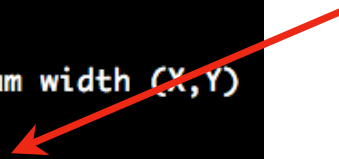
Only relevant info for the MC simulation.

```
Beam characteristics for RUN NUMBER 1902
*****
Beam incoming direction (cosinus directors):
  Tkr1ZDir =   -0.867399864
  Tkr1XDir =   -0.497593766
  Tkr1YDir =    0.003926879373
Beam impact point on Calorimeter input (CalZ = -4
  PosXAtCalZ (mm) =    207.8792706
  PosYAtCalZ (mm) =    37.80050175
Beam width (RMS or Sigma) estimated from projected beam width (X,Y)
on the first hit height, and incoming beam direction:
Beam Width (Sigma) in X direction (mm) = 2.620157343
Beam Width (Sigma) in Y direction (mm) = 2.702856174
Upper limit for Beam divergence:
  CosMaxBeamDivergence() =    0.9999981834
  MaxBeamDivergence(degrees) =    0.1063984533
```

200 GeV,  
30 degrees

Corrected for incoming angle

$$\text{Width}_X = \text{Sigma}_X * \sqrt{1 - (\langle \text{Tkr1XDir} \rangle^2)}$$
$$= 3.02 * \sqrt{1 - 0.497593766^2} = 2.62$$



## USAGE:

One can easily put this macro within another macro looping over the runs which need to be used, thus getting a “table” (single file) with the parameters estimated for all those runs.

### This was done for all runs in PS and SPS

Macros used for these calculations, as well as the resulting ascii files with info for all these runs are in (SLAC machines):

*/afs/slac.stanford.edu/u/gl/dpaneque/Documents/Work/GLAST/EstimationOfBeamCharacteristics/*

```
dpaneque@noric05 $ ls -ltr *
AsciiFiles:
total 6688
-rw-r--r--    1 dpaneque gl          3395794 Nov 14 15:52 EstimatedBeamCharacteristics_PS_AllRuns.txt
-rw-r--r--    1 dpaneque gl          2499816 Nov 14 15:53 EstimatedBeamCharacteristics_SPS_AllRuns.txt
-rw-r--r--    1 dpaneque gl          539306  Nov 14 15:53 EstimatedBeamCharacteristicsTable_PS_AllRuns.txt
-rw-r--r--    1 dpaneque gl          411632  Nov 14 15:53 EstimatedBeamCharacteristicsTable_SPS_AllRuns.txt

Programs:
total 170
-rw-r--r--    1 dpaneque gl           1273 Nov 14 15:45 Style.C
-rw-rw-r--    1 dpaneque gl          31555 Nov 14 15:46 EstimateBeamProfile_FromOneRun_v4.C
-rw-rw-r--    1 dpaneque gl          38082 Nov 14 15:46 EstimateBeamProfile_From_SPS_DataRuns.C
-rw-rw-r--    1 dpaneque gl          47592 Nov 14 15:46 EstimateBeamProfile_From_PS_DataRuns.C
-rwxrwxr-x   1 dpaneque gl          52925 Nov 14 15:47 EstimateBeamProfile_FromOneRun_v4_C.so
```

Perhaps I should put it somewhere in the confluence...



## USAGE:

Root files and Gif plots for all these distributions are in (SLAC machines)

*/nfs/farm/g/glast/u33/dpaneque/BeamTestData/EstimationOfBeamProfile/out/ PS/*

*/nfs/farm/g/glast/u33/dpaneque/BeamTestData/EstimationOfBeamProfile/out/ SPS/*

**Filter cuts applied:** `CalEnergyRaw>100 && TkrNumTracks < 10 && TkrNumTracks>0`

`CalEnergyRaw > 100 MeV`; it removes empty or poorly detected events ...

I just noticed I should have used a lower cut to allow more MIPs...

I was mostly thinking in electrons and photons when doing this.

`TkrNumTracks > 0`; Well... we need at least one track to play...

`TrkNumTracks < 10`; it removes events highly affected by backplash

Note that, in the case of electron beam, a cut `TkrNumTracks == 1` purifies the data set, but reduces dramatically the statistics; the overall effect is a worsening in the accuracy in the determination of the beam characteristics)

Many PS and SPS runs were almost empty (after these filter cuts).

I did not check all results; if you want to use these data for a particular Run, inspect quickly the plots and be sure you are happy with the derived quantities

# Few Quick plots using info from these ascii files (PS and SPS)

## Overall distribution of Tkr1YDir values for all SPS runs

Clear deviation from “desired” value,  $Tkr1YDir = 0.0$ .

$90.-acos(0.005) \sim 0.3$  degrees

$90.-acos(0.008) \sim 0.5$  degrees

I had seen this with the few SPS runs I played with at CERN, but thought it was not significant...

Total length of CU =

Tracker + Calorimeter =

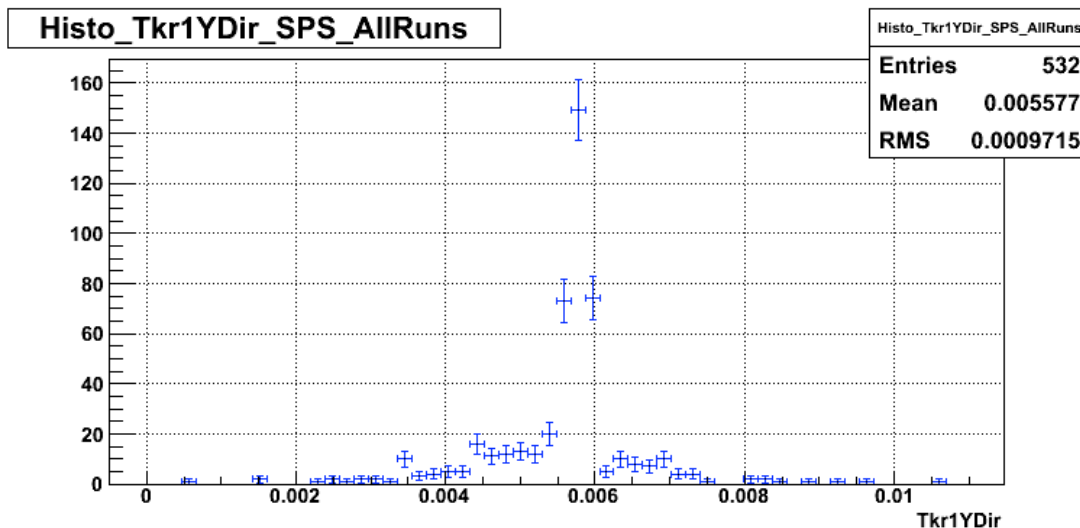
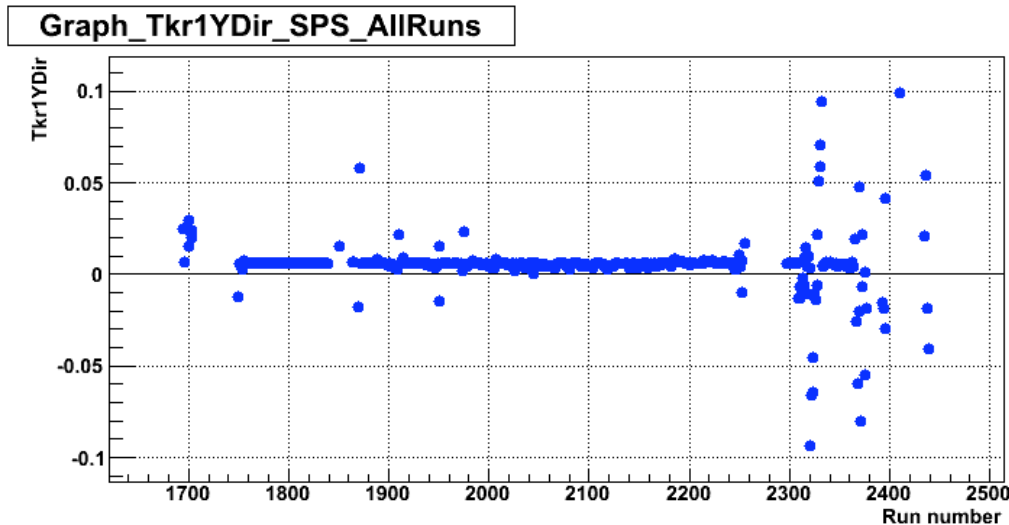
$640 + 224 = 864$  mm

Displacement in Y direction caused by this beam inclination:

$864 * \tan(0.3deg) \sim 4.5$  mm

$864 * \tan(0.5deg) \sim 7.5$  mm

**Should we include that in the MC simulations ?**



# Few Quick plots using info from these ascii files (PS and SPS)

## Overall distribution of Tkr1YDir values for all PS runs

Clear deviation from “desired” value,  $Tkr1YDir = 0.0$ .

$90.-acos(0.0027) \sim 0.15$  degrees

Better than in SPS

Total length of CU =

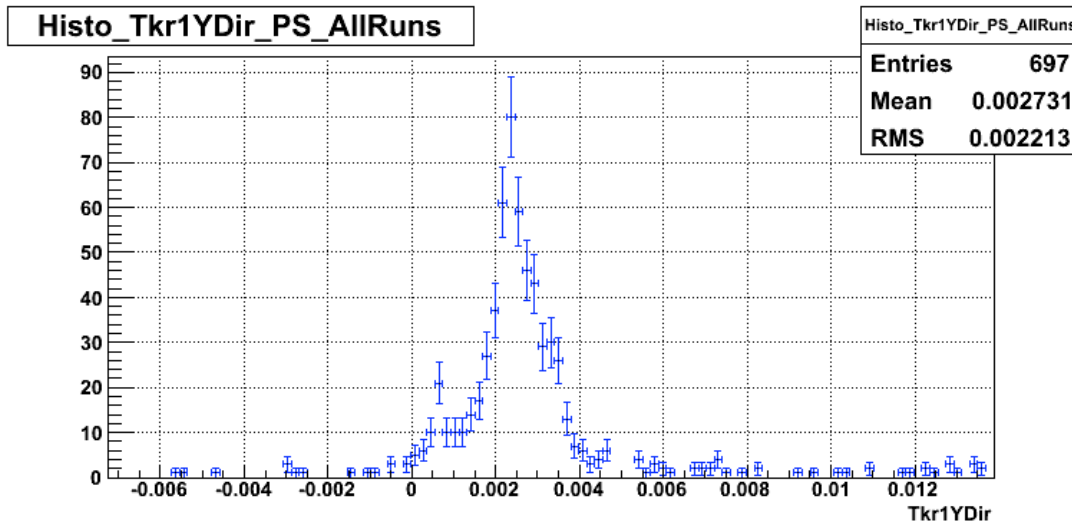
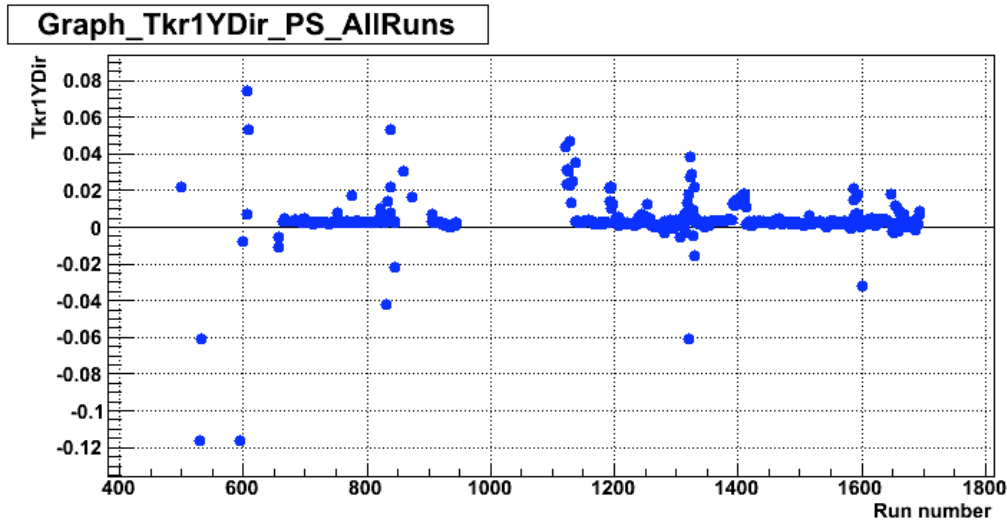
Tracker + Calorimeter =

$640 + 224 = 864$  mm

Displacement in Y direction caused by this beam inclination:

$864 * \tan(0.15deg) \sim 2.3$  mm

Should we include that in the MC simulations ?

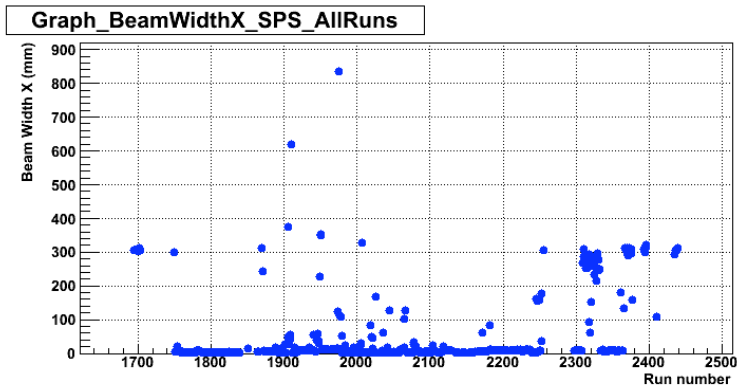


# Few Quick plots using info from these ascii files (PS and SPS)

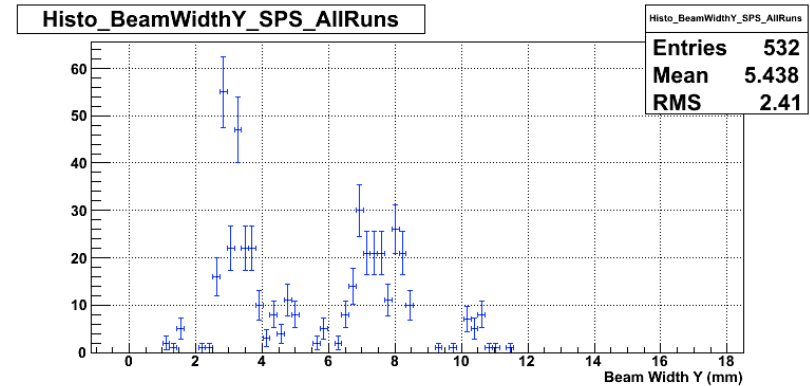
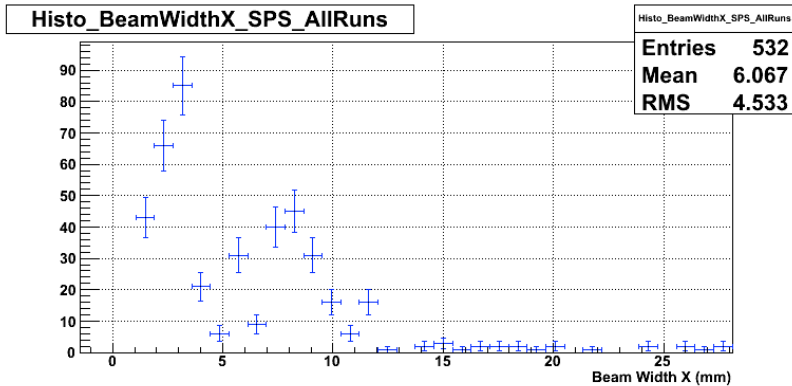
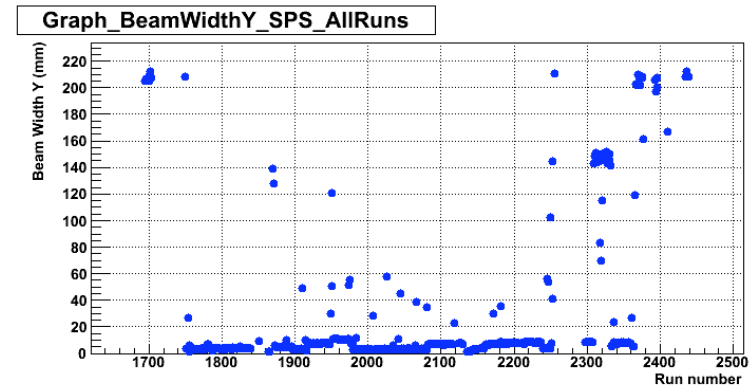
Overall distribution of Beam Width X and Y values for all **SPS runs**

Note that this involves different “particle beams”

**X**



**Y**



Very clear two bump structure in both directions.

Did not have time to correlate with changes in the beam settings

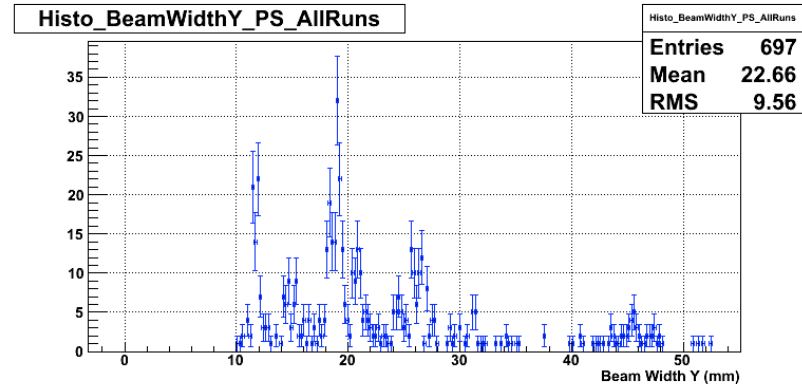
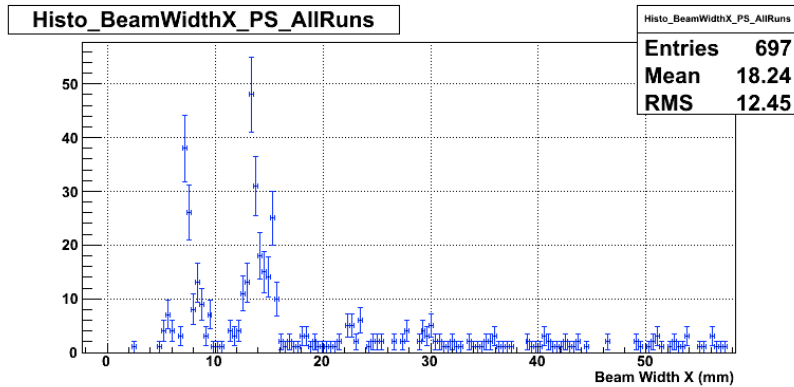
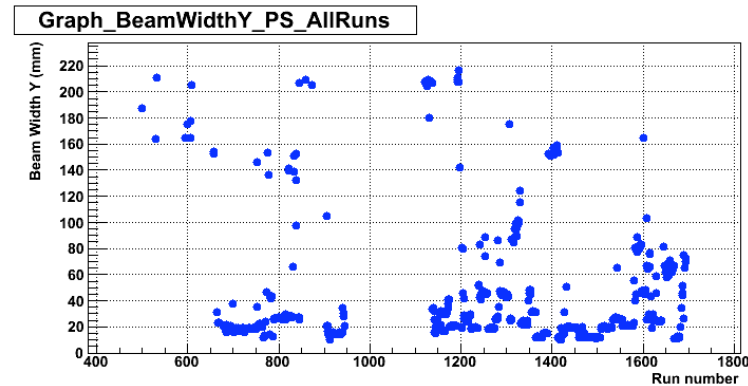
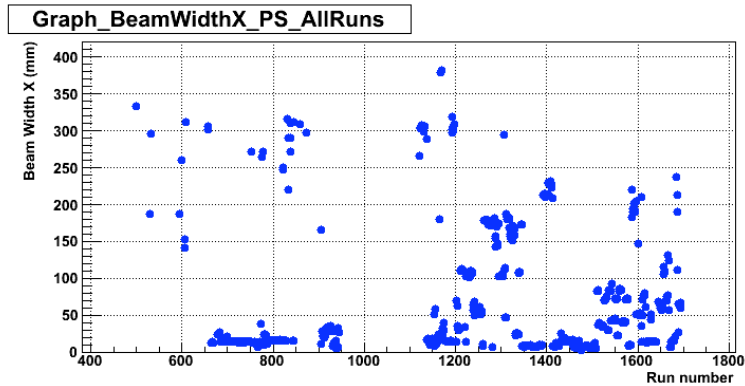
# Few Quick plots using info from these ascii files (PS and SPS)

Overall distribution of Beam Width X and Y values for all **PS runs**

Note that this involves different “particle beams”

**X**

**Y**



Very clear two bump structure in both directions.

Did not have time to correlate with changes in the beam settings

Note also that Width in Y is LARGER than Width in X (any idea ???) 21

## Production of MC runs

**There is not much documentation around...**

**I had to bother quite some people with many questions**

**Benoit;**

after “several trials” he could run **SPS\_setup.exe** in my working space, but only using *MRvcmt*. I wanted to do things with “commands” so that I can repeat exactly (systematically) the same procedures in a quick way (using simple scripts). *I never get things done the first time I try... important to be able to repeat.*

At that moment, beamtest06 was not properly built in my working space... Benoit, that is why we had so many troubles... sorry; I learnt that later...

**Francesco (via ICQ + mail)**

I learnt the commands (with conf. files) to be used for a complete MC simulation (generation of beamtest files, Gleam files and BT tuple).

**That was a big step in my learning curve !**

**Leon -> Tracy -> Tom Glanzmann -> Richard (e-mail)**

*(Plus a scolding from administrators for running long jobs in the public SLAC machines)*

I learnt to Generate (long) MC runs with the SLAC computer farm  
(splitting the generation to run in the medium queue)

Currently using some custom Perl scripts from Richard,

**I am NOT using the pipeline**

I now have a reasonable overview of how things work; yet still not  
successful in generating the files I want (see later)

**EVERYBODY was very kind helping me...**

**But very probably, if I would have had some detailed documentation  
about “Generating MC runs for LAT/BeamTest”, I could have reached  
this point faster and without bothering that many people**

**In case we decide to go on with web page and to allow anyone to  
generate MC, we should consider making this documentation**

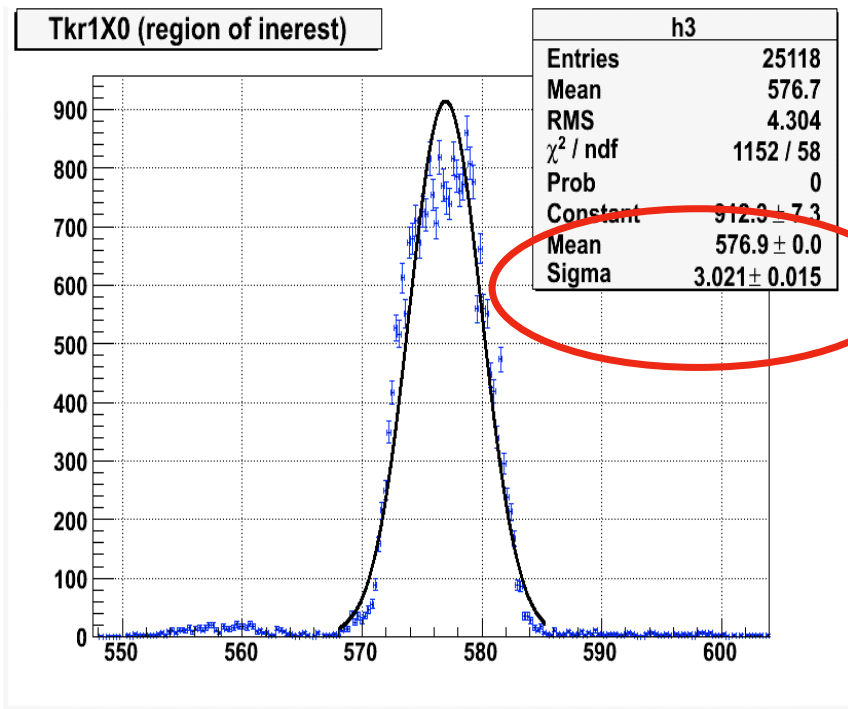
# Generation of SPS runs

Even though I plug the right numbers in the conf. files I do not get the right beam profile

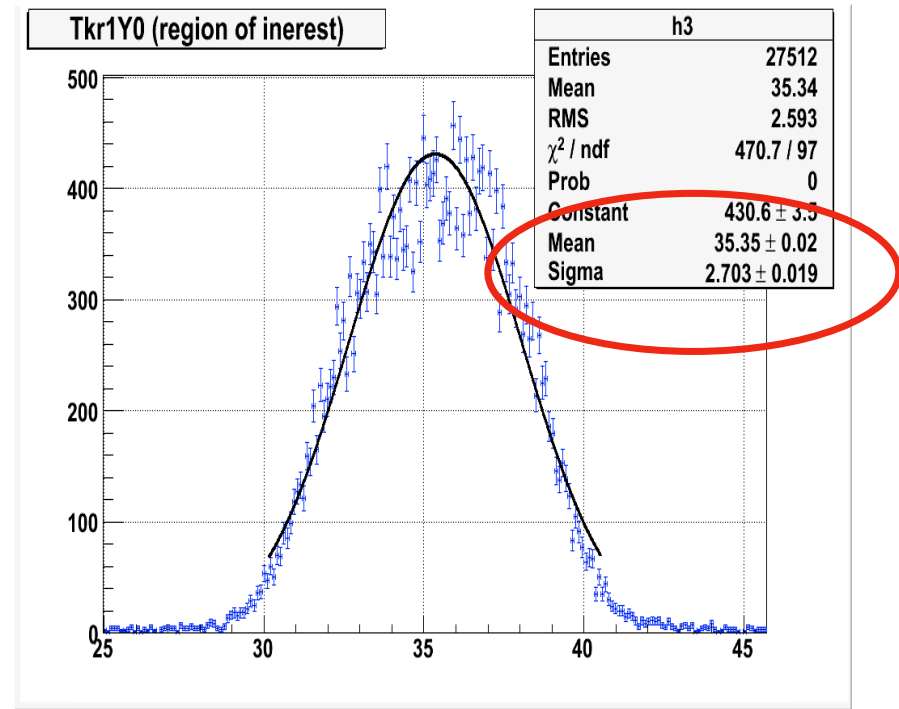
Ej. Generation of MC which fits beam profile from run 1902

## Profile from REAL data

X



Y





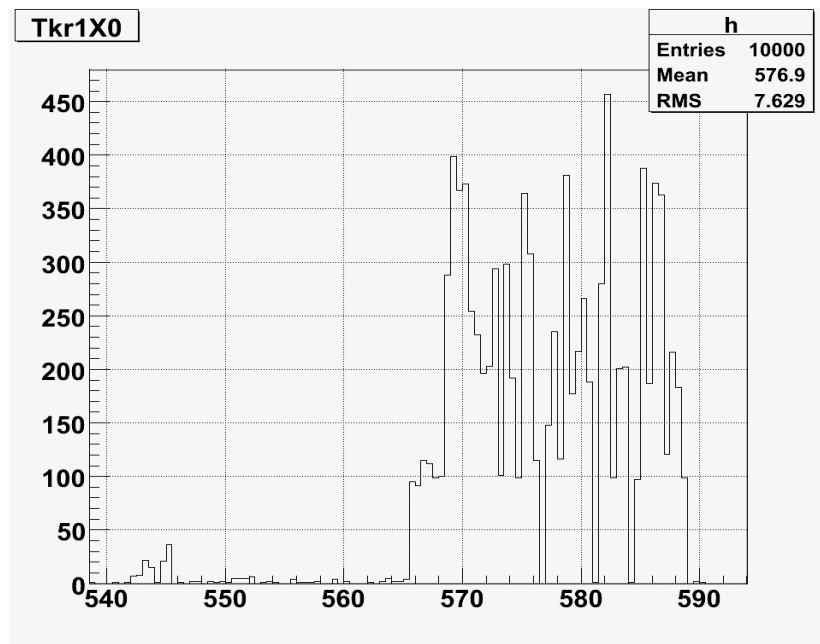
# Generation of SPS runs

Even though I plug the right numbers in the conf. files I do not get the right beam profile

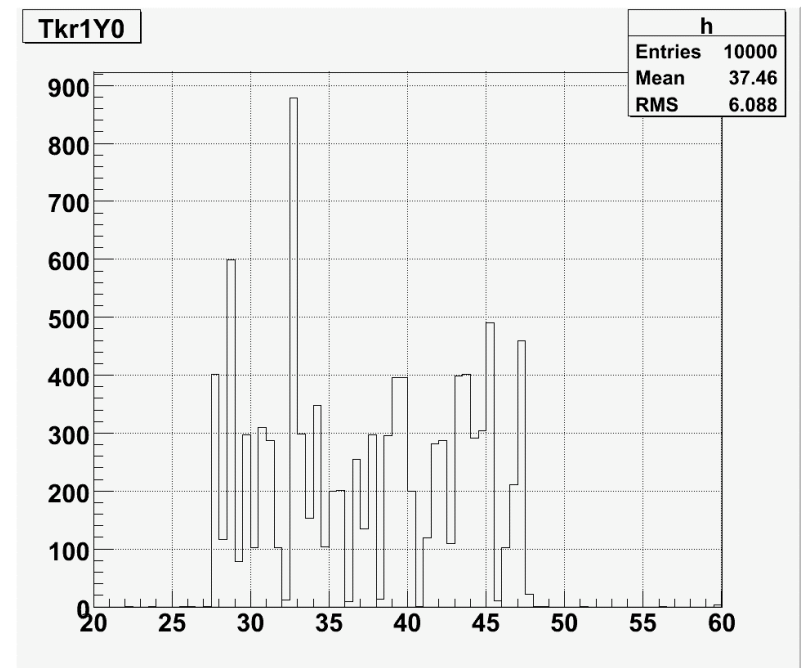
Ej. Generation of MC which fits beam profile from run 1902

## Profile from SIMULATED data

**X**



**Y**



Impact point is in rather good agreement (also incoming angle, energy...)  
BUT the profile of the beam is NOT.

The same effect in all the other runs I simulated (1911... 2096)

It looks like there are “fluctuations from low statistics” which are amplified

The generation of beamtest data is done at once (no splitting, one file 10k Evts),  
but GLEAM is run as 100 Jobs X 100 Evts (= 10k Evts)

Inspection of the individual files show that they are NOT the  
“same” file; yet **there is a clear pattern that gets repeated in all  
those files**

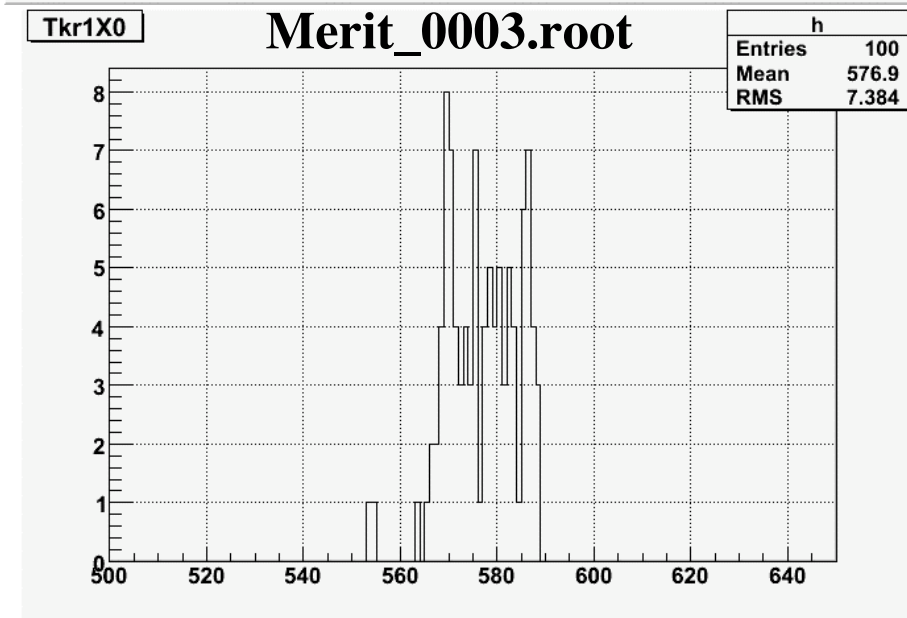
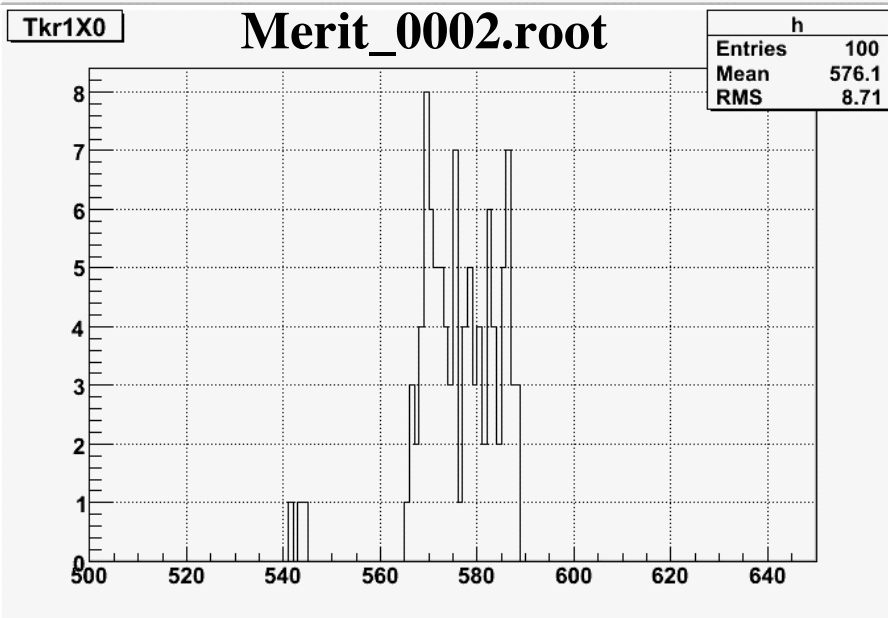
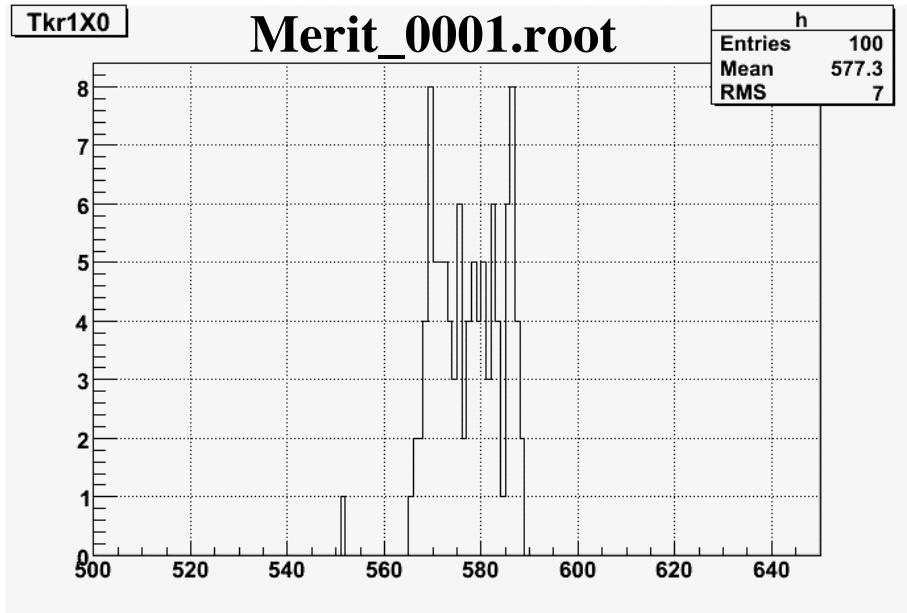
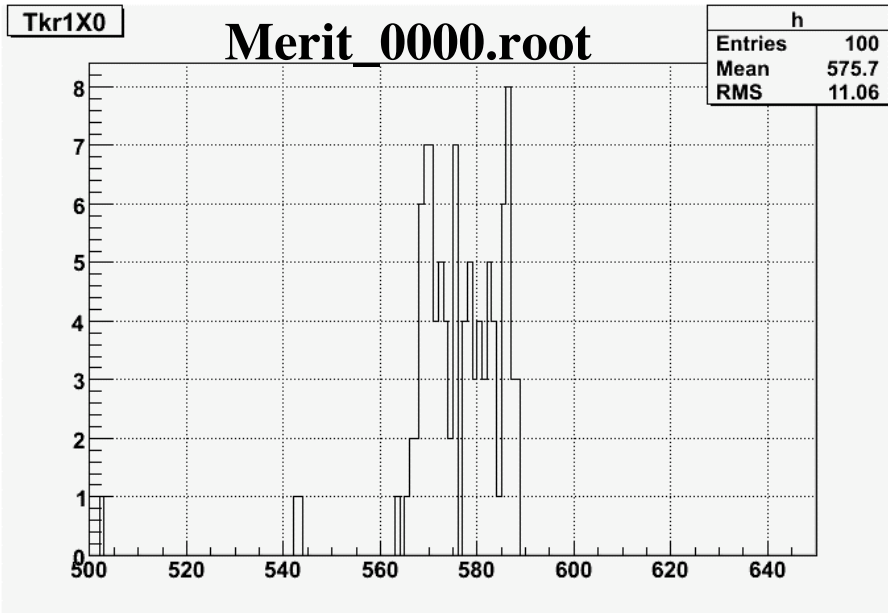
**See next slide....**

**I think GLEAM is taking the SAME 100 events from beamtest root file  
Consequently, the only thing that changes is the simulation of the detector**

**Probably I will have to modify these scripts so that the beamtest data is  
also split in the 100 jobs, producing one file for each Gleam job**

**To be discussed with Richard....**

# Tk1X0 distribution for the first 4 files



# Another technical detail that I do not understand...

Correspondence between parameters set in G4config.mac file for executable SPS\_setup.exe and final parameters in the simulated MC run

Example:

Data run 1902 (200 GeV, **30 deg**)

Data run 1911 (200 GeV, **0 deg**)

```
Beam characteristics for RUN NUMBER 1902
*****
Beam incoming direction (cosinus directors):
  Tkr1ZDir =   -0.867399864
  Tkr1XDir =   -0.497593766
  Tkr1YDir =    0.003926879373

Beam impact point on Calorimeter input (CalZ = -47 mm):
  PosXAtCalZ (mm) =   207.8792706
  PosYAtCalZ (mm) =    37.80050175

Beam width (RMS or Sigma) estimated from projected beam width (X,Y)
on the first hit height, and incoming beam direction:
Beam Width (Sigma) in X direction (mm) = 2.620157343
Beam Width (Sigma) in Y direction (mm) = 2.702856174

Upper limit for Beam divergence:
  CosMaxBeamDivergence() =   0.9999981834
  MaxBeamDivergence(degrees) =  0.1063984533
```

```
Beam characteristics for RUN NUMBER 1911
*****
Beam incoming direction (cosinus directors):
  Tkr1ZDir =   -0.9999619745
  Tkr1XDir =    0.006467714474
  Tkr1YDir =    0.005833725307

Beam impact point on Calorimeter input (CalZ = -47 mm):
  PosXAtCalZ (mm) =   208.2359891
  PosYAtCalZ (mm) =    38.9988796

Beam width (Sigma) estimated from projected beam width (X,Y)
on the first hit height, and incoming beam direction:
Beam Width (Sigma) in X direction (mm) = 3.0718561
Beam Width (Sigma) in Y direction (mm) = 2.757472046

Upper limit for Beam divergence:
  CosMaxBeamDivergence() =   0.999998297
  MaxBeamDivergence(degrees) =  0.03121889102
```

**Small difference in beam profile**

# Another technical detail that I do not understand...

Correspondence between parameters set in G4config.mac file for executable SPS\_setup.exe and final parameters in the simulated MC run

Example:

MC run 168 (200 GeV, 30 deg)

MC run 164 (200 GeV, 0 deg)

```
Beam characteristics for RUN NUMBER 168
*****
Beam incoming direction (cosinus directors):
  Tkr1ZDir = -0.8660211296
  Tkr1XDir = -0.5000071057
  Tkr1YDir = -3.17813731e-06

Beam impact point on Calorimeter input (CalZ = -47 mm):
  PosXAtCalZ (mm) = 201.4454089
  PosYAtCalZ (mm) = 39.98407894

Beam width (Sigma) estimated from projected beam width (X,Y)
on the first hit height, and incoming beam direction.
Beam Width (Sigma) in X direction (mm) = 3.973289095
Beam Width (Sigma) in Y direction (mm) = 3.936920696

Upper limit for Beam divergence:
  CosMaxBeamDivergence() = 0.9999998277
  MaxBeamDivergence(degrees) = 0.03339220169
```

```
Beam characteristics for RUN NUMBER 164
*****
Beam incoming direction (cosinus directors):
  Tkr1ZDir = -1.000000047
  Tkr1XDir = 5.990895843e-07
  Tkr1YDir = -2.534571477e-06

Beam impact point on Calorimeter input (CalZ = -47 mm):
  PosXAtCalZ (mm) = 201.0895009
  PosYAtCalZ (mm) = 39.88215881

Beam width (Sigma) estimated from projected beam width (X,Y)
on the first hit height, and incoming beam direction.
Beam Width (Sigma) in X direction (mm) = 7.96289599
Beam Width (Sigma) in Y direction (mm) = 7.972792914

Upper limit for Beam divergence:
  CosMaxBeamDivergence() = 1.000000024
  MaxBeamDivergence(degrees) = 0.003333252438
```

Factor 2 difference in beam profile

## Another technical detail that I do not understand...

Correspondence between parameters set in G4config.mac file for executable SPS\_setup.exe and final parameters in the simulated MC run

Example:

MC run 168 (200 GeV, 30 deg)

MC run 164 (200 GeV, 0 deg)

**G4config.mac**

**G4config.mac**

```
#!/Cern/detector/triggerxpos -1870 mm
/Cern/detector/triggerywidth 0.5 cm
/Cern/detector/triggerzwidth 0.5 cm
/Cern/gun/ydiv 0. mrad
/Cern/gun/zdiv 0. mrad
/Cern/gun/edispersion 0.1
#!/Cern/gun/ywidth 1. cm
#!/Cern/gun/zwidth 1. cm
/gun/particle e-
/Cern/gun/pos -1300 0 0 cm
/Cern/detector/cherenkovpressure 0.2
#!/Cern/gun/energy 99.749 GeV
/Cern/gun/energy 196.120 GeV
/run/beamOn 100
```

```
#!/Cern/detector/triggerxpos -1870 mm
#!/Cern/detector/triggerywidth 0.5 cm
#!/Cern/detector/triggerzwidth 0.5 cm
/Cern/gun/ydiv 0. mrad
/Cern/gun/zdiv 0. mrad
/Cern/gun/edispersion 0.1
/Cern/gun/ywidth 0.1 cm
/Cern/gun/zwidth 0.1 cm
/gun/particle e-
/Cern/gun/pos -1300 0 0 cm
/Cern/detector/cherenkovpressure 0.2
#!/Cern/gun/energy 99.749 GeV
/Cern/gun/energy 196.120 GeV
/run/beamOn 100
```

**Config files are different, but none of them seem to produce what we have in the final root files. Any idea ??**

**In most runs from SPS we did not use Cherenkov detectors... shouldn't we set this value to ZERO ?**

# Conclusions

Differences data-MC in beam characteristics are substantial. A proper/detailed comparison data-mc requires generating customized MC runs

Simple macro to estimate beam characteristics ready for being used. It produces the values that need to be plugged into the configuration files for MC generation

Proposal for making a web page with this data info. “customized MC runs” should be linked to this page

**R1902 -> MC1902**

**R1911 -> MC1911**

Still not able to generate myself MC runs... but getting closer...