PS Beam Analysis

PS Beam parameters

Tagged Photon runs :

The beam parameters has been studied using the first two tagger chambers. We found that the beam can be described with a gaussian shape with lower/upped bounds. The coordinate system is the one used in the Monte-Carlo.

In the following table are the parameters (with incertitude) for the beam spot gaussian, they don't depend on the beam momentum.

Beam Spot	Position		Min		Max		RMS	
(mm)	Mean	RM S	Mean	RM S	Mean	RM S	Mean	RM S
Horizontal	3.49	0.68	-17.96	0.18	23.24	0.7	12.14	0.47
Vertical	-11.16	0.36	-26.5	0	8.38	0.86	10.43	0.25

In the following table are the parameters for beam divergence as function of the nominal momentum of the electron beam.

Divergence					
Momentum	0.5	1	1.5	2.5	(GeV)
Horizontal	10.03	7.17	4.82	3.17	(mrad)
Vertical	7.19	4.45	3.38	2.33	(mrad)

The beam momentum dispersion has been derived from the Tagger Calibration.

Description of the analysis

We used the following variables : TAG_XYZ, TAG_NUM_CLUSTERS_LAYER and work only on "4 points" events, i.e. one cluster per tagger layer. Use the highest cluster to draw interesting distributions :

- spot : Horizontal, Vertical position and correlation
- divergence : Horizontal, Vertical angles and correlation

Beam spot is truncated by the scintillators, so we need to get the min/max of both horizontal and vertical distributions. Boundaries are defined as : Number of Hits > Maximum hits / 10. Each distribution is then fitted within these boundaries with a Gaussian function, in order to retrieve the first two moments.

Horizontal and vertical angle distributions are fitted equally with a Gaussian function within +/- 1.5*RMS of the distribution in order to fit the peak and exclude tails.

This analysis is done on all good tagged photons runs and global parameters are derived for each beam momentum as shown on the following plot :

- beam spot : Truncated Gaussian function parameters (Min, Max, Mean, RMS)
 - + Horizontal/Vertical position (mm) : Min (blue triangle), Mean (Black circle), Max (red triangle) + Horizontal/Vertical dispersion (mm): RMS (Black circle)
- beam divergence : Horizontal/Vertical angles in mrad, clearly depend upon beam momentum.

Click on the thumbnail to open the Beam statistics plot for Tagged photons runs :



Please find in attachment all the beam spot plots in the Tagger and in the CU for all the runs