Study of Lorent Angle with Silicon strip detector for the CMS tracker upgrade

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Plan of talk

- Lorentz angle and its importance.
- Present status.
- Where are we?
- Future plan?

Lorentz angle and its importance

In presence of high magnetic field a Lorentz force acts on the drifting charge carriers produced by ionizing particles in the Silicon sensors of CMS Tracker and this leads to systematic shift in readout position of charges which degrades the tracking performance.
Charge carriers are deflected in a magnetic field perpendicular to electric field by Lorentz angle

$$\Theta_L = \frac{\Delta x}{d} = \mu_H B = r_H \mu B$$

Where d drift distance of charge along electricc field
Δx is shift of signal position
μ_H is Hall mobility
μ is drift mobility without magnetic field
r_H is Hall scaling factor.$r_H \simeq 0.7$ for holes and $r_H \simeq 1.15$ for electrons at room temperature[1].

Neccessity of LA

Measurement of Lorentz angle is very important for some reason[2]. Viz.

- It is one of the parameter in alignment correction.
- Monitor μ_H changes to constrain the alignment fit and allow fits over during which the detector was not moved.
- Measurement of μ_H will help to measure the position shift of charge particle due to Lorentz angle.
- Monitor μ_H changes mesure will help to follow detector aging.

Present Status[3]

Clusterwidth vs tangente of track angle has been stuied,

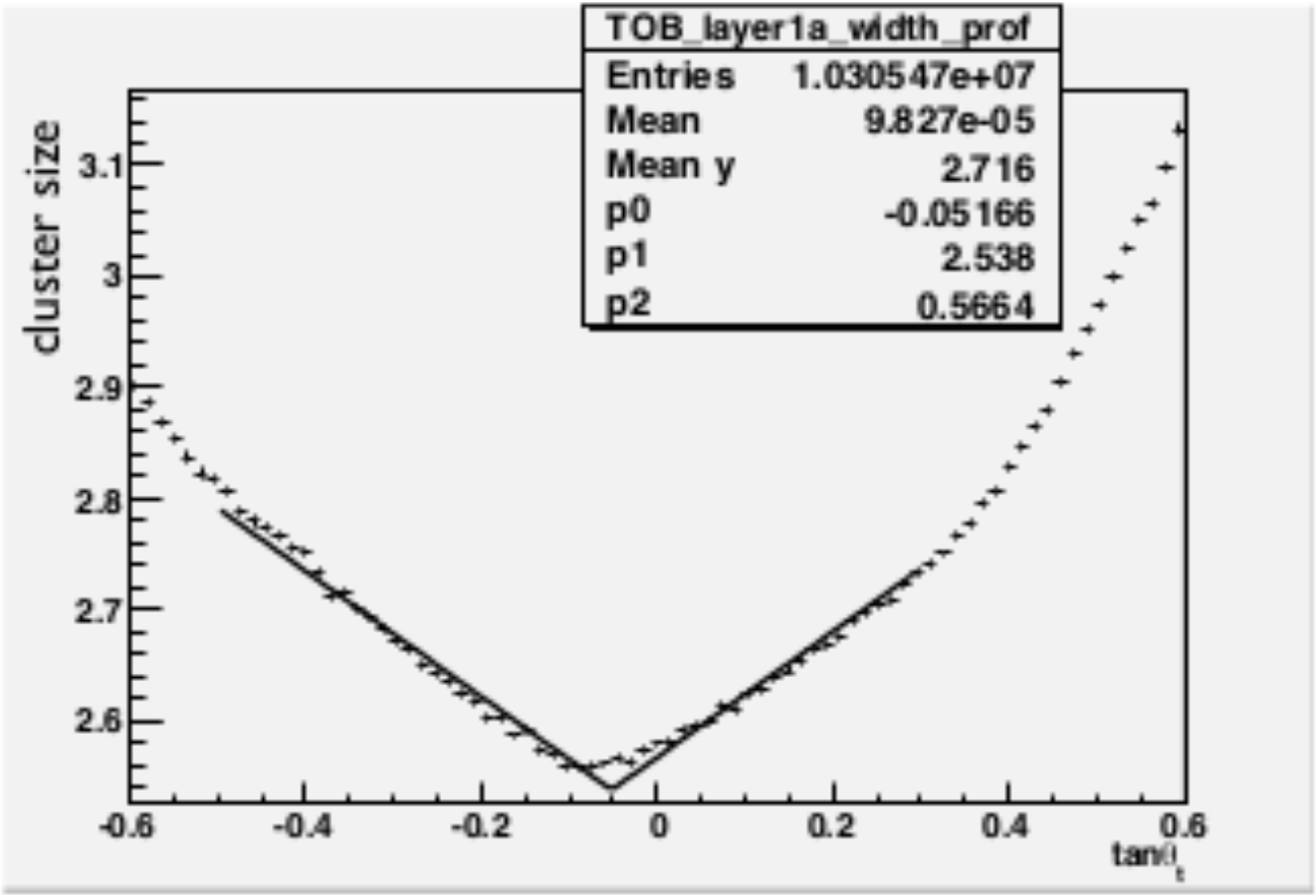

Figure 1 : Clusterwidth vs tangente of track angle