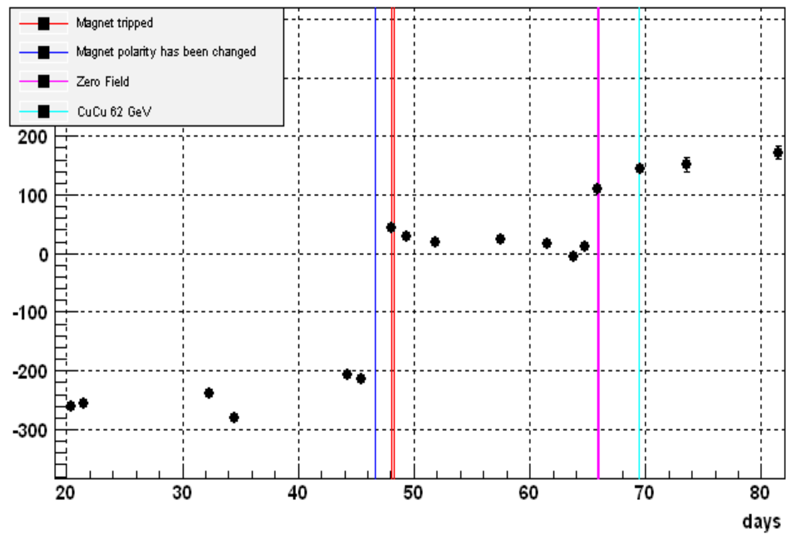
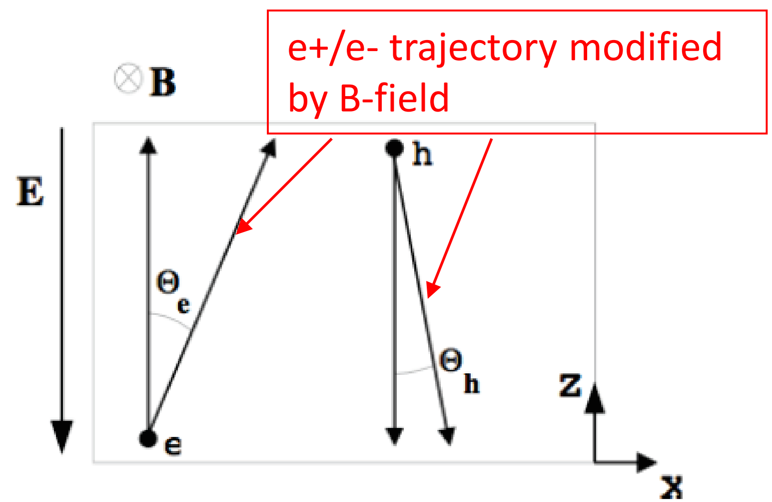
Lorentz effect

- Observation from data : shift in <z> residuals of the order of 200μm depending on the B-field orientation. Not all shifts explained by sign of B.



- Lorentz effect : trajectory of electrons/holes are modified due to the combination of the STAR magnet B-field and the SSD wafer E-field



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Lorentz effect correction in the code

- Values from CMS : ϑ_e^- , ϑ_e^+
- Θ_L = 21° for electrons and Θ_L=8° for holes (at T =280 K and V_{bias} = 40 V [1])
- Normalized to STAR B-Field

$$tan(\theta_L^{STAR}) = \arctan(\tan(\theta_L^{CMS}) \times \frac{B^{STAR}}{B^{CMS}})$$

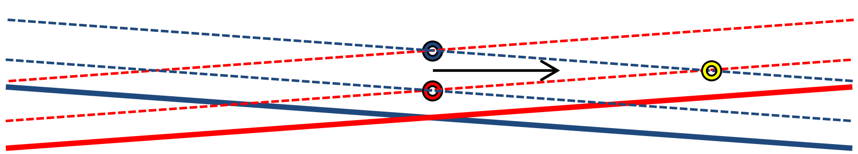
→ $\theta_e^+ = 4.4$ °
$\theta_h^- = 1.6$ °

$$\Delta(x) = \tan(\theta_L^{STAR}) \times d$$

→ Δx = 12 μm for electrons
Δx = 4.2 μm for holes

d = drift distance along the E-field (d =150 microns , half-thickness of the wafer)

Thus the anode and cathode strips will experience different distortions on the two sides of the detector. When reconstructed, this leads to a distortion in the Z direction approximately equal to $\tan(\theta_e - \theta_h)$*d / $\tan(\theta_{ac})$ or about 210 μm.



J. Bouchet

[1]:http://arxiv.org/pdf/physics/0204078v2.pdf