

COT Alignment

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Current Alignment

Axial alignment set with cosmic rays muons

- Cell tilts and shifts for east and west endplates
- ~ 5 micron resolution per cell
- Residual misalignments result in maximum d_0 offset of ~ 100 microns

Stereo alignment set with gravitational sag, electrostatic calculations

- Gravitational sag: 203 micron quadratic (wire) term, 59 micron linear (spacer) term
- Electrostatic motion has two components:
 - Wire offset in cell
 - Relative sag of field sheet to wire
- Field sheet sag larger than wire \rightarrow counteracts gravitational sag

Current Alignment

Sign error in electrostatic correction:

```
028 // calculate electrostatic motion
030 CT_FTYPE const amplitude = 0.0117;
031 CT_FTYPE const offset = 0.0084;
032 CT_FTYPE magnitude = amplitude*cos(_tilt)+offset;
033 magnitude *= 1./2.7; // scale factor for 1.9 kV (section 16.4)
034
035 //quadratic z dependence
036 CT_FTYPE zfactor = z > ZERO ? (_eastZ - z)/_eastZ : (_westZ - z)/_we
037
038 // direction is -phi_tilt
039 wirePosition.x() += magnitude*sin(_tilt)*zfactor*zfactor;
040 wirePosition.y() += magnitude*cos(_tilt)*zfactor*zfactor;
```

x term should be -= (rotation)

Current Alignment

Study current misalignments with cosmic rays

- Difference in muon parameters as function of z_0

(see cosmic531z0.ps)

Towards a New Alignment

x sign fixed, offset sign flip also improves Δd_0 distribution

Need additional terms:

- $-(1-zfactor)^2 \times (1 \text{ mm}) \times radius/140$ (fix $\Delta curvature$)
- $-(1-zfactor)^4 \times (150 \mu m)$ (fix edges of Δd_0)

(see cosmic6x.ps)

Still tuning $\Delta curvature$ term