

Plan of Tracker Alignment MC studies

Hiro Tajima and Leon Rochester Stanford Linear Accelerator Center

> November, 25, 2002 GLAST analysis meeting

> > GLAST



• Objectives.

- Evaluation of alignment precision.
 - Alignment parameters for perfect TKR in MC.
 - Alignment parameters for misaligned TKR in MC.
- Evaluation of misalignment correction procedure.
 - Comparison between data and MC.

Boundary conditions.

- Mechanical precision is not much worse than the specification (SCIPP 97/32).
- Detector placement precisions.
 - Displacement in z direction < 20 μ m.
 - Displacement in xy plane $< 50 \,\mu$ m.
 - Rotation < 0.3 mrad.

Plan of TKR Alignment MC Studies, Hiro Tajima, Nov 25, 2002



- No modification of TKR geometry.
 - Changing geometry for each detector is too complicated and probably unnecessary for small misalignment.
 - Hits are generated with nominal detector positions.
- Misalignment by Digi.
 - Digi recalculates the hit position in the SSD according to misalignment parameter and track slope (α).





- Track finder ignores misalignment.
 - Rotation correction requires 3D space point information.
 - Effect of misalignment is considered negligible.
- Alignment parameters are obtained by independent alignment program. $(x'_{shf}, y'_{shf}, z'_{shf}, y'_{rot}, x'_{rot}, z'_{rot})$
- Track fitter takes into account misalignment.
 - Recalculate xy hit position at the nominal z position according to misalignment parameters and track slope.

$$x'' = x' + x'_{shf} + z'_{rot}y' - \alpha'_{x}(z'_{shf} - y'_{rot}x' + x'_{rot}y')$$

$$y'' = y' + y'_{shf} - z'_{rot}x' - \alpha'_{y}(z'_{shf} - y'_{rot}x' + x'_{rot}y')$$

- Alternatively, in addition to xy, z value of hit can be recalculated.
 - Greater modification is required for track fitter.

$$x'' = x' + x'_{shf} + z'_{rot}y', \quad y'' = y' + y'_{shf} - z'_{rot}x'$$
$$z'' = z + z'_{shf} - y'_{rot}x' + x'_{rot}y'$$

Plan of TKR Alignment MC Studies, Hiro Tajima, Nov 25, 2002