Comparison of debris simulations between SixTrack and FLUKA

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Introduction

• FLUKA simulations of IP debris by L. Esposito

• SixTrack simulations of debris tracking by myself from FLUKA distribution of debris

• Same optics (7TeV nominal)
  - $\beta^*=55\text{cm}$, $\text{Xing} = 142.5 \ \mu\text{rad}$

• First results quite different:
  - Collimator alignment error in FLUKA
  - Small difference in aperture
    - Beam screen “aperture” / “nominal dimension”
  - Energy cuts too tight in SixTrack initial distribution

• Will be part of an IPAC article
$dp/p$ cut of collision debris in SixTrack (10 %) was too tight: losses were “missing” from the DS and before

• Initial distributions were generated again
$dp/p$ of particle lost vs. longitudinal position: new results

- Distributions are now matching
- The SixTrack one is wider: more statistics

- 1D distributions of $dp/p$ between 280m and 290m
- Distributions normalised to $\Sigma=1$
Comparison SixTrack / FLUKA: no TCL

- Now excellent agreement!
- Longitudinal positions of peaks within one bin (1m)
Conclusion on comparison with FLUKA

- Excellent agreement between SixTrack and FLUKA in DS (p/m/s)
- Gives us confidence that tools are in agreement for estimated far losses

- Next steps:
  - Multi-turn tracking
  - Scans of crossing angle
Spare slides
$dp/p$ of particle lost vs. longitudinal position:
new results

- Distributions are now matching
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- 1D distributions of $dp/p$ between 280m and 290m
- Distributions not normalised
Comparison SixTrack / FLUKA: TCL4

- Difference in longitudinal position can be due to misalignment: left jaw too far away in FLUKA simulation
Comparison SixTrack / FLUKA: TCL5

- Also an alignment issue in FLUKA