Update on striplets paper

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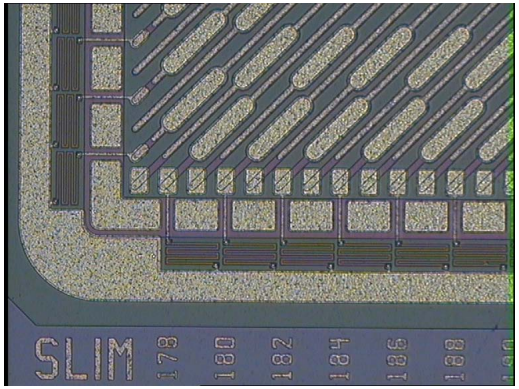
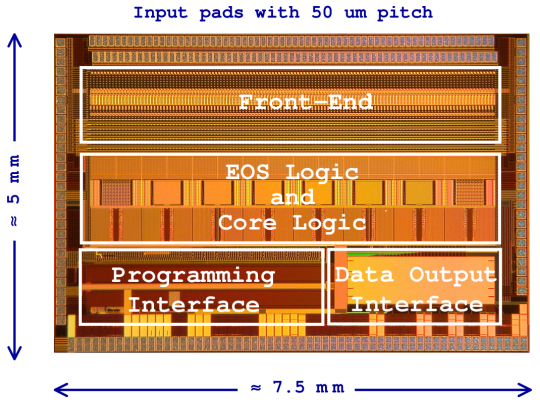


Outline



- Cross checks, bug corrections,
- Paper writing

Resolution from Residuals

The resolution of the DUT can be estimated from the residual distribution, but the track extrapolation to the DUT position and the Multiple Scattering must be subtracted.

$$\sigma^2_{resolution} = \sigma^2_{residual} - \sigma^2_{extr\text{-}track} - \sigma^2_{MS\ on\ DUT}$$

Residual on DUT = measured pos. – extrapolated pos.

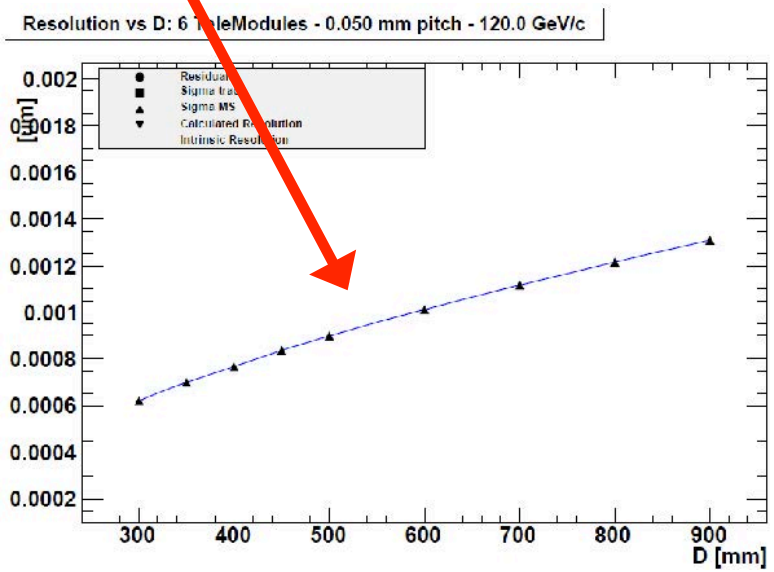
depends on $(z_{DUT}, reso_T, MS_T)$

Typical values at normal incidence are:

σ residual ~ 12 μm

σ extr-track ~ 3.2 μm

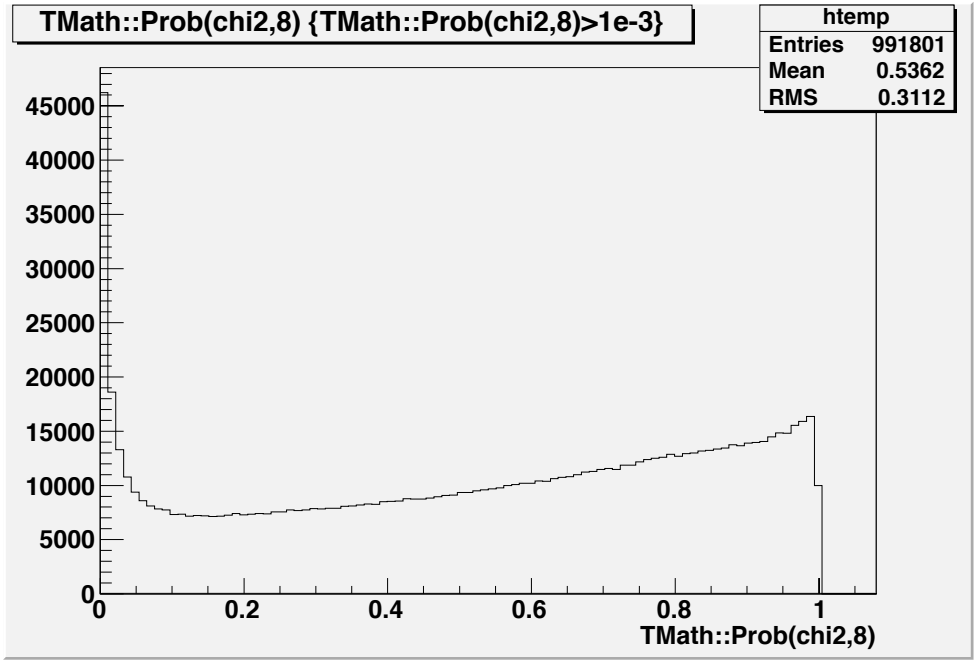
σ MS ~ 1.0 μm



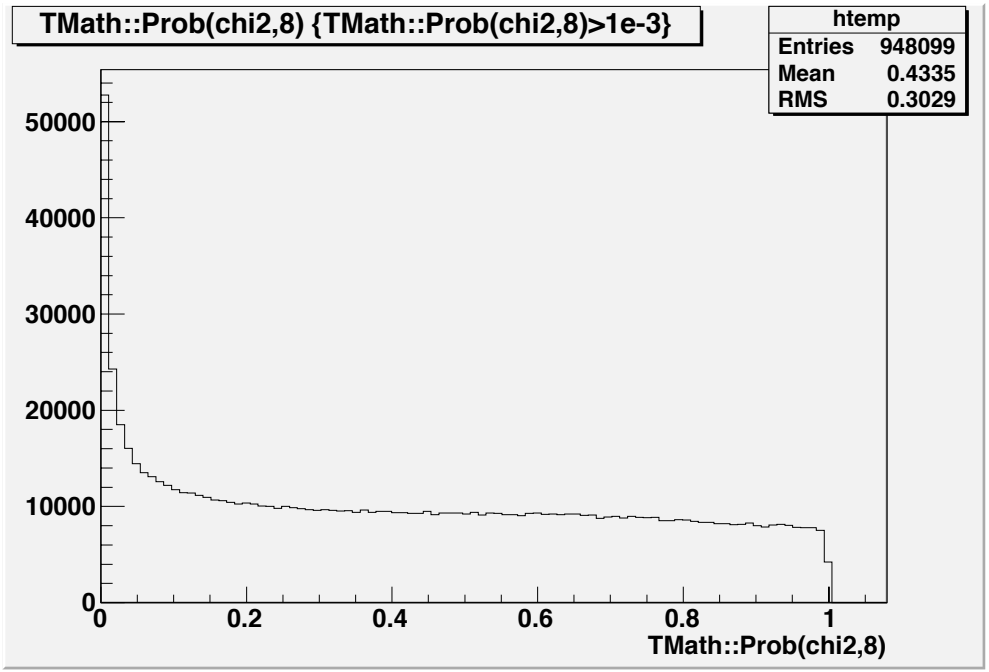
Contribution from track

Default values were 10 μm both for p and n sides, but in this way error matrix was largely overestimated.
After correction for a bug in SbtSpacePoint.cc,
input error for the telescope hits have been tuned until Prob(Chi2) was flat.

σ_p=7 μm; σ_n=10 μm



σ_p=6 μm; σ_n=9 μm OK!



Then the error matrix was used to propagate to the DUT position:

Some Formulas

$x = a + bz$ $\rightarrow$ similarly for y : $y = a + bz$

$z_{DUT} = 434mm$

$x_{EXT-DUT} = a + bz_{DUT}$

$$\sigma_{x_{EXT-DUT}} = \sqrt{\sigma_a^2 + (z\sigma_b)^2 + (b\sigma_z)^2 + 2zc_{ab}} = 2.47\mu m$$

with $\sigma_a = 3.535\mu m$ $\sigma_b = 5.315 \cdot 10^{-6}$ $c_{ab} = -1.398 \cdot 10^{-5}$

Assume (from RMS angle) $b \approx 10^{-6}$ $\sigma_z = 1mm$

For y $\sigma_a = 5.392\mu m$ $\sigma_b = 7.972 \cdot 10^{-6}$ $c_{ab} = -3.146 \cdot 10^{-5}$

$\sigma_{y_{EXT-DUT}} = 3.71\mu m$

Resolution from Telescope

The extrapolated track resolution on the DUT can be estimated from the telescope resolution using this formula:

$$\sigma_{EXT-DUT} = \frac{1}{\sqrt{2}} \sqrt{\frac{\sigma^2_{xEXT-DUT}}{\cos^2 \vartheta} + \sigma^2_{yEXT-DUT}}$$

With:

$\sigma_{\text{x-track}}$ the resolution in x of telescope extrapolated track

$\sigma_{\text{y-track}}$ the resolution in y of telescope extrapolated track

ϑ the DUT rotation angle

At normal incidence $\sigma_{\text{extr-track}} = 3.15\ \mu m$

Other cross checks

- Multiple scattering
- Carlo rerun all efficiencies and resolutions
- Maximum likelihood fits (use as a cross check for systematics?)

Paper writing

- We are one week late wrt promised schedule
- But 8 pages and first draft of figures are already in CVS