

Allowed hit density to achieve a given probability of correctly linking hit with track

$$P_{\text{ch}} = \frac{1}{2 \cdot \pi \cdot \sigma_x \cdot \sigma_y \cdot \rho + 1}$$

Probability of correctly associating a hit with a track, see <http://www-rnc.lbl.gov/~wieman/HitFinding2DXsq.htm>

σ_x track pointing resolution in x at detector surface

σ_y track pointing resolution in y at detector surface

ρ hits per area, hit density on the detector

$$\rho(P_{\text{ch}}, \sigma_x, \sigma_y) = \frac{\frac{1}{P_{\text{ch}}} - 1}{2 \cdot \pi \cdot \sigma_x \cdot \sigma_y}$$

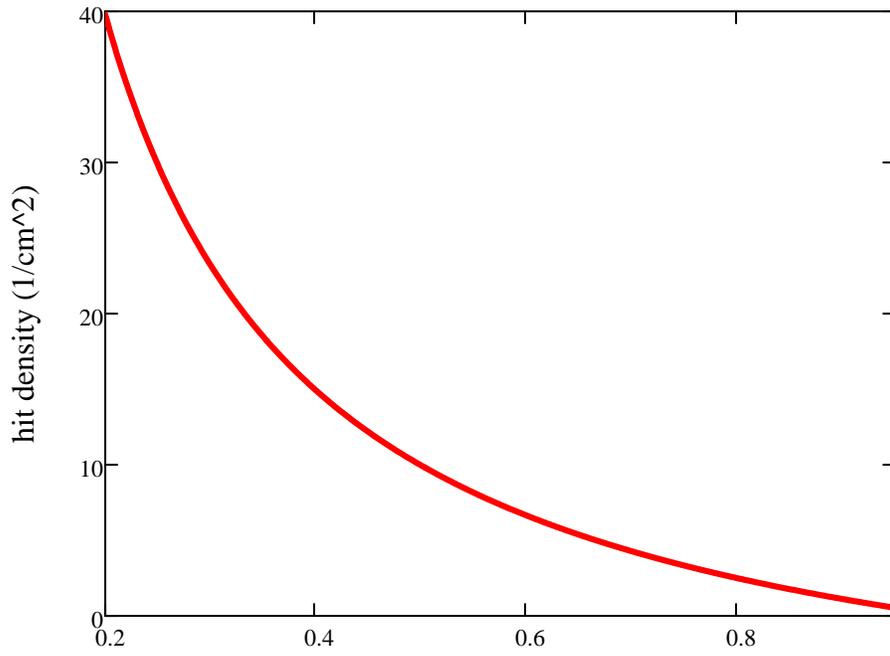
$\sigma_x = 2\text{mm}$ TPC pointing resolution from Flemming's plots
<http://drupal.star.bnl.gov/STAR/blog/videbaks/2013/may/24/pxl-track-hit-matching>

$\sigma_y = .8\text{mm}$

$$\rho(.8, \sigma_x, \sigma_y) = 2.5 \frac{1}{\text{cm}^2}$$

ie 10 hits per sensor will give 80% correct association with our global pointing resolution

hit density vs correct association probability



Probability of correctly associating hit with track

— hit density (n/cm^2)