

CDC Tracking Software

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Sept. 8, 2008

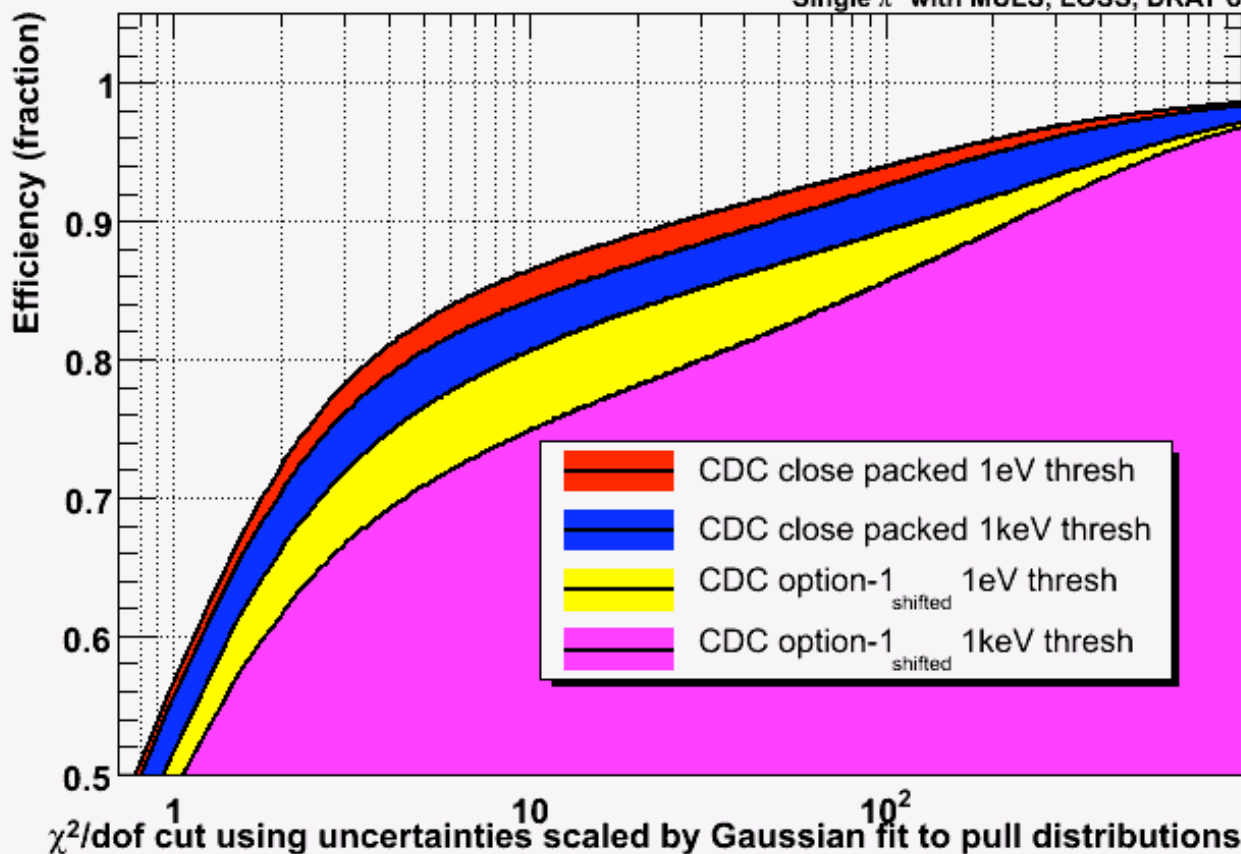
Efficiency vs. cut on χ^2/dof (scaled)

August 23, 2008 DL

svn revision: 4096

Candidates from finder

Single π^+ with MULS, LOSS, DRAY on



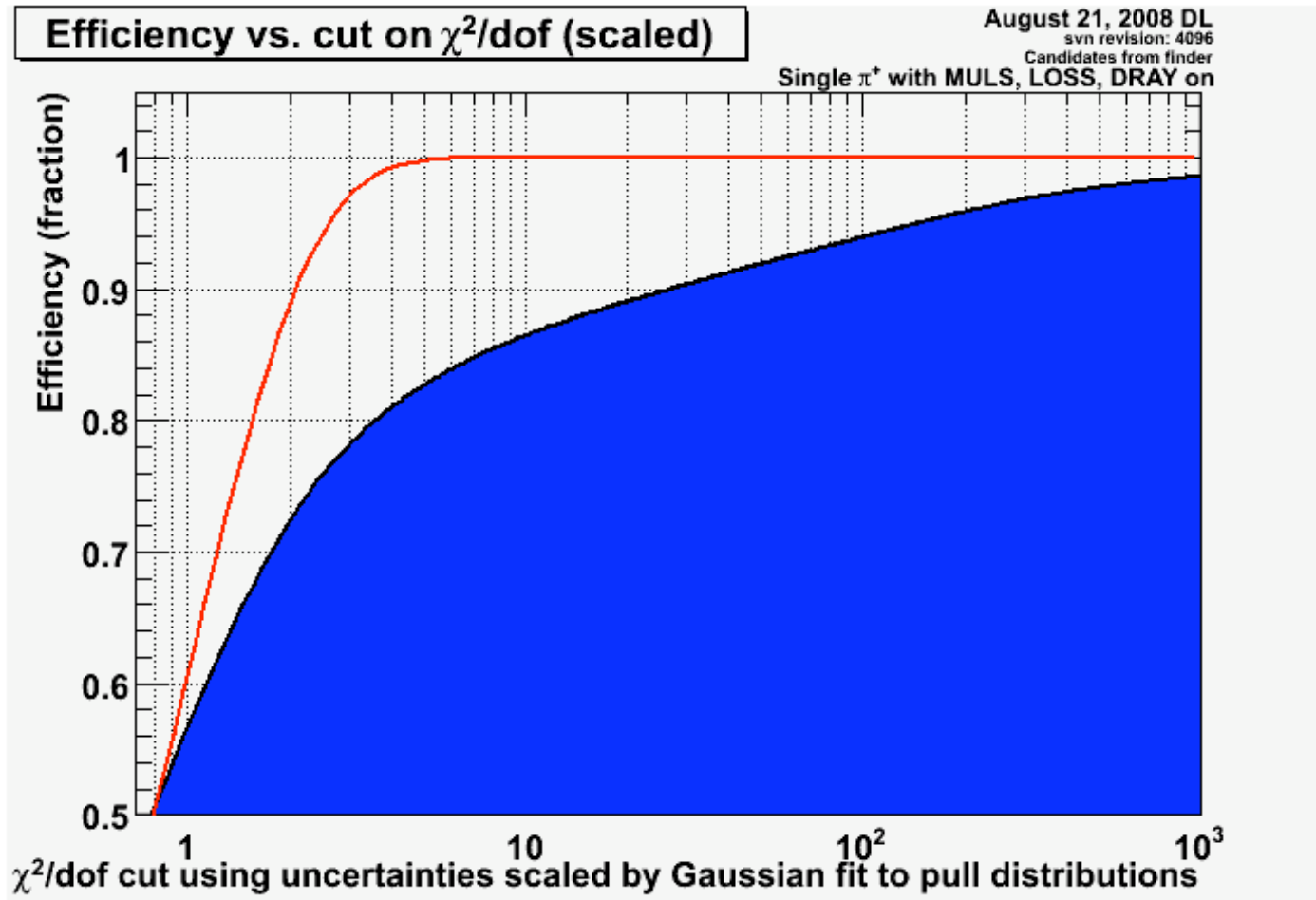
How χ^2 is defined

The χ^2 is formed using the residuals between the fit and thrown parameters:

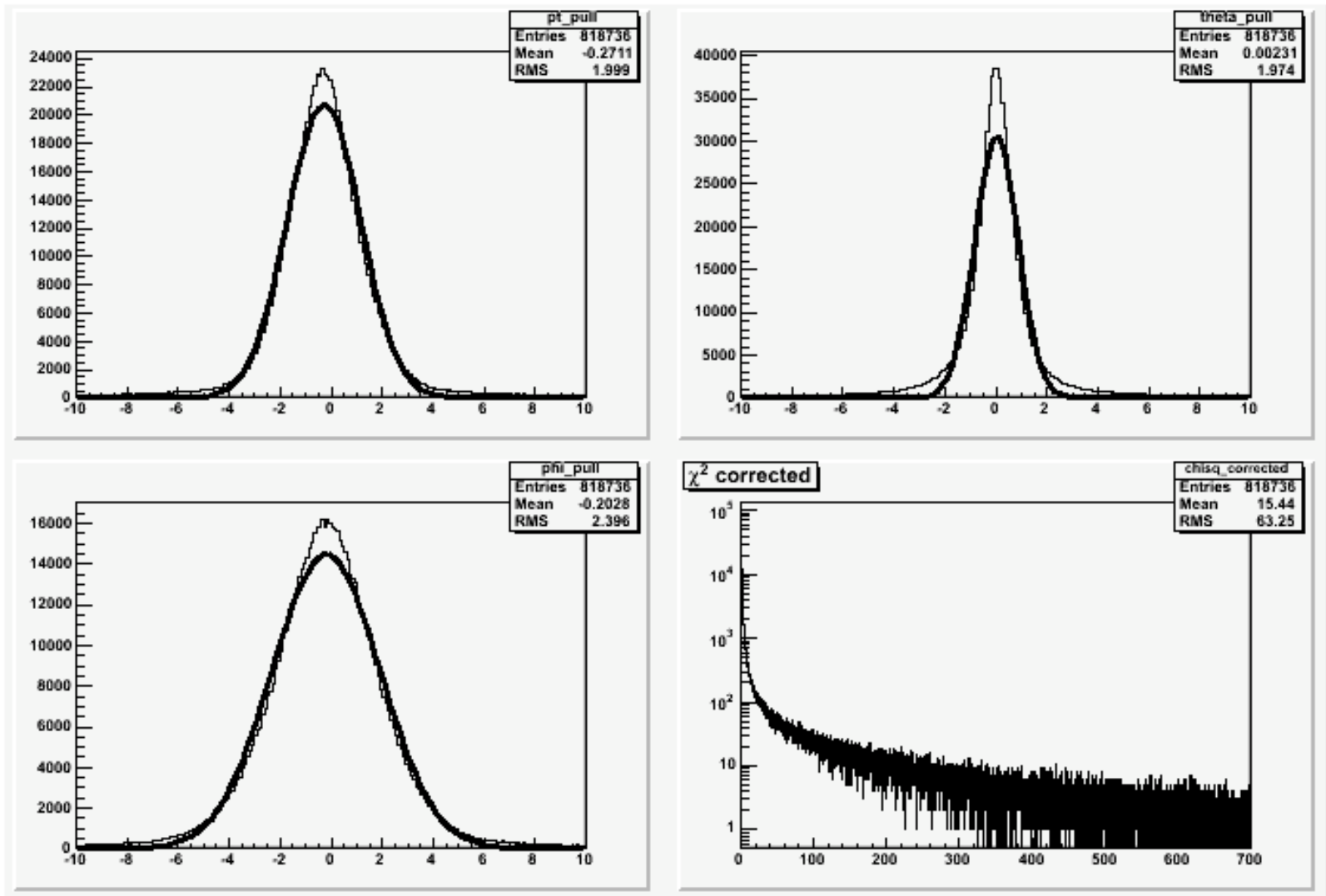
$$\chi^2 = (\Delta p_t / p_t)^2 + (\Delta \theta)^2 + (\Delta \phi)^2$$

If the components are independent and drawn from a Gaussian parent distribution, this would follow a “chi-squared” distribution with a well-known probability distribution (see next slide)

“Tracking Efficiency” compared to χ^2 cumulative distribution function



Pull distributions have non-Gaussian tails

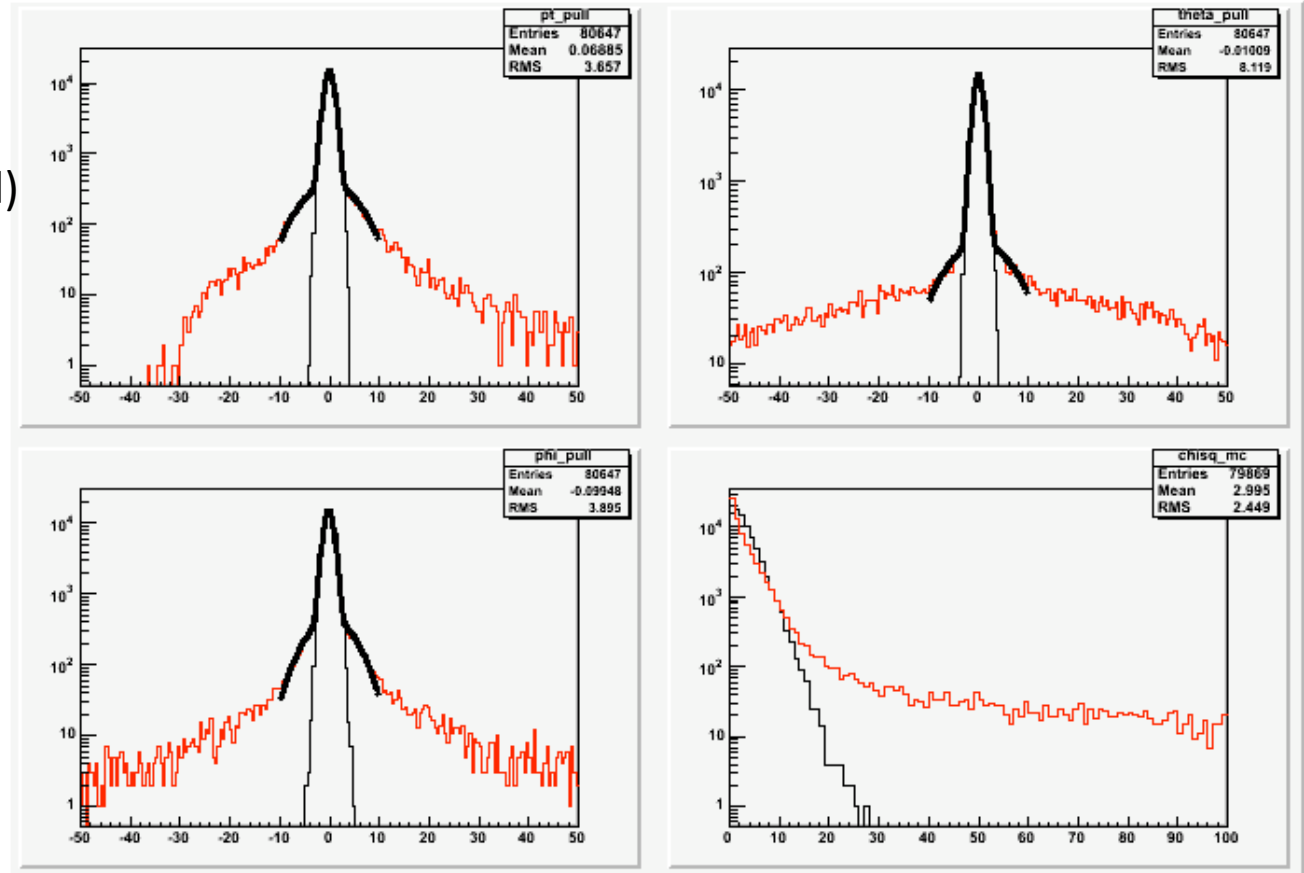


Pulls with double Gaussian fits

Red = Tracking Results

Thick black = double gaussian

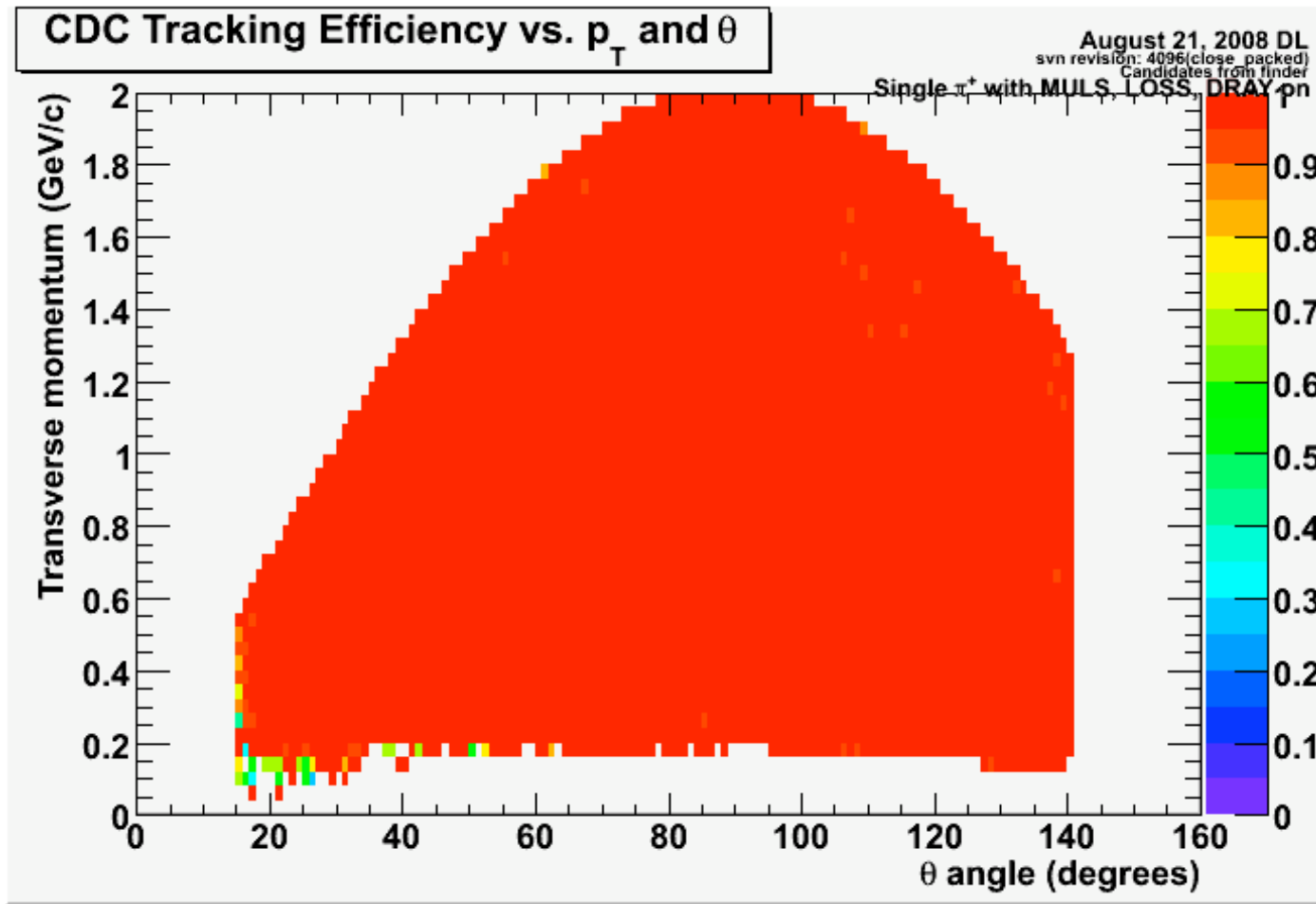
Thin black = gaussian (sampled)



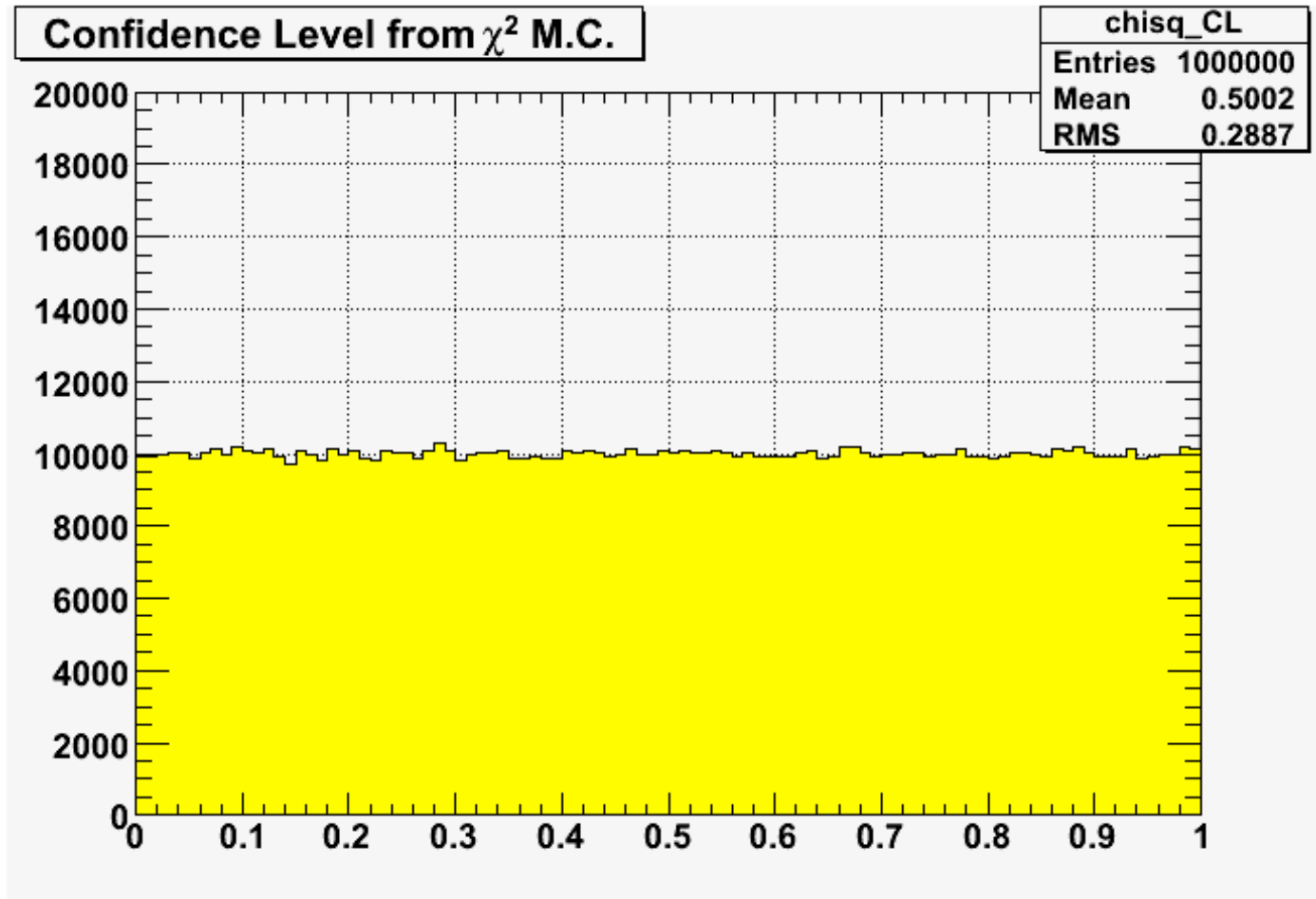
Efficiency as a function of phase space

$0.2 \text{ GeV}/c \leq p \leq 2.0 \text{ GeV}/c$

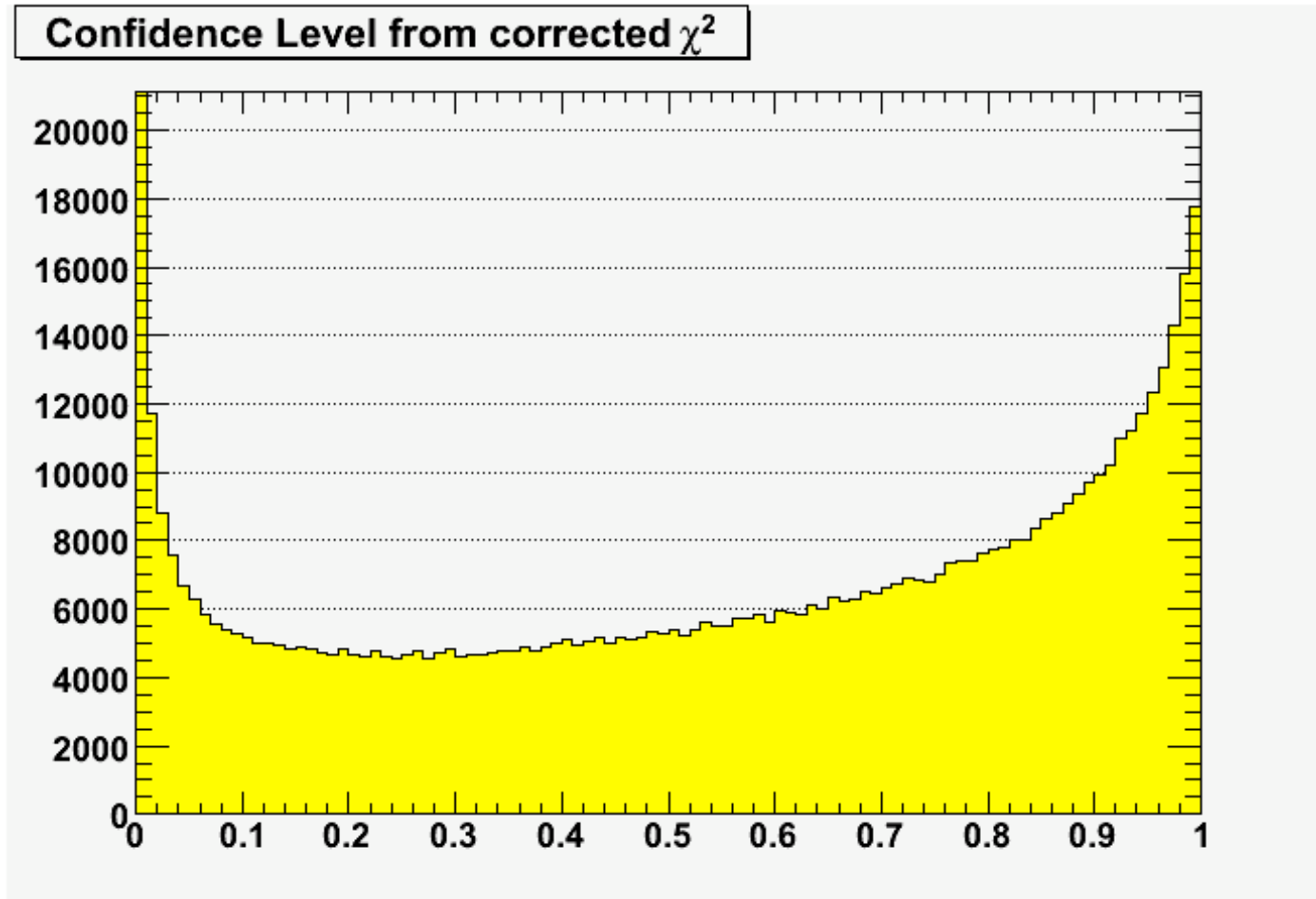
$15^\circ \leq \theta \leq 140^\circ$



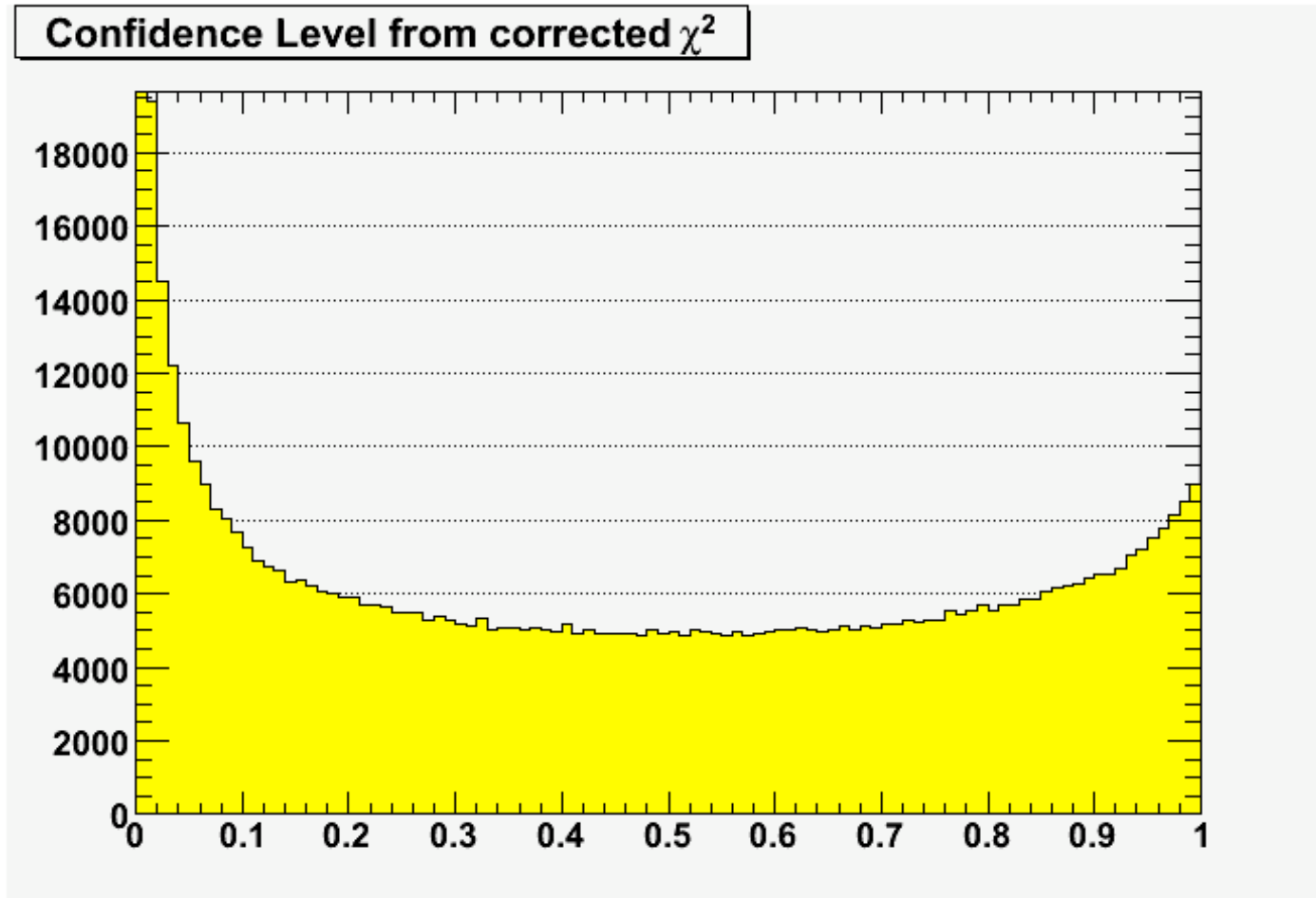
Expected Probability Density as a Function of the Integral Fraction



Probability Density from Tracking Results



Fitting pulls to core Gaussians (i.e. smaller errors)



Next step

- There is some evidence that suggests the “bad” fits come from poor choices for the L-R ambiguity solution, particularly in the stereo
- If this is true, tracking based only on wire-positions would have broader pull distributions, but they would have Gaussian tails
- Tracking code is being reconfigured to make access to wire-based tracks easier. This is about 85% done.