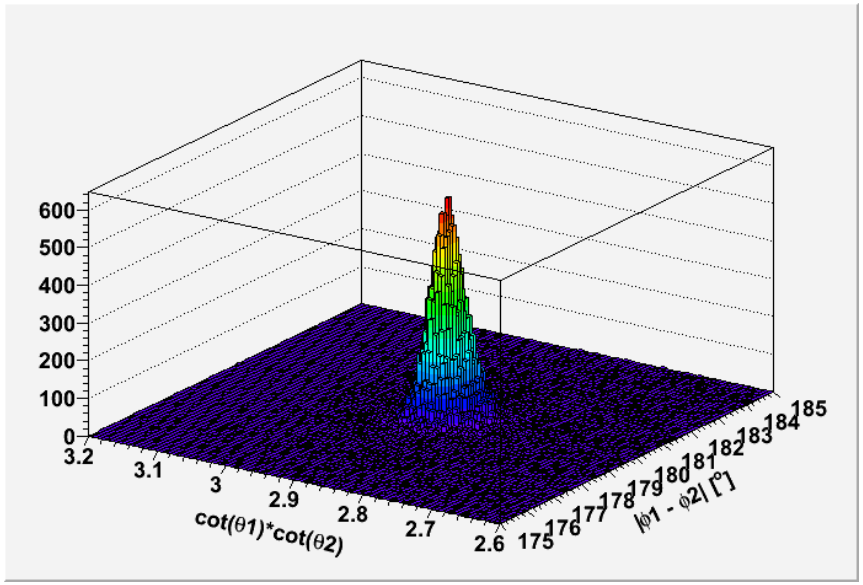
Absolute normalization for the 3.5 GeV pp data (gen2)

A. Rustamov

normalizing to the elastic scattering



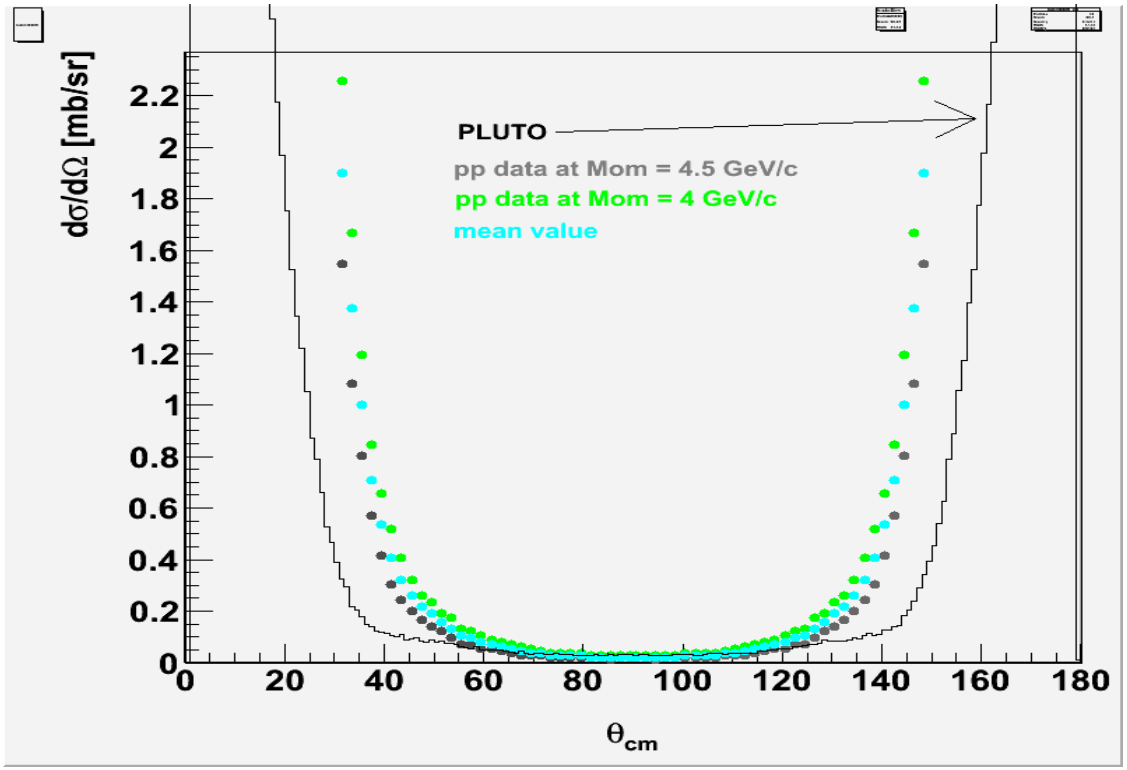
$$N_{4\pi}^{el} = \sigma_{4\pi}^{el} \frac{N_{acc}^{el}}{\sigma_{acc}^{el}}$$

15.3 mb ± something , we do not need this anyway.

Normalization is done to $\frac{N_{4\pi}^{el}}{\sigma_{4\pi}^{el}} = \frac{N_{acc}^{el}}{\sigma_{acc}^{el}}$

In this case we need σ_{acc}^{el}

differential elastic cross section



For pp data at E=3.5GeV, Mom ≈ 4.33, therefore taking the mean points from this figure

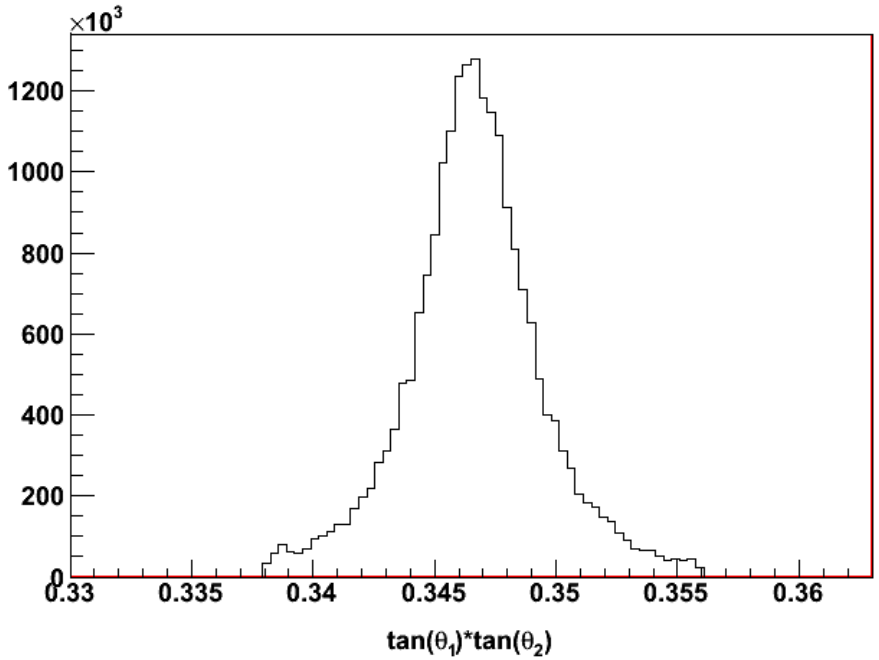
$$\sigma_{acc}^{el} = \int \frac{d\sigma}{d\Omega} d\Omega = \int \frac{d\sigma}{d\Omega} \sin(\theta) d\theta d\varphi = 2\pi \int_{55^o}^{125^o} \frac{d\sigma}{d\Omega} d\cos(\theta) = 0.16mb$$

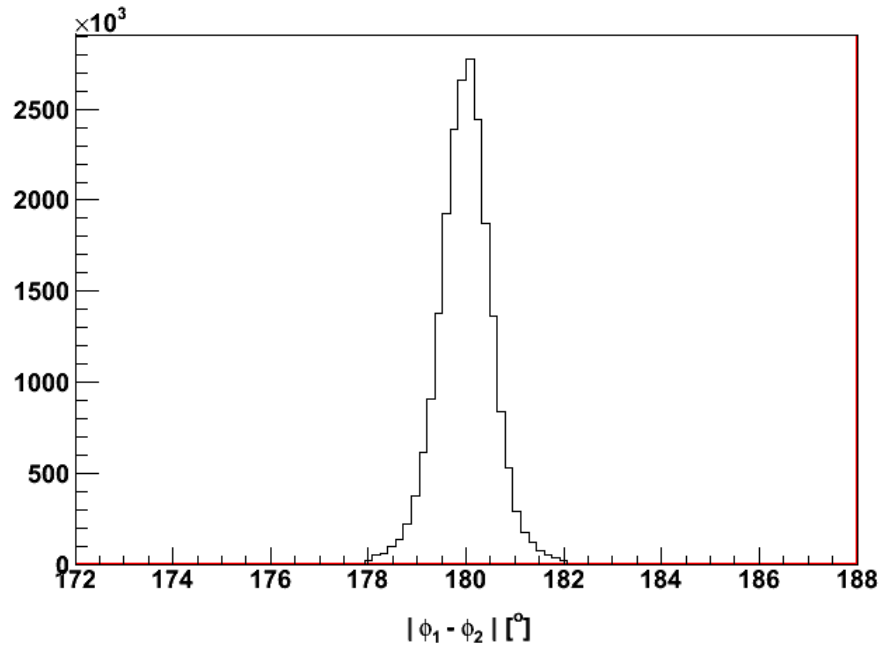
data points are taken from:

Kammerud et al. Phys. Rev. D 4 (1971), 5

pp elastic scattering

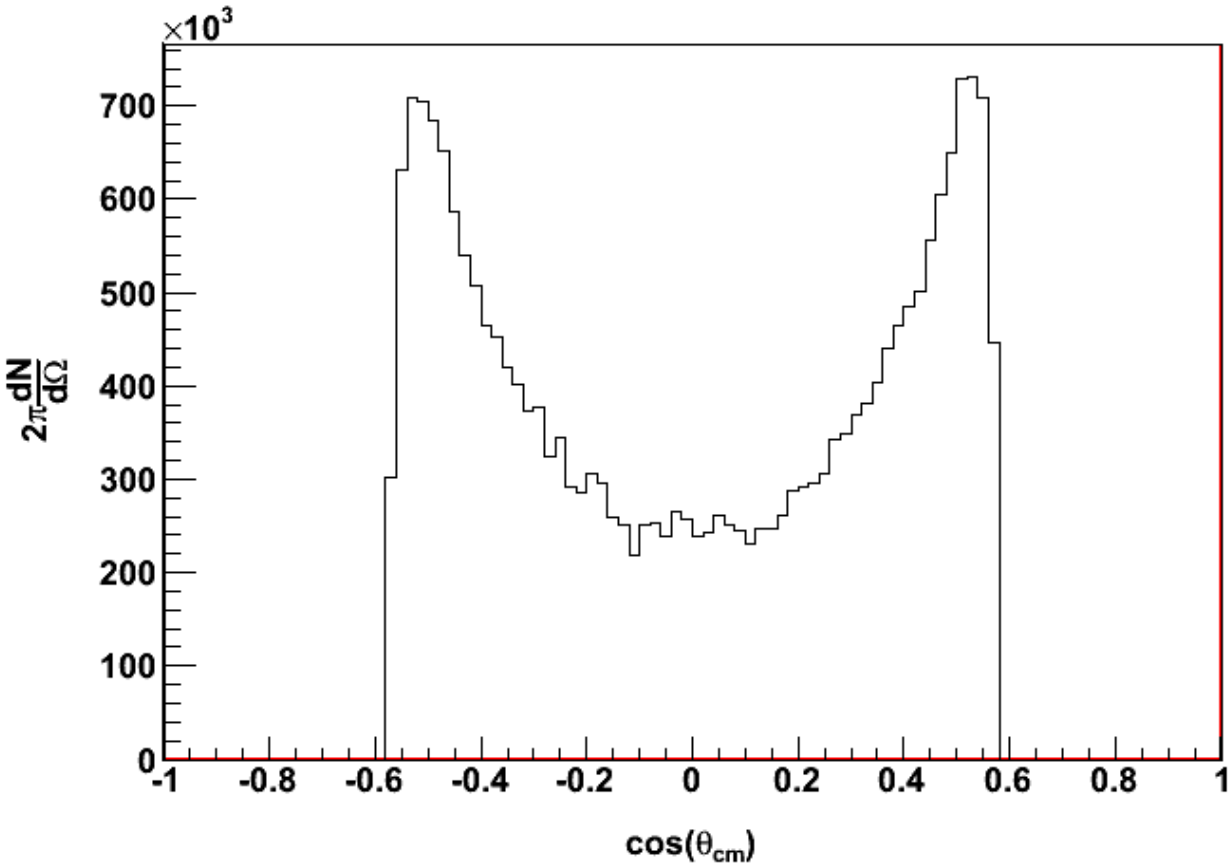
- Applied cuts:
  - Event selection:
    - (tBit&32)==32
    - Downscaled events
  - Kinematic cuts:





- Correcting for
  - LVL1 (elastic) downscaling: on average ~3
  - Trigger box scaling: 256 (for these files, day111-day127)

3.5 GeV pp data



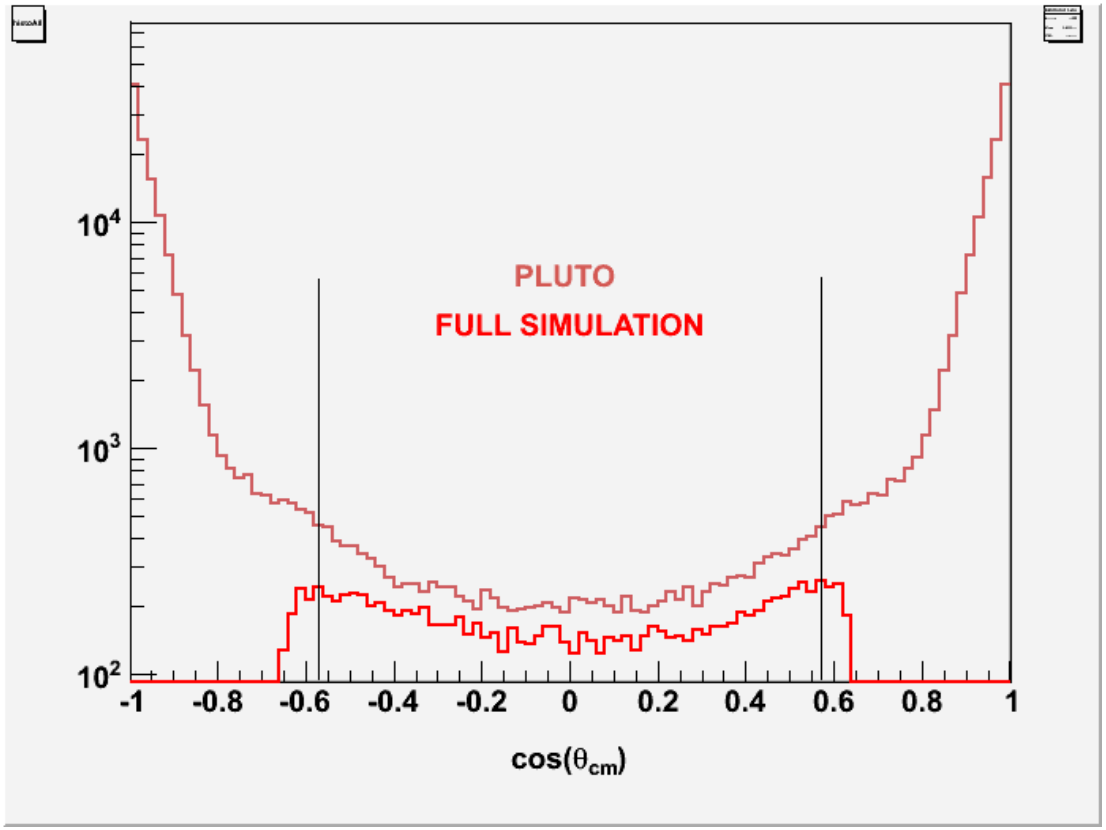
$$N_{acc}^{el} = 2.321\text{e}+07$$

number of analyzed files: 10417

acceptance and eff. corrections

Acceptance and efficiency corrections are done by running the full simulation:
PLUTO (elastic events) + GEANT + DST + ANALYSIS

$$\text{Correction}_{\text{acc*eff}} = \frac{\text{All}}{\text{Reconstructed}} (\text{in } 55^o < \theta_{cm} < 125^o \text{ range}) = 1.6$$



final correction

$$\frac{N_{4\pi}^{el}}{\sigma_{4\pi}^{el}} = \frac{N_{acc}^{el}}{\sigma_{acc}^{el}} = \frac{2.321\text{e}+07}{0.16} = 1.45\text{e}+08$$

$$\frac{N_{4\pi}^{el}}{\sigma_{4\pi}^{el}} = \frac{N_{acc}^{el}}{\sigma_{acc}^{el}} = \frac{1.45\text{e}+08}{10417} = 13925 \text{ (per file)}$$

The final correction, including error propagation

$$F^{\text{per file}} = 13925 * 1.6 \pm 2\%(\text{stat}) \pm 7\%(\text{sys})$$