COLLABORATION MEETING
Physics Book

Analysis on the Electromagnetic Form Factors at $q^2 = 8.2\ (\mathrm{GeV/c})^2$

(p = 3.3 GeV/c)

Status report

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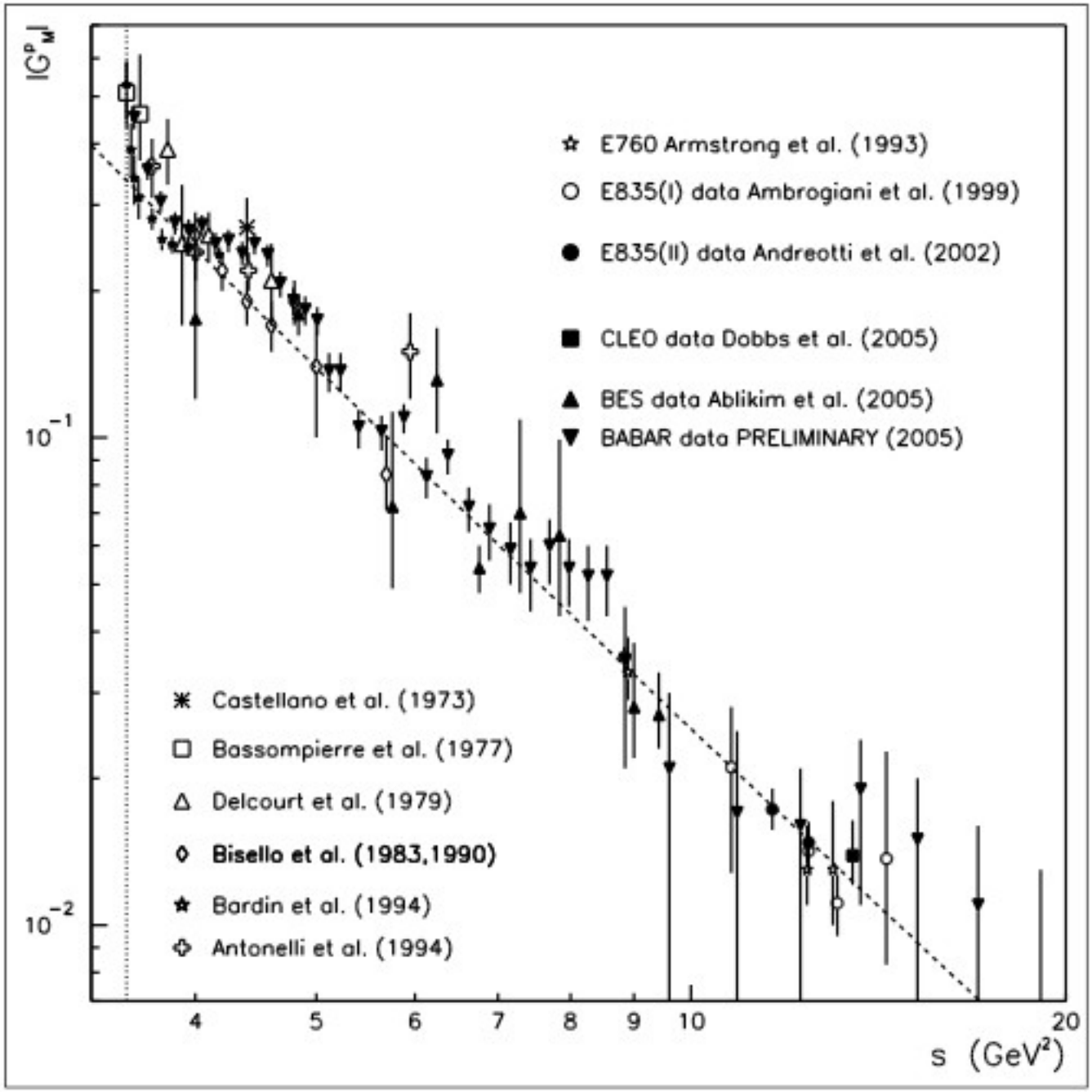
Motivation



We want to measure the values of Ge and Gm

Available data available so far have been calculated with the hypothesis of Ge=Gm due to the low statistics

Motivation

e+e- cross section

$$\frac{d\sigma}{d(\cos\theta)} = \frac{\pi\alpha^2}{8M_p^2\tau\sqrt{\tau(\tau-1)}}[\tau|G_M|^2(1+\cos^2\theta)+|G_E|^2(1-\cos^2\theta)]$$

Fit function

$$y = par[0][\tau(1+\cos^2\theta)+par[1]^2(1-\cos^2\theta)]$$

$$par[0]=N$$

$$par[1]=R=\frac{|G_e|}{|G_m|}$$

Simulated events at q^2= 8.2 $(GeV/c)^2$

New data from new release 0.15.3

Background:

pi+pi-	**10^8**	

Signal:

e+e-	**10^6**	**Ge=0**
	10^6	**Ge=Gm**
	10^6	**Ge=3·Gm**

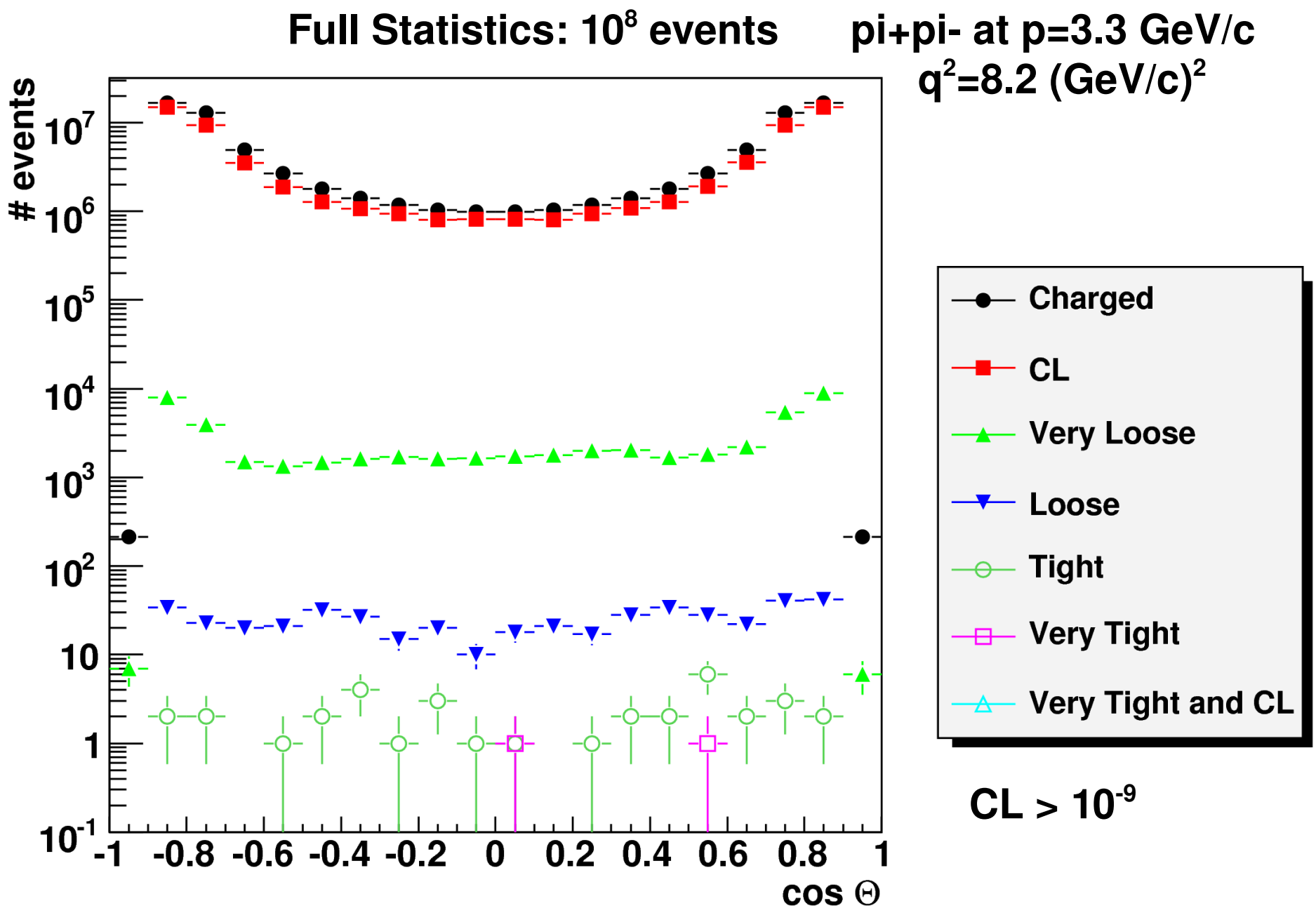
Expected events for 100 days and $\mathcal{L}$= 2·10^{32}:

e+e-	**64.000**
pi+pi-	**10^6 times larger**

Background Analysis

$\pi^+\pi^-$

Background suppression with the applied cuts



Signal Analysis

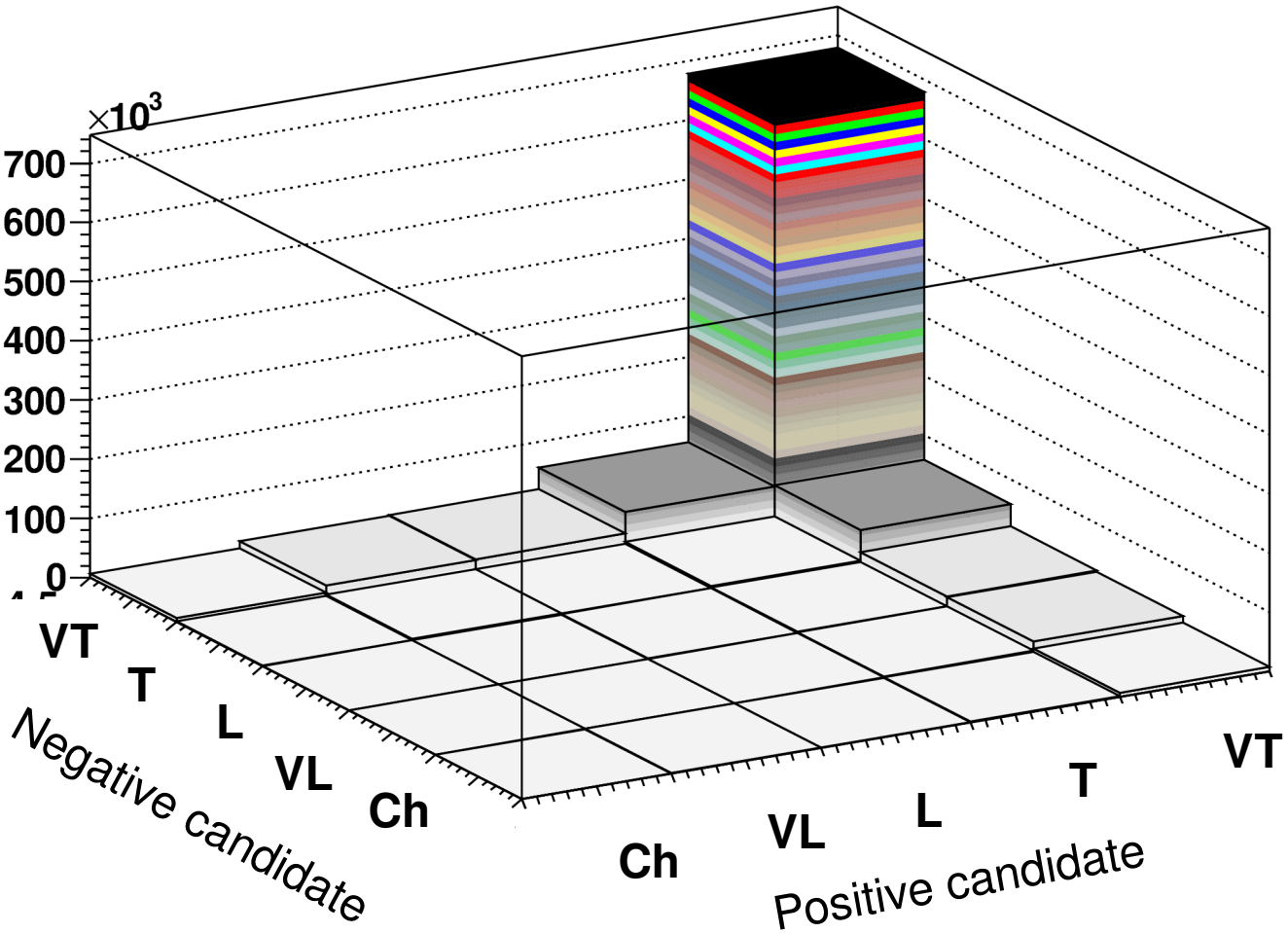
e+e-

Particle identification: e+e-

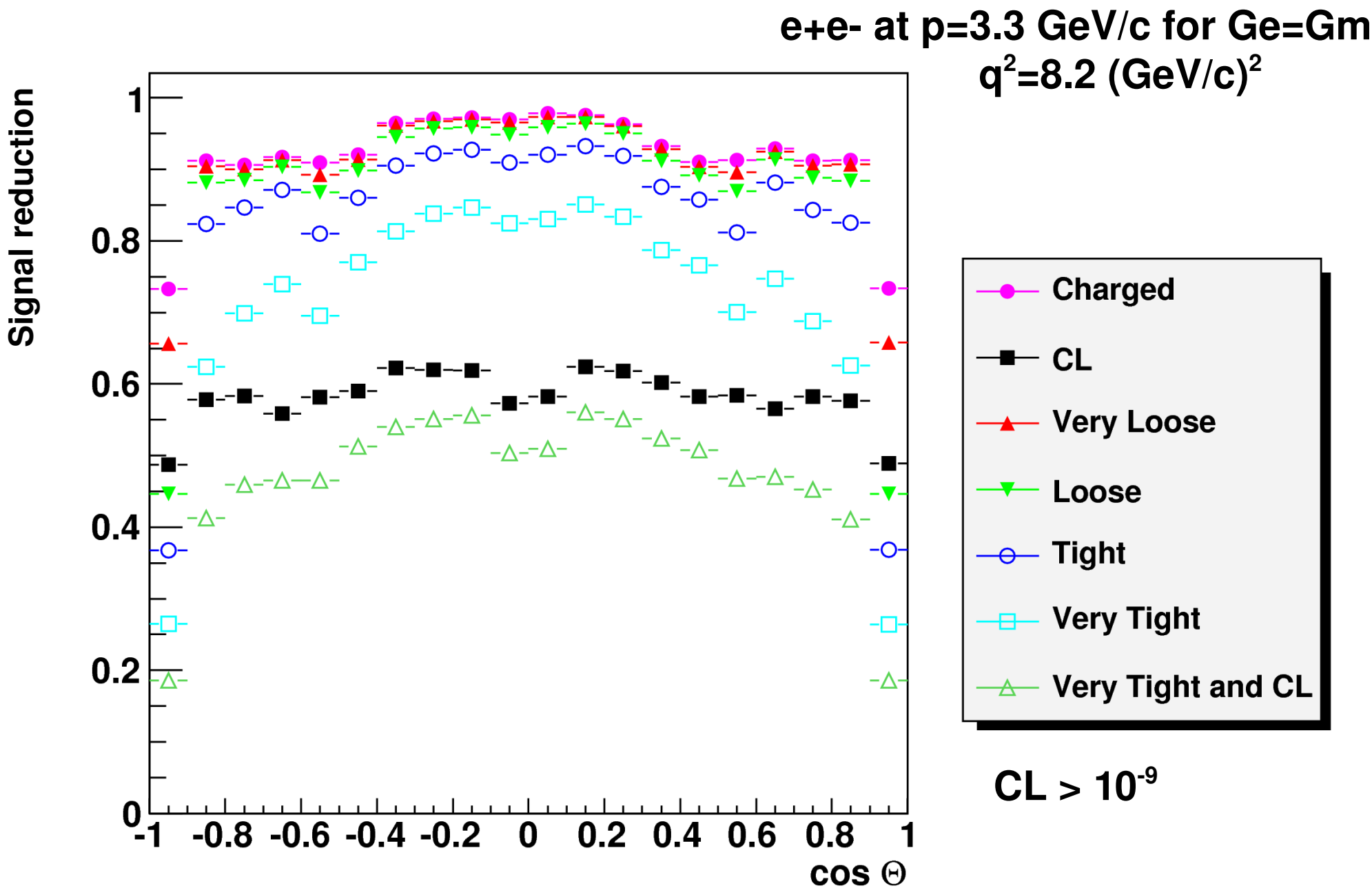
e+e- at p=3.3 GeV/c for Ge=Gm
q^2=8.2 $(GeV/c)^2$

PID:

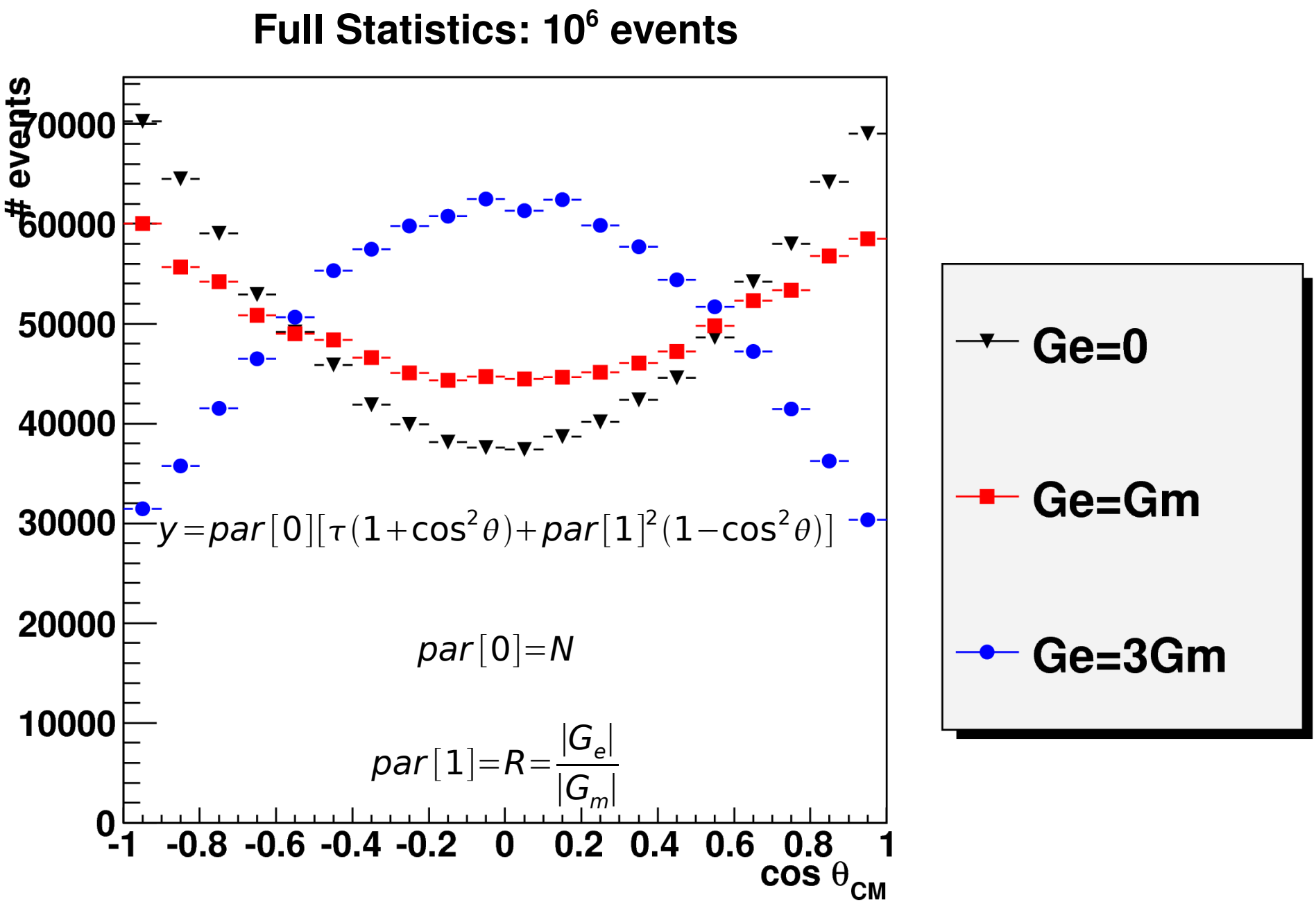
Very Loose	19.9%
Loose	85%
Tight	99%
Very Tight	99.8%



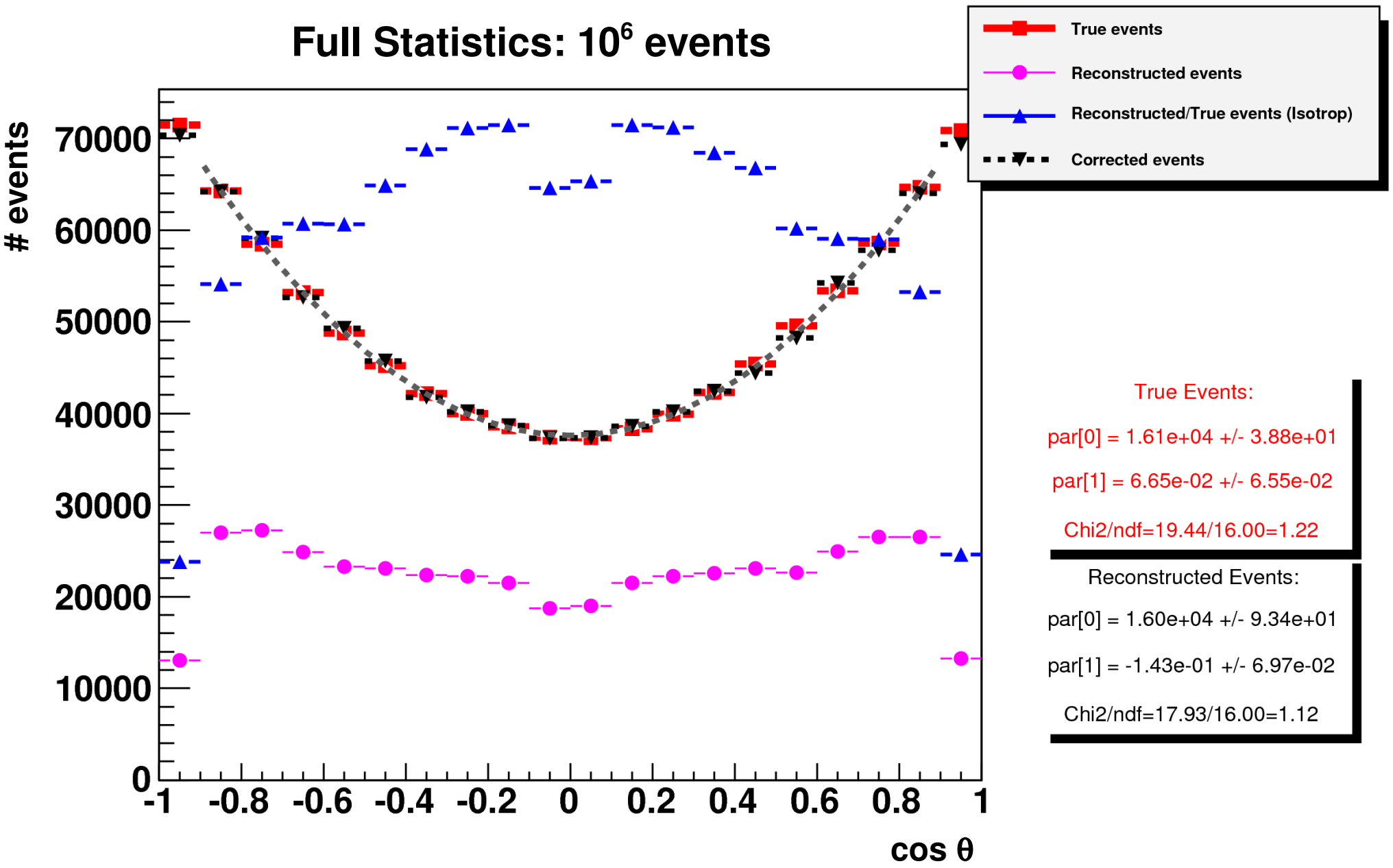
Signal efficiency with the applied cuts



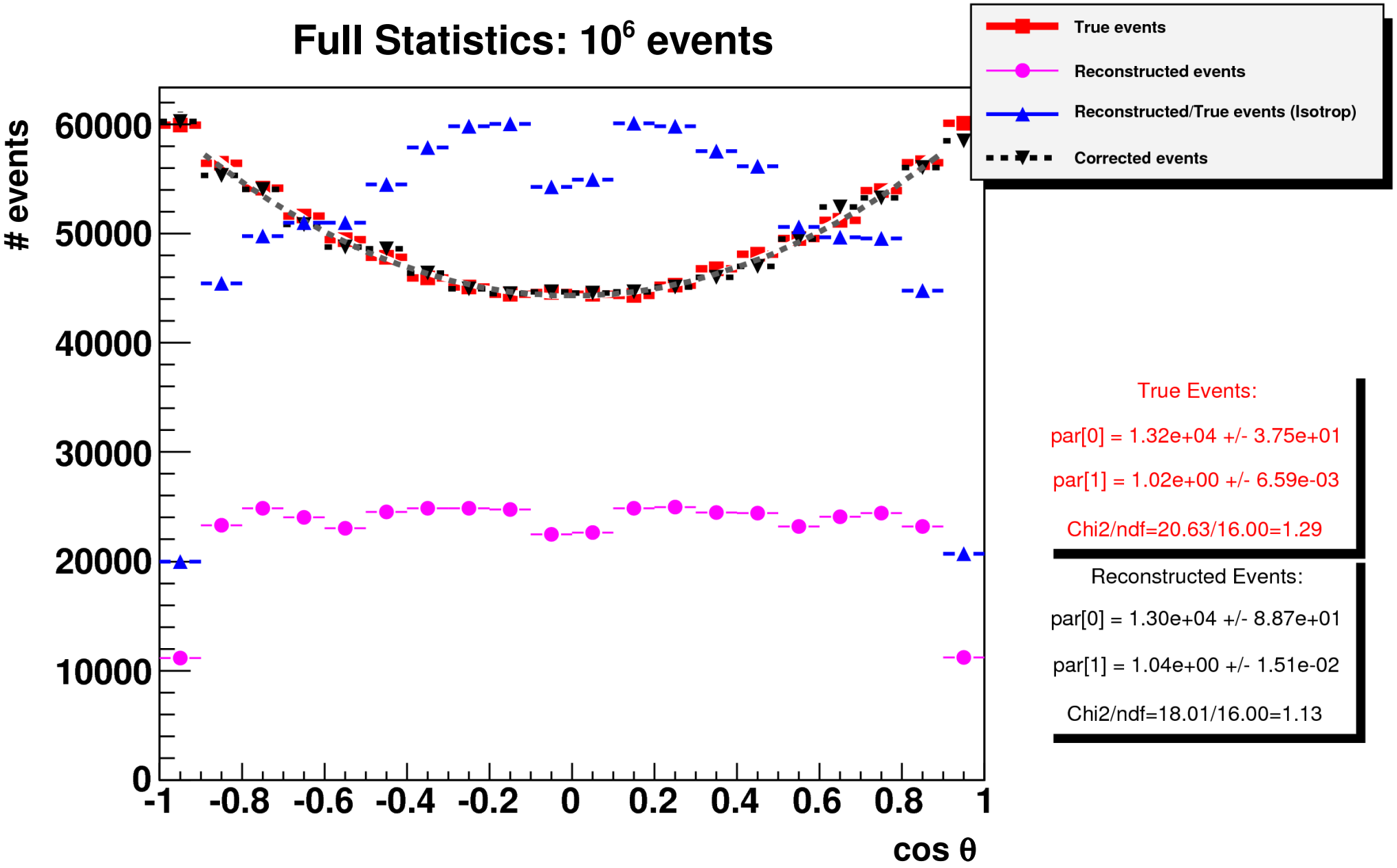
Acceptance corrected angular distributions



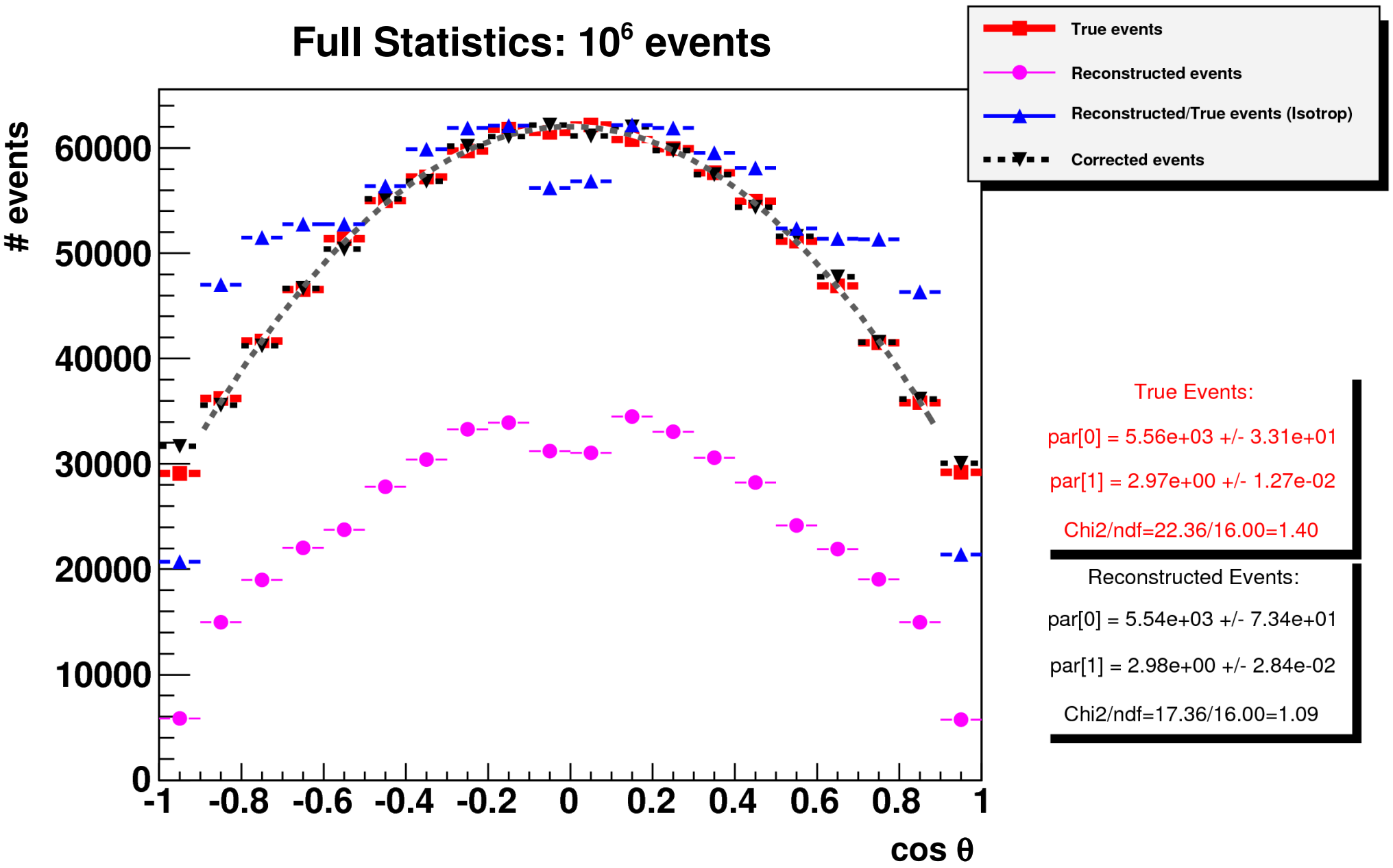
Fit results for e+e- at p = 3.3 GeV/c for Ge = 0



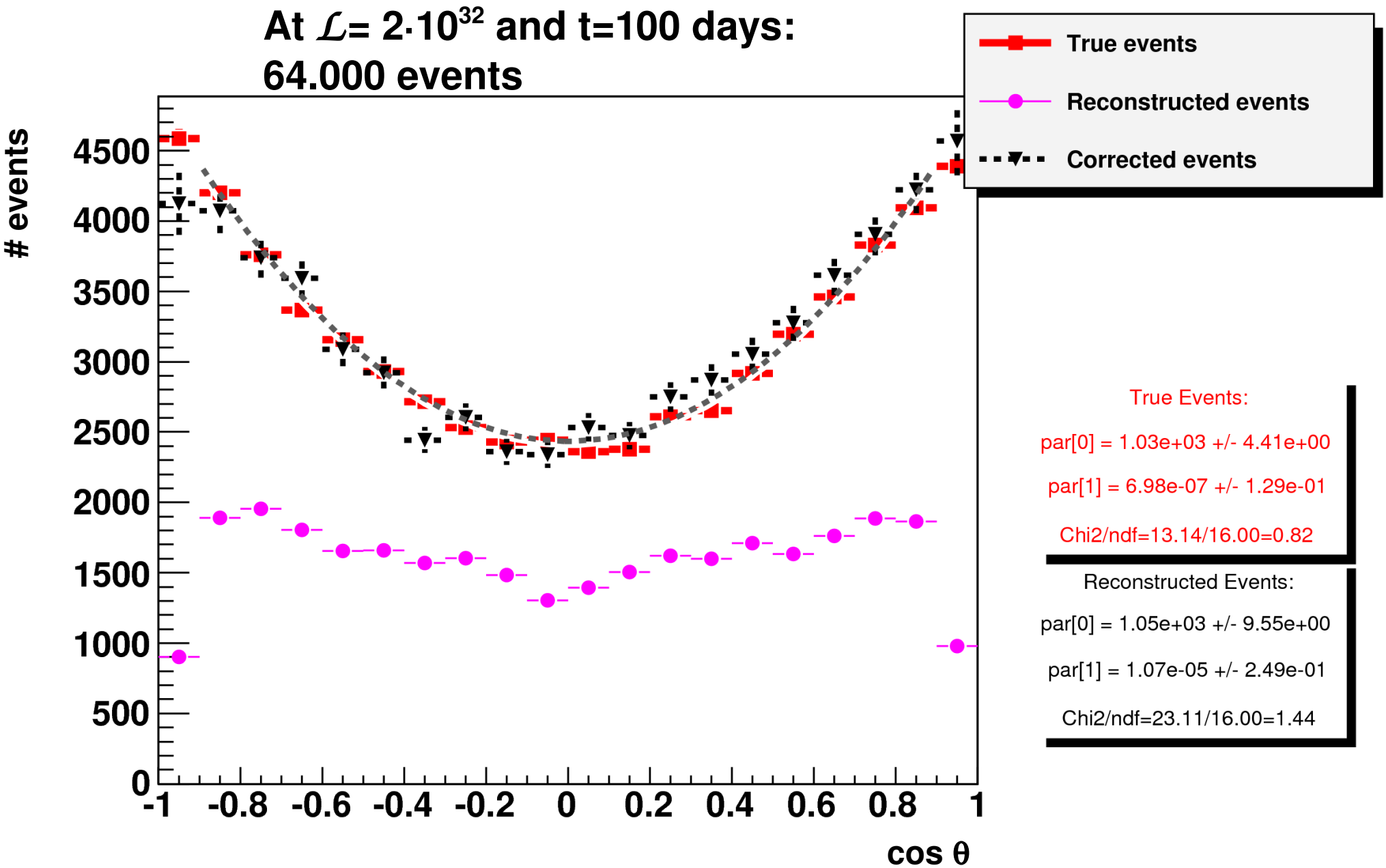
Fit results for e+e- at p = 3.3 GeV/c for Ge = Gm



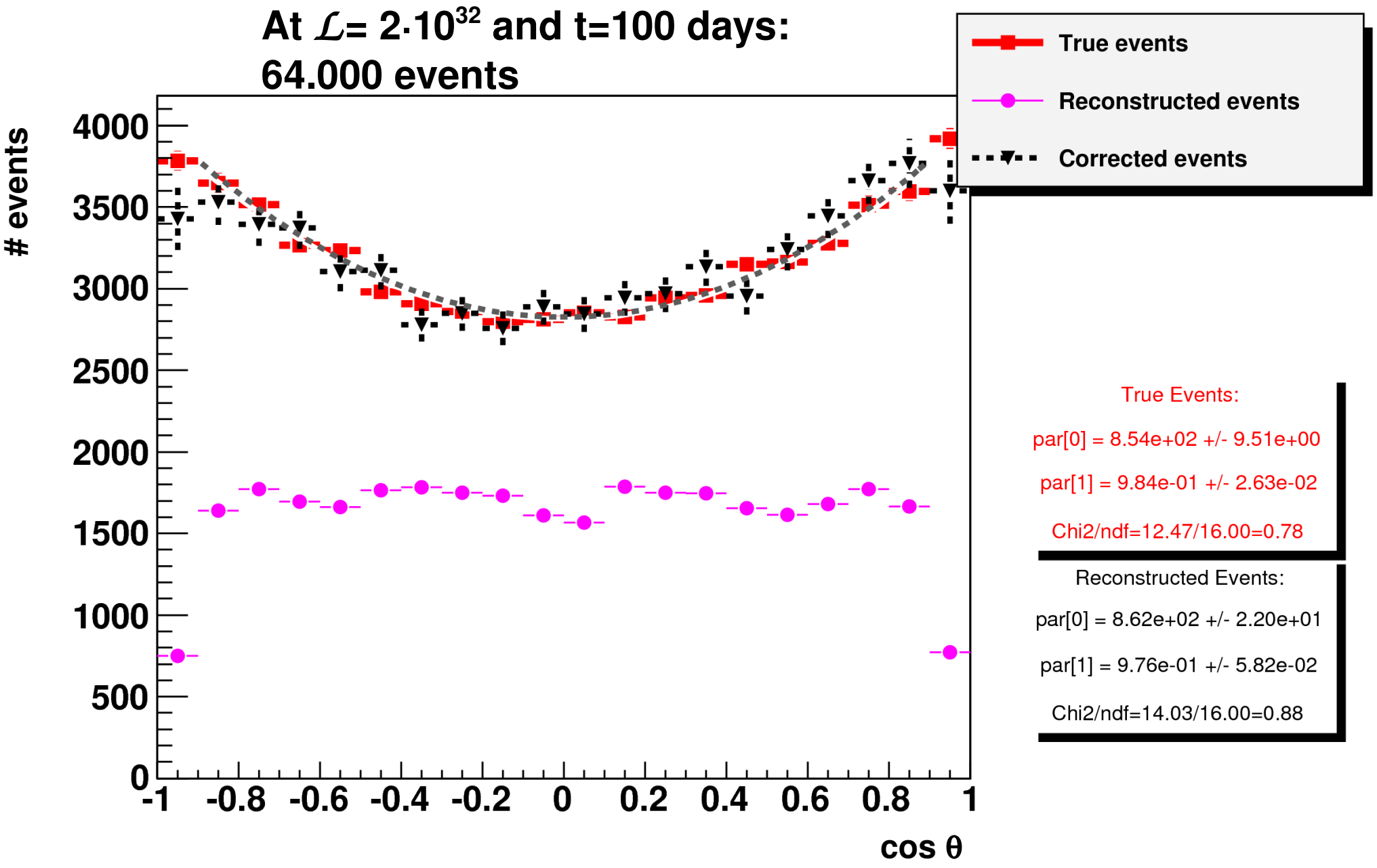
Fit results for e+e- at p = 3.3 GeV/c for Ge = 3·Gm



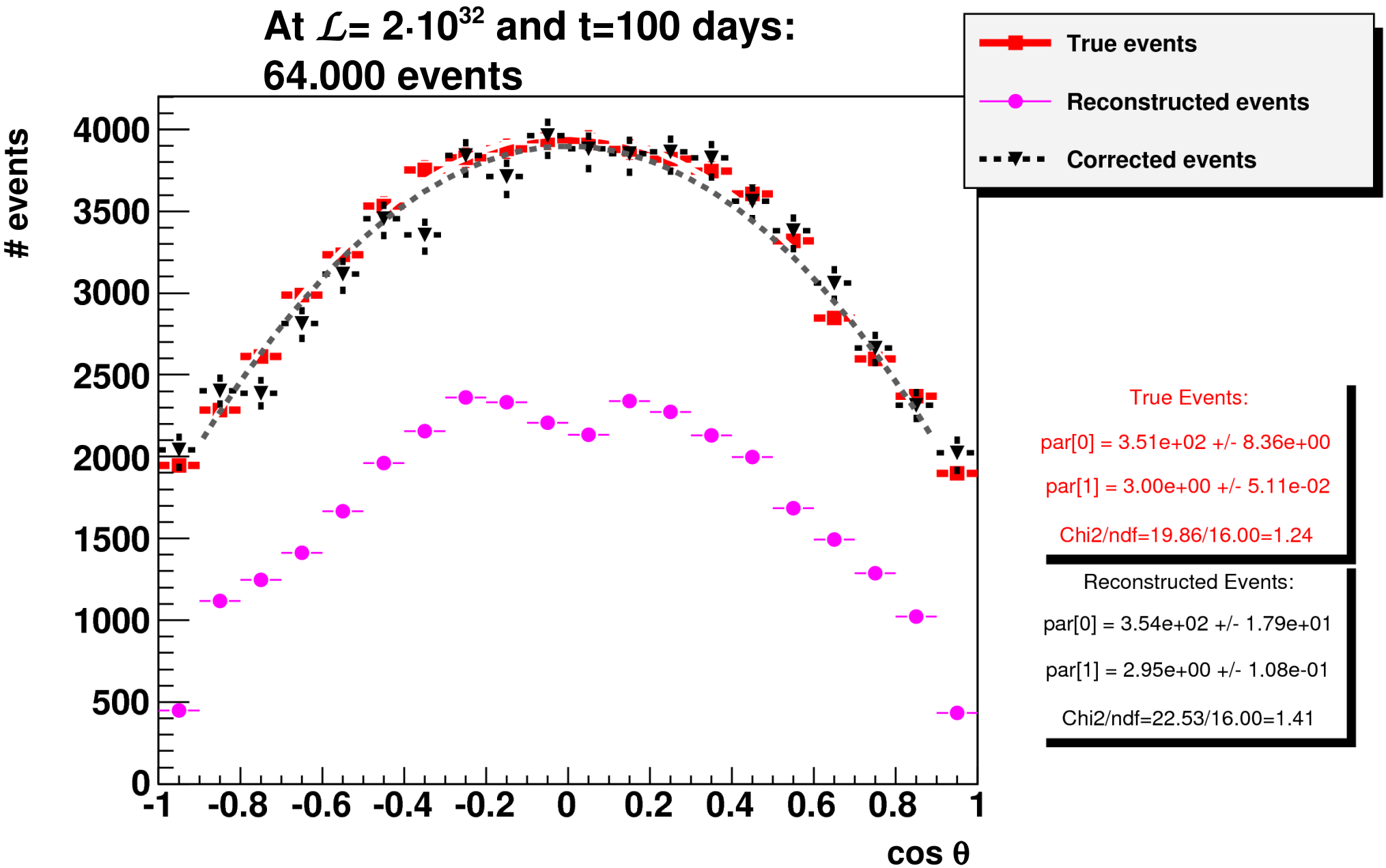
More realistic statistics results for for e+e- at p = 3.3 GeV/c for Ge = 0



More realistic statistics results for for e+e- at p = 3.3 GeV/c for Ge = Gm



More realistic statistics results for for e+e- at p = 3.3 GeV/c for Ge = 3·Gm



Summary

Background: pi+pi-

PID	2 events from 10^8
PID and kinematical fit	0 events from 10^8

Signal: e+e-

100 days and full luminosity

Statistic error:

Δ(Ge/Gm)=0.25 at q^2=8.2 $(GeV/c)^2$ (p = 3.3 GeV/c) for Ge=0
Δ(Ge/Gm)=0.06 at q^2=8.2 $(GeV/c)^2$ (p = 3.3 GeV/c) for Ge=Gm
Δ(Ge/Gm)=0.10 at q^2=8.2 $(GeV/c)^2$ (p = 3.3 GeV/c) for Ge=3·Gm