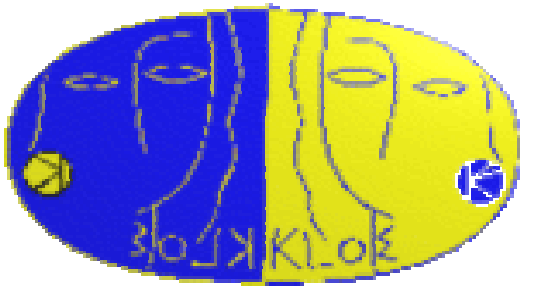
Update on

$h \to \pi^+\pi^-\pi^0$



- Recall to previous talk
- Results on MC – rad04
- Results on all data
- Results on Asymmetry parameters
- Conclusions

$h \to p^+p^-p^0$

We expand the decay amplitude about the center of the Dalitz plot as:

$$|A(X,Y)|^2 = 1 + aY + bY^2 + cX + dX^2 + eXY$$

Where:

$$X = \sqrt{3}\frac{T_+ - T_-}{Q_h} \qquad X \in [-1;1]$$

$$Y = \frac{3T_0}{Q_h} - 1 \qquad Y \in [-1;0.895[$$

$$Q_h = m_h - 2m_{p^+} - m_{p^0}$$

But to improve the resolution we put as Y-variable

$$Y_M = (Y_{ch} + Y_0) / 2$$

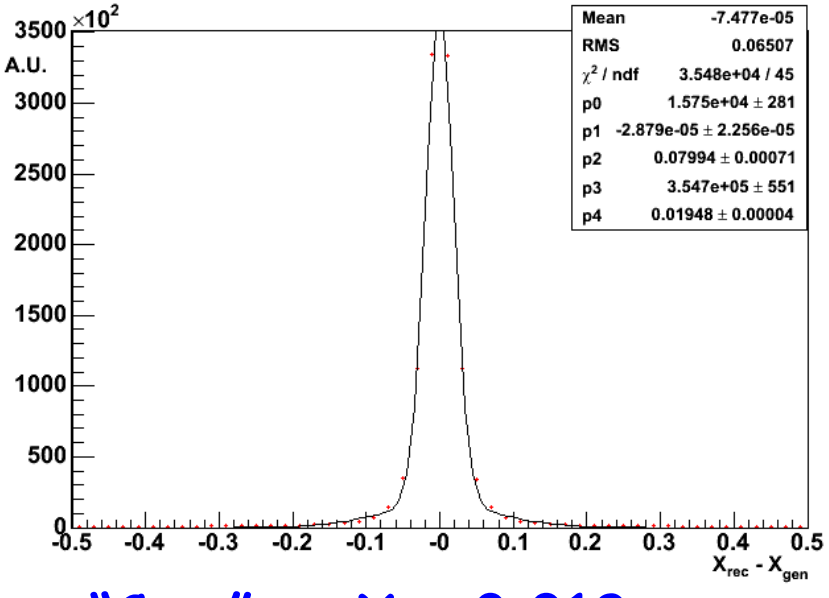
Results on MC – rad04

On MC_old sample of events:

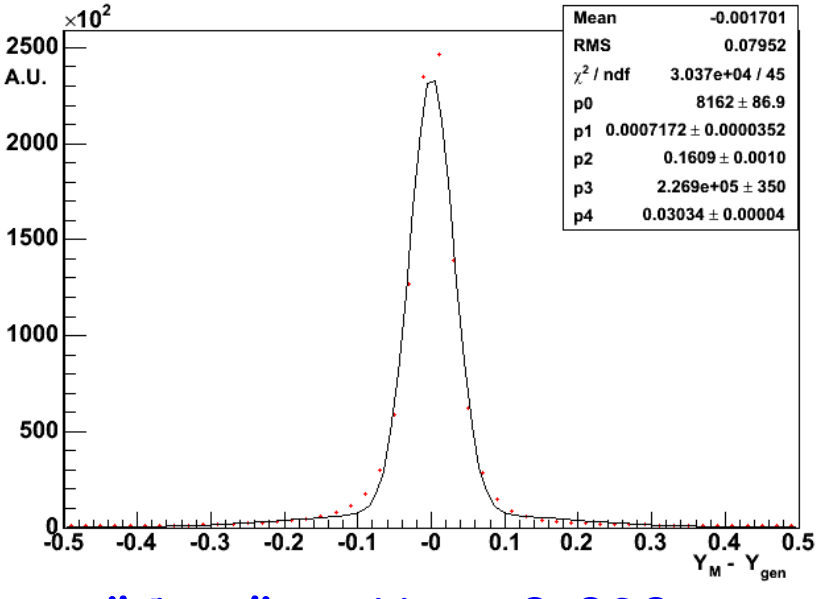
"Core" resX = 0.016 a.u.

"Core" resY$_M$ = 0.026 a.u.

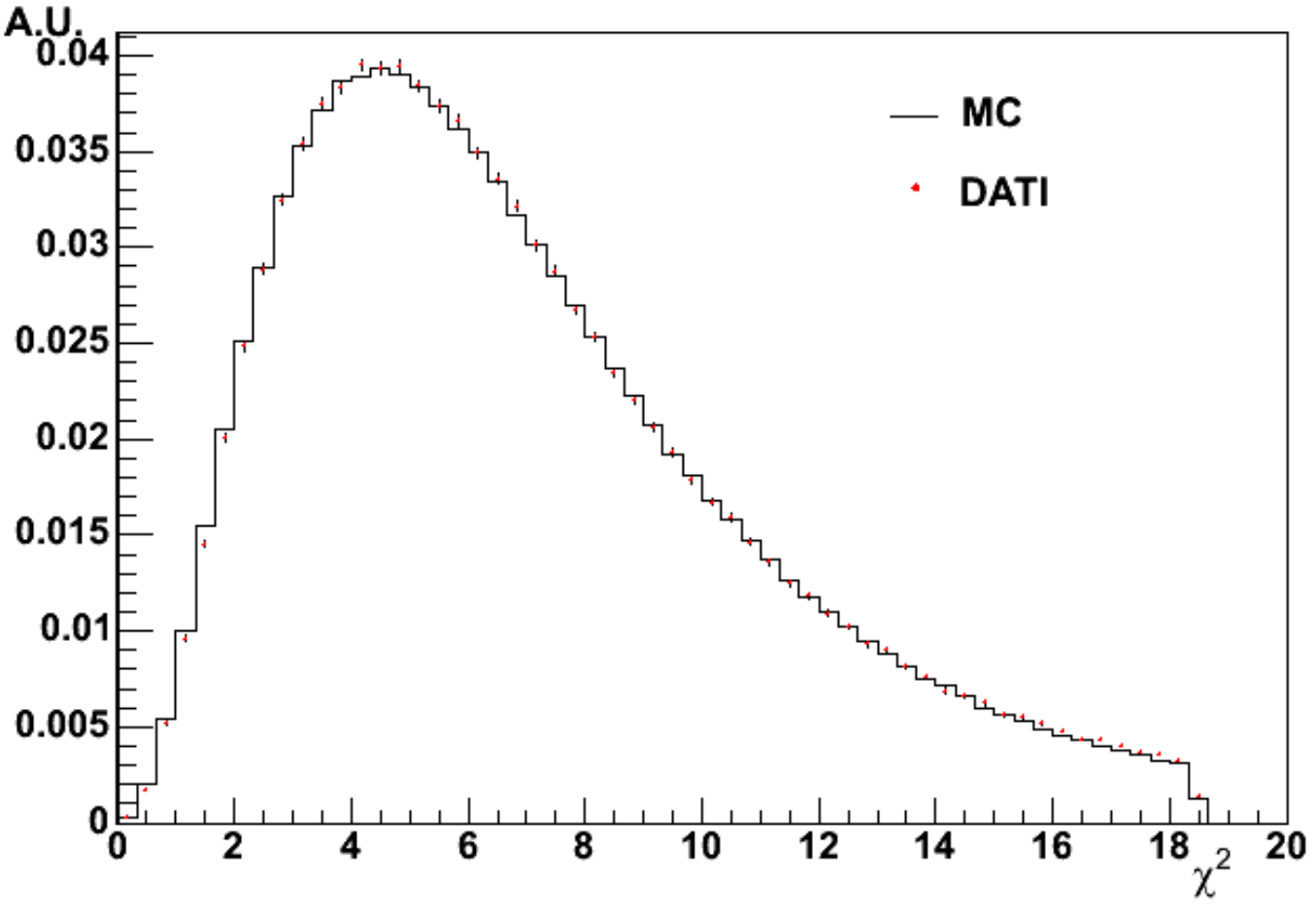
On sample of 2763000 MC_rad04 events



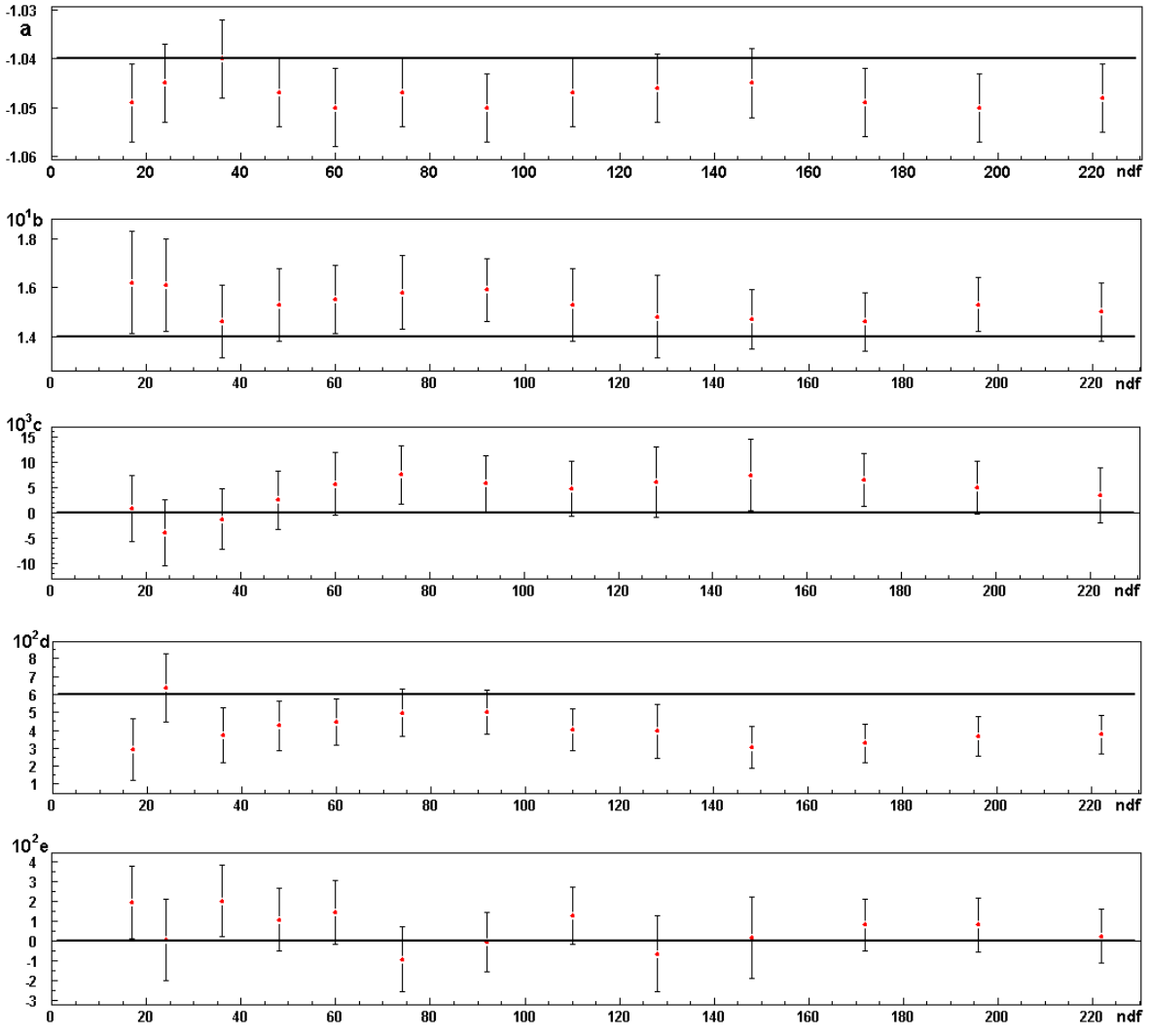
"Core" resX = 0.019



"Core" resY$_M$ = 0.030


A.U.
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
0
2
4
6
8
10
12
14
16
18
20
χ^2
MC
DATI

Tests of the fit procedure on MC



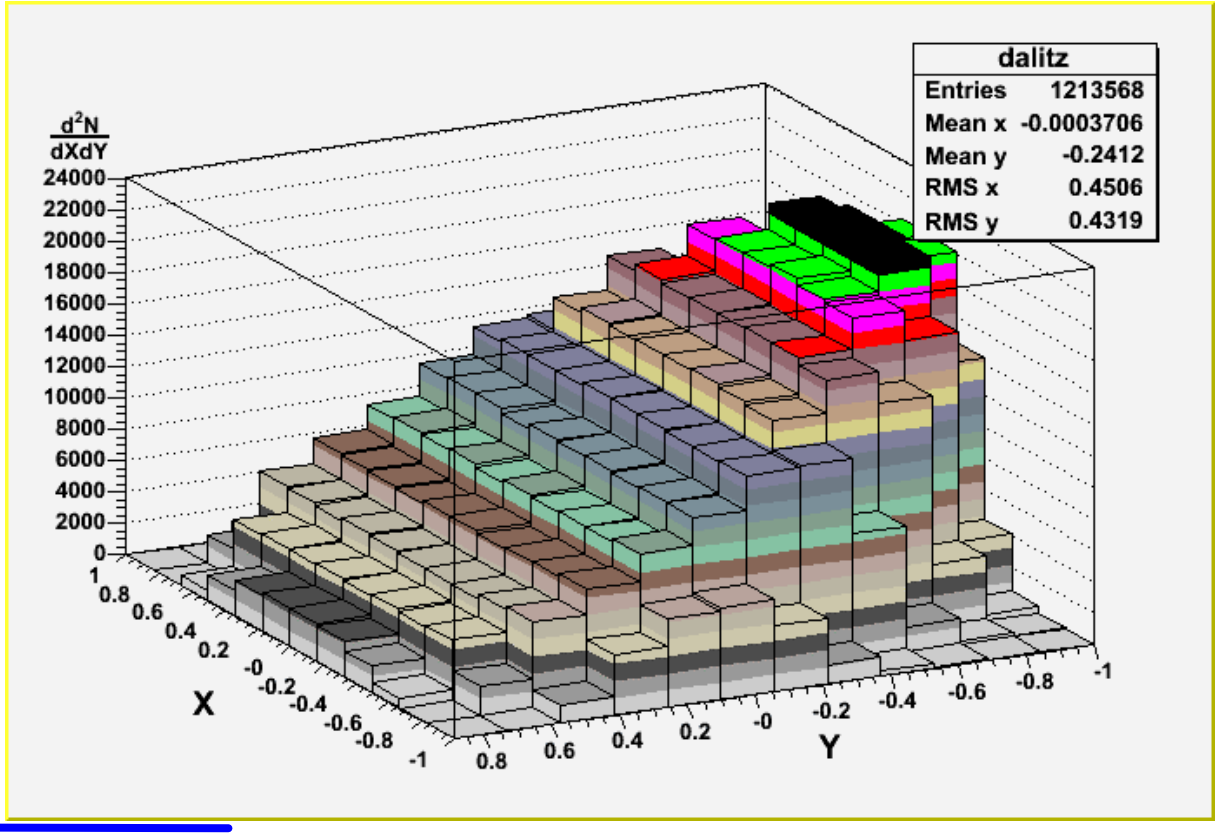
$Ndf = N^{eff}_{bin} -$

Analysis on Data

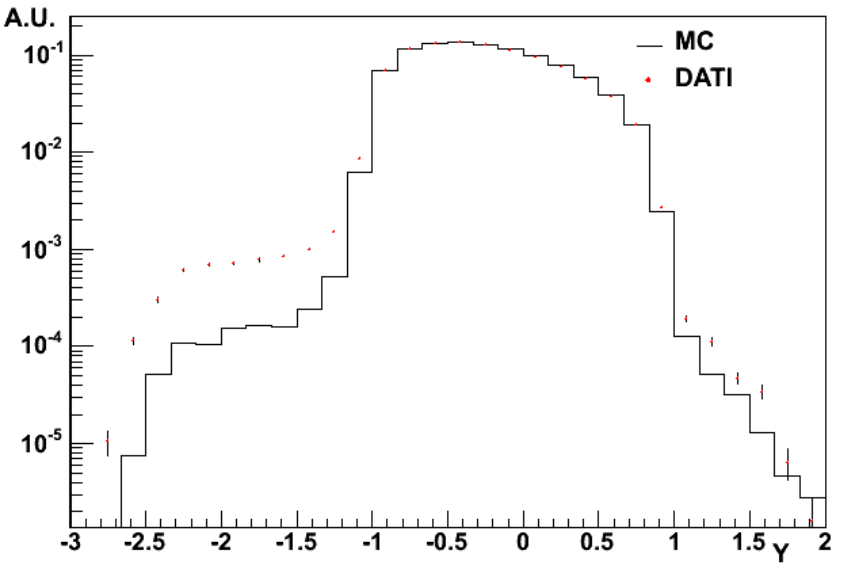
The analysis has been applied on all KLOE statistic corresponding to:

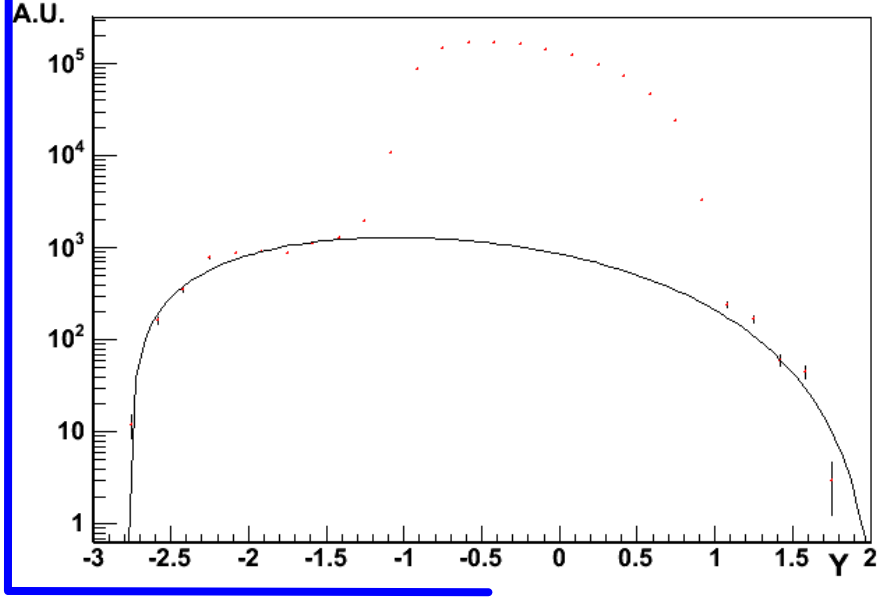
$$N(h \to p^+p^-p^0) = 1{,}213{,}568$$

events in the Dalitz plot



Background evaluation





B/S » 0.8%

Procedure of fit

Until now the fit is done using:

$$|A(X,Y)|^2 = 1 + aY + bY^2 + cX + dX^2 + eXY$$

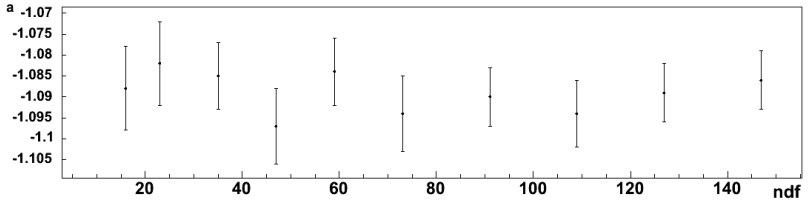
We found "low" P_C^2 .

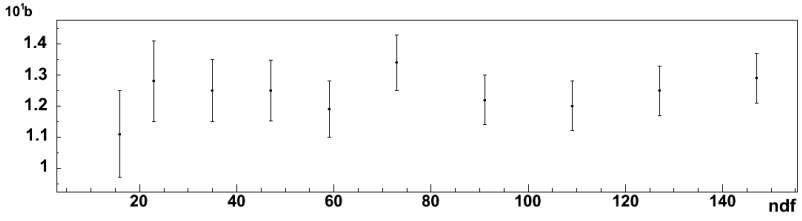
We decide to fit using:

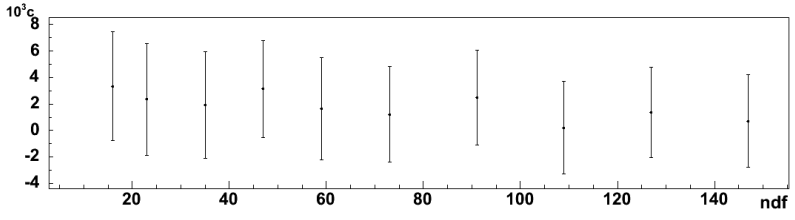
$$|A(X,Y)|^2 = 1 + aY + bY^2 + fY^3 + cX + dX^2 + eXY$$

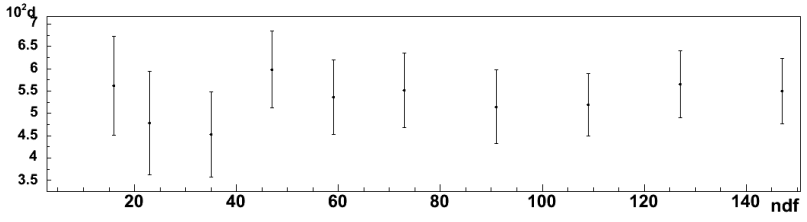
We found an improvement of P_C^2.

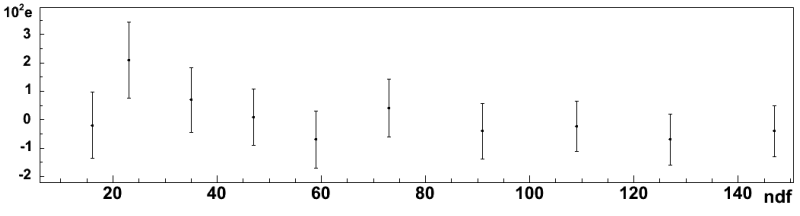
Tests of the fit procedure on Data

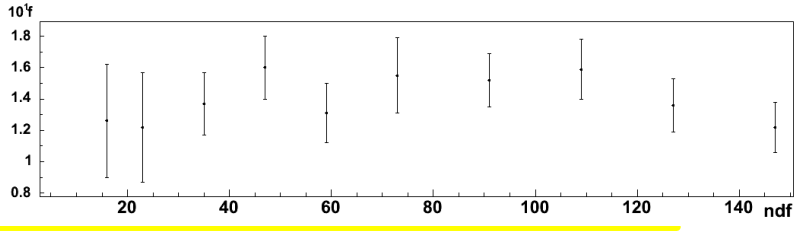










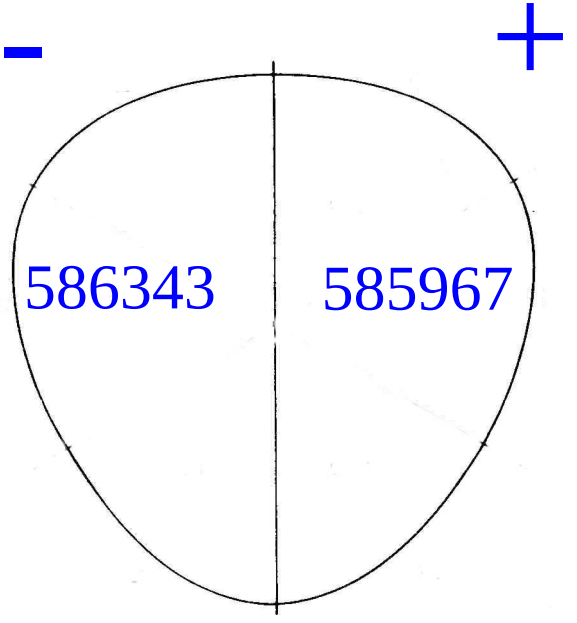


Results on Data

df	$P_{\chi 2}$ %	a	b	c	d	e	f
9	29	**-1.084 ± 0.008 -0.013/0**	**0.120 ± 0.009 0/0.014**	**0.001 ±0.004 0/0.001**	**0.053 ±0.008 -0.009/0.006**	**-0.007 ±0.010 0/0.01**	**0.13 ±0.0 0/0.03**
0	32	**-1.084 ± 0.008 -0.013/0**	**0.120 ± 0.009 0/0.005**	**0.0001 ±0.0030 0/0.003**	**0.054 ±0.009 -0.009/0.006**	¼	**0.13 ±0.0 0/0.03**
1	35	**-1.084 ± 0.008 -0.013/0**	**0.120 ± 0.009 0/0.005**	---	**0.054 ±0.008 -0.009/0.006**	¼	**0.13 ±0.0 0/0.03**
2	0	**-1.062 ± 0.007 -0.013/0**	**0.100± 0.008 0/0.009**	---	---	---	**0.11± 0.0 0/0.03**
2	0	**-1.043 ± 0.005 -0.04/0**	**0.140 ± 0.009 -0.02/0.01**	---	**0.046 ±0.008 -0.003/0.008**	---	---

Left-Right Asymmetry

$$A = \frac{N^+ - N^-}{N^+ + N^-}$$

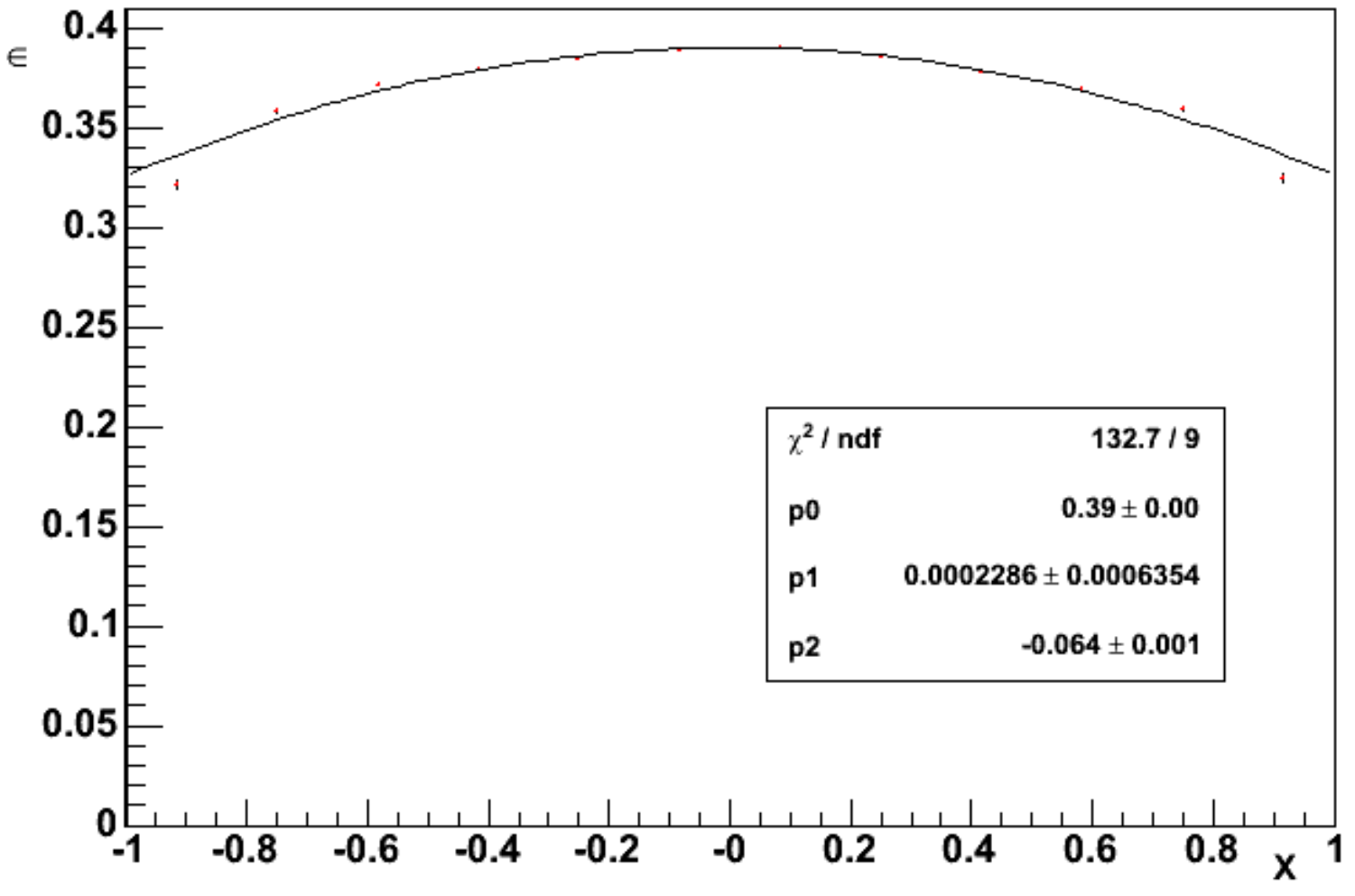


e+ = 0.3769 ± 0.0004

e− = 0.3766 ± 0.0004

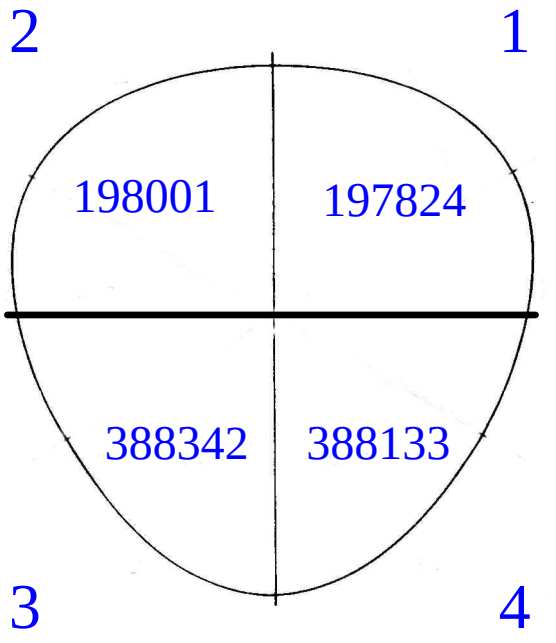
$A = (-0.03 \pm 0.09) \cdot 10^{-2}$

$A_{PDG} = (-0.09 \pm 0.17) \cdot 10^{-2}$


ε
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-1
-0.8
-0.6
-0.4
-0.2
-0
0.2
0.4
0.6
0.8
1
X
χ² / ndf 132.7 / 9
p0 0.39 ± 0.00
p1 0.0002286 ± 0.0006354
p2 -0.064 ± 0.001

Quadrant Asymmetry

$$A_q = \frac{N_1 + N_3 - N_2 - N_4}{N_1 + N_2 + N_3 + N_4}$$



A_q is sensitive to an I = 2 C-violating final state

$e_{13} = 0.3768 \pm 0.0004$

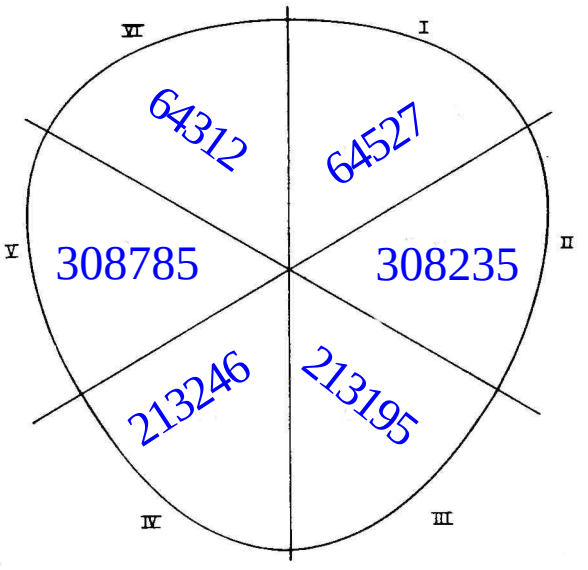
$e_{24} = 0.3767 \pm 0.0004$

$$A_q = (0.003 \pm 0.092) \cdot 10^{-2}$$

$$A_{PDG} = (-0.17 \pm 0.17) \cdot 10^{-2}$$

Sextant Asymmetry

$$A_q = \frac{N_1 + N_3 + N_5 - N_2 - N_4 - N_6}{N_1 + N_2 + N_3 + N_4 + N_5 + N_6}$$



A_s is sensitive to an I = 0 C-violating final state

$e_{135} = 0.3765 \pm 0.0004$

$e_{246} = 0.3770 \pm 0.0004$

$$A_s = (0.06 \pm 0.09) \cdot 10^{-2}$$

$$A_{PDG} = (0.18 \pm 0.16) \cdot 10^{-2}$$

Conclusions

- We applied the analysis on new official MC production, RAD04. We found good results: we reproduce the input parameters and the Data-MC comparison is satisfactory.
- We analyzed "all" Kloe data; the analysis signals clear sensitivity to quadratic slope in x and apparently signals even sensitivity to the cubic slope in y (never measured before).
- We measure left-right, quadrant and sextant asymmetries better than PDG
- KLOE MEMO in preparation.