SPIN 2003–Conference, Dubna, Russia

EDDA at COSY: Spin–Correlation Coefficients of Elastic Proton–Proton Scattering in the 0.8 – 2.5 GeV Range

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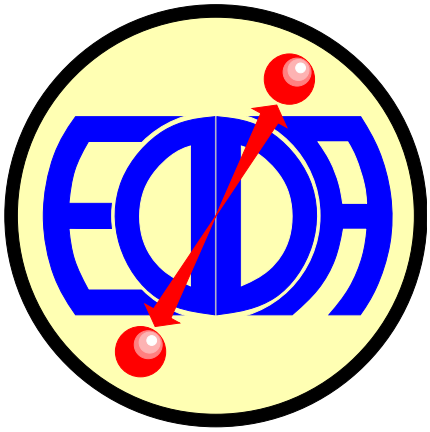
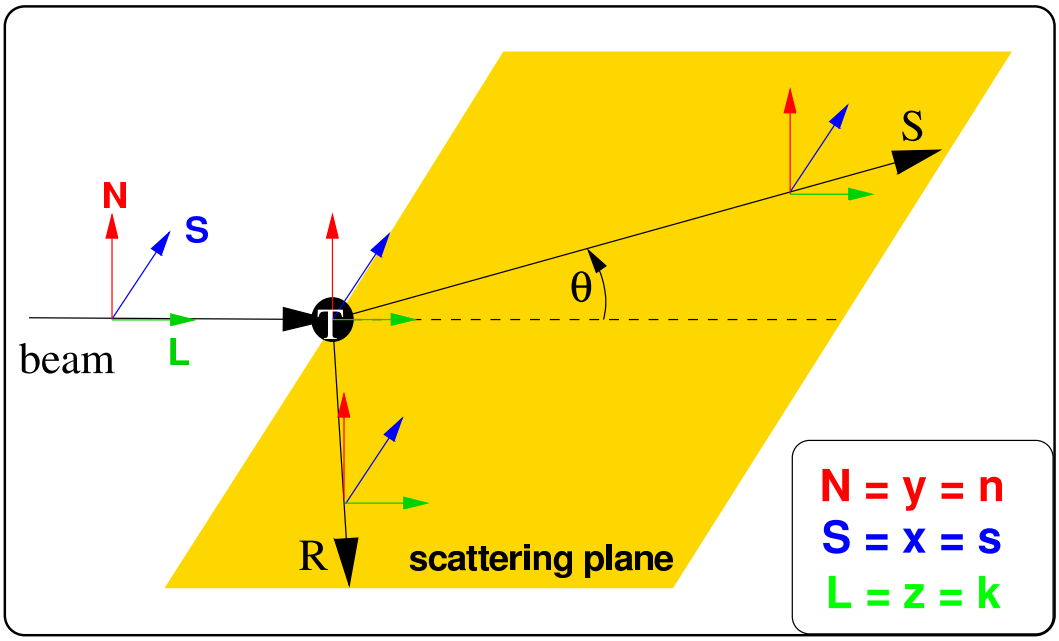


Scattering of Polarised Protons



5 complex amplitudes → 9 observables

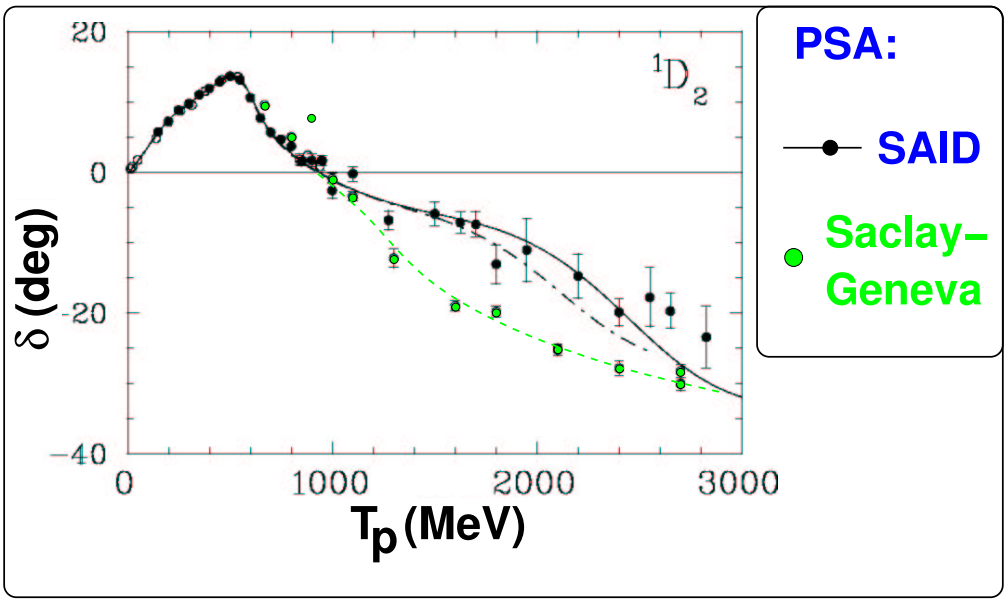
Measured Polarisation Observables

A_N : **polarised target, unpolarised beam**

A_{NN}, A_{SS}, A_{SL} : **polarised target, polarised beam**

Why pp Elastic Scattering?

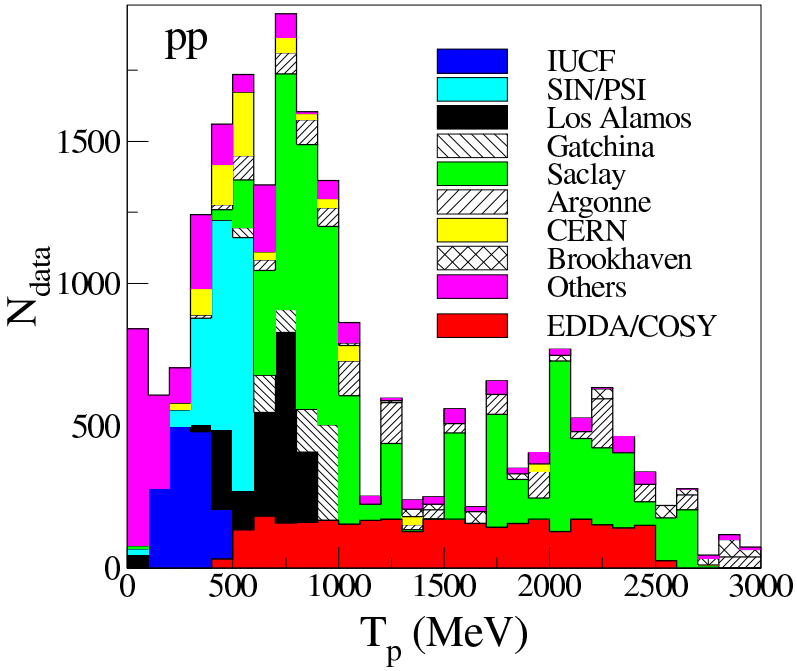
Discrepancies in Phase Shifts



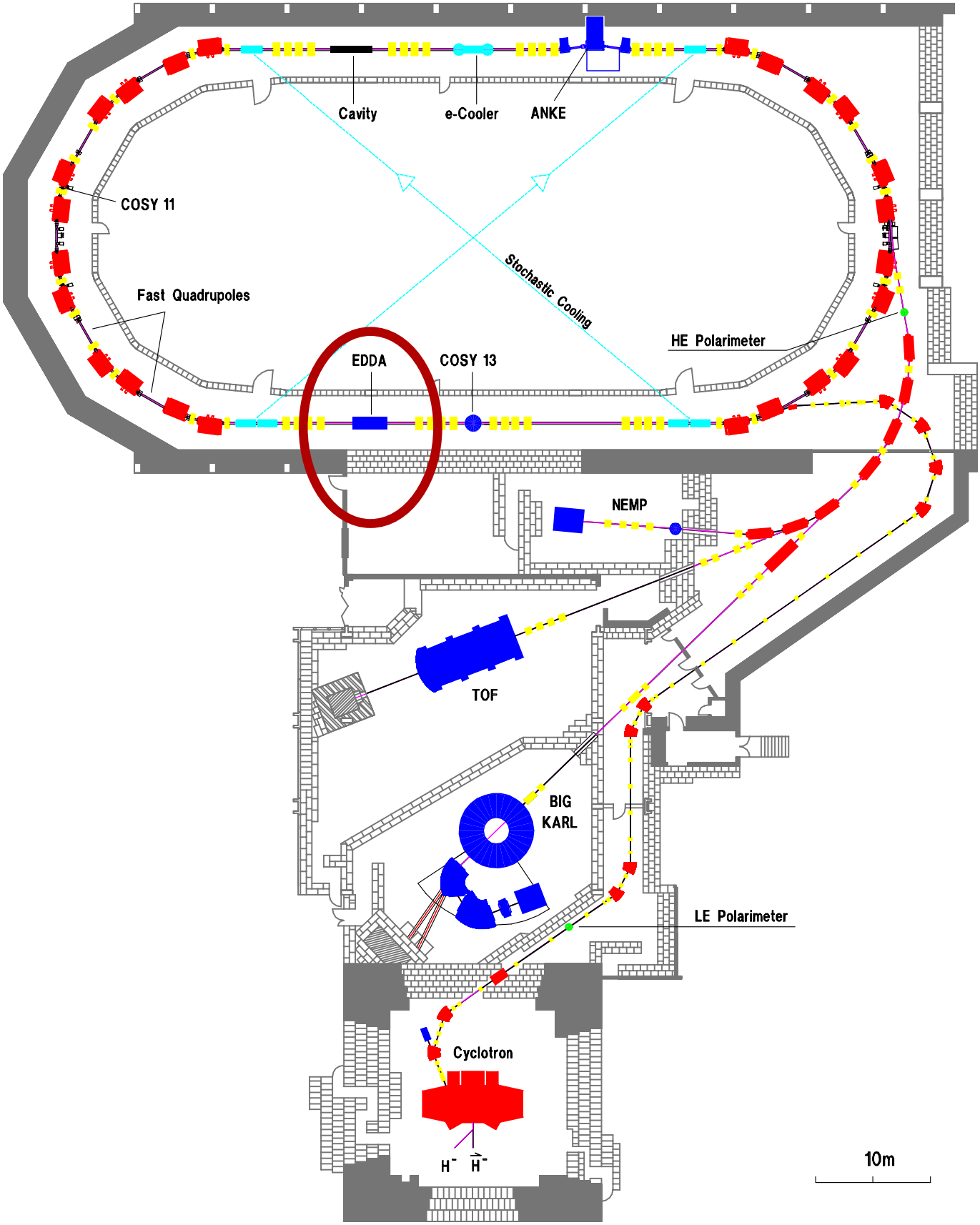
Bystricky, Lechanoine–Leluc, Lehar Eur. Phys. J. C4, 607 (1998)

Arndt, Strakovsky, Workman, Phys. Rev. C62, 034005 (2000)

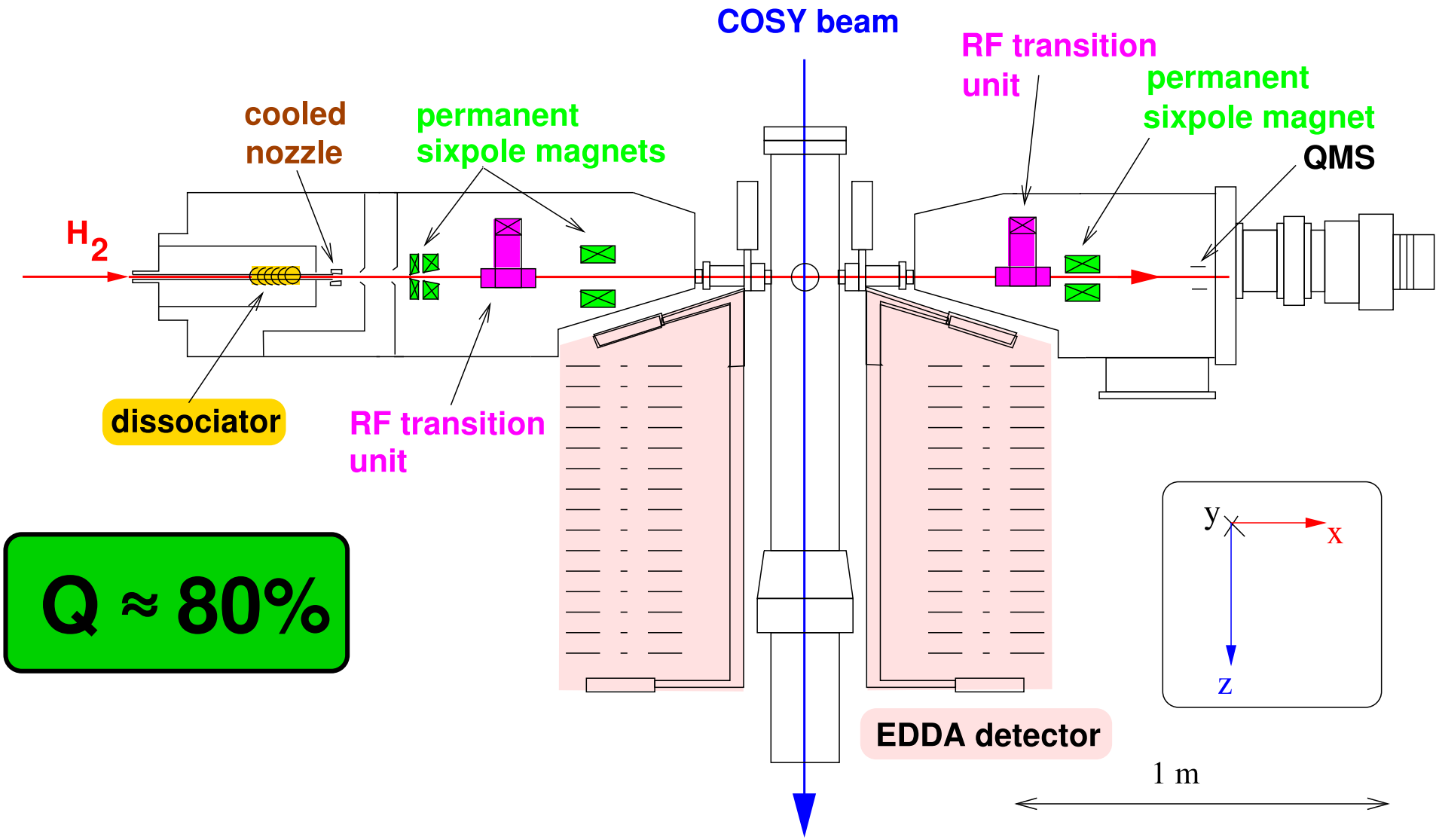
pp World Database



COSY Accelerator Facility

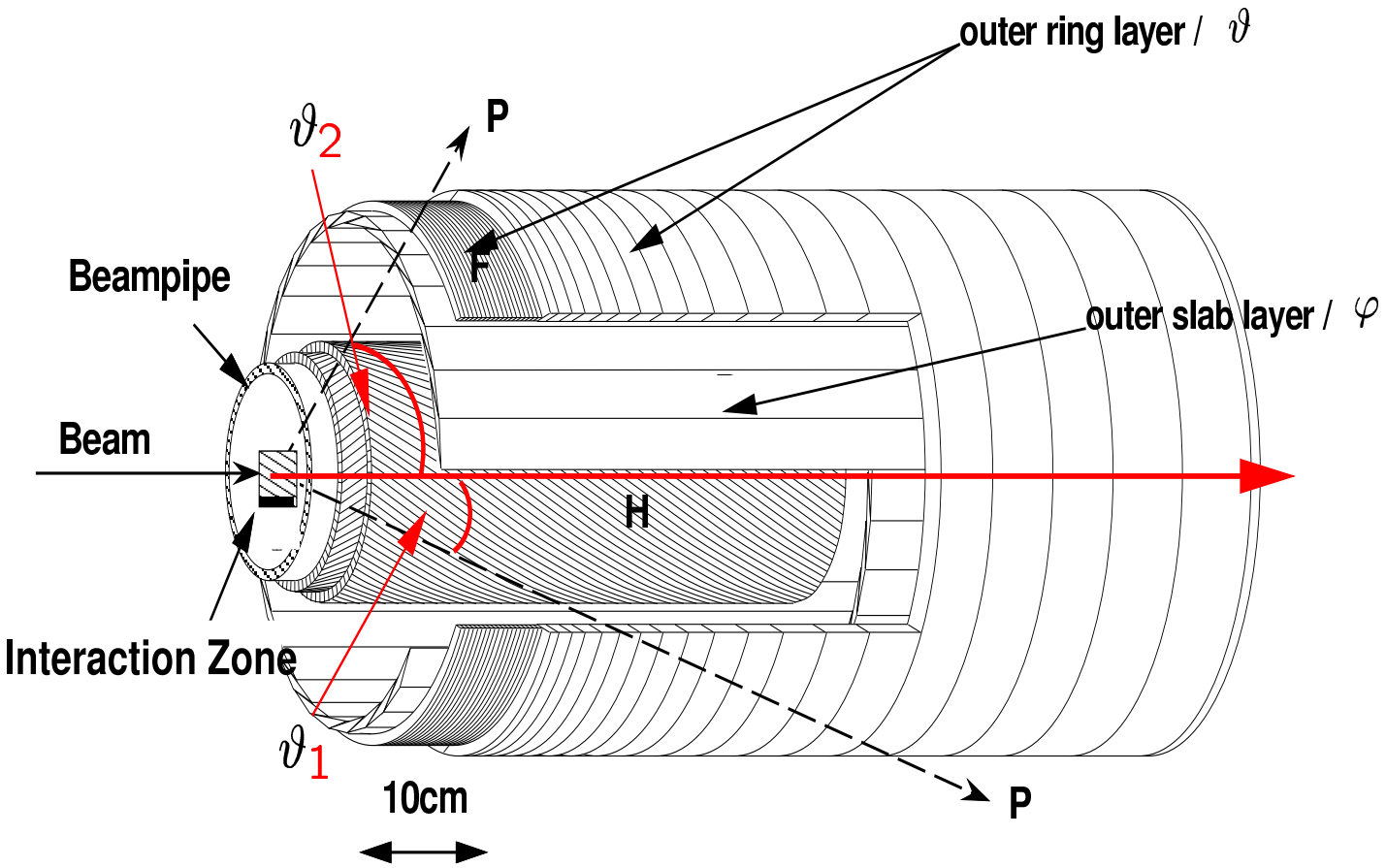


Atomic Beam Target



Q ≈ 80%

EDDA–Detector



$$\Delta\varphi \approx 1.8^\circ, \Delta\vartheta_{cm} \approx 1.5^\circ$$

Differential cross section, laboratory coordinates, beam polarisation along y–axis:

$$\begin{aligned}\frac{\sigma}{\sigma_0} = 1 \;&+\; A_N(\vartheta)[(P_y + Q_y)\cos\varphi + Q_x \sin\varphi] \\ &+\; A_{SS}(\vartheta)[P_y Q_y \sin^2\varphi + P_y Q_x \cos\varphi \sin\varphi] \\ &+\; A_{NN}(\vartheta)[P_y Q_y \cos^2\varphi - P_y Q_x \cos\varphi \sin\varphi] \\ &+\; A_{SL}(\vartheta)[P_y Q_z \sin\varphi]\end{aligned}$$

P_i : **beam polarisation**

Q_i : **target polarisation**

EDDA Results: Analyzing Power

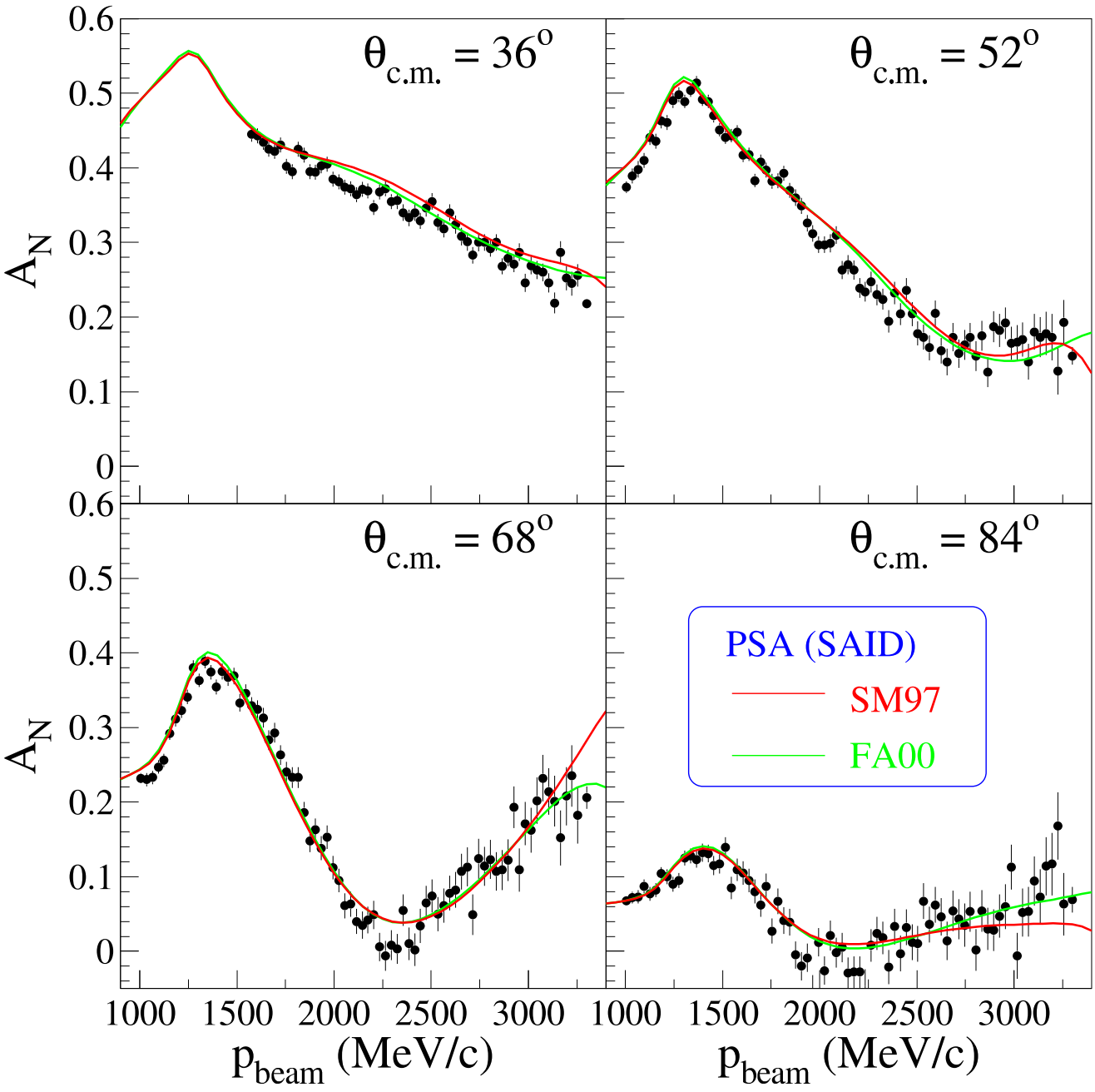
M.Altmeier et al. *Phys. Rev. Lett.* **85** ,1819 (2000)

$p\vec{p} \rightarrow pp$

25×10^6 Events

$\Delta\theta = 4°$

$\Delta p = 30$ MeV/c



Coplanarity:

$$|\varphi_1 - \varphi_2| = \pi$$

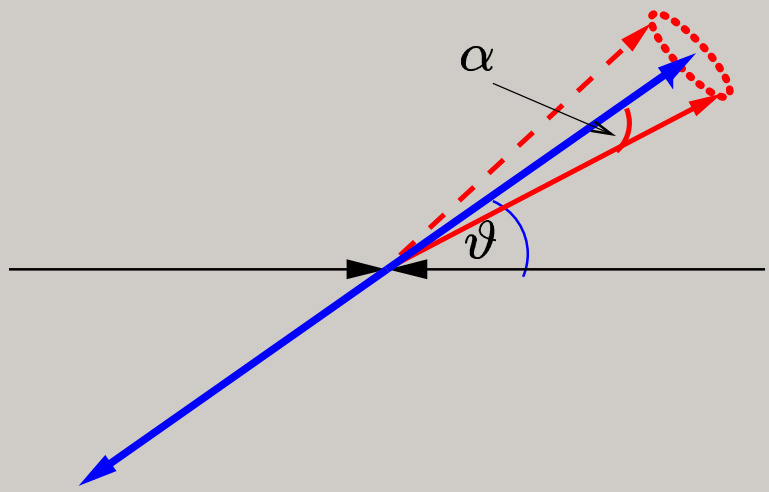
Coplanar Trigger

Kinematical Relation:

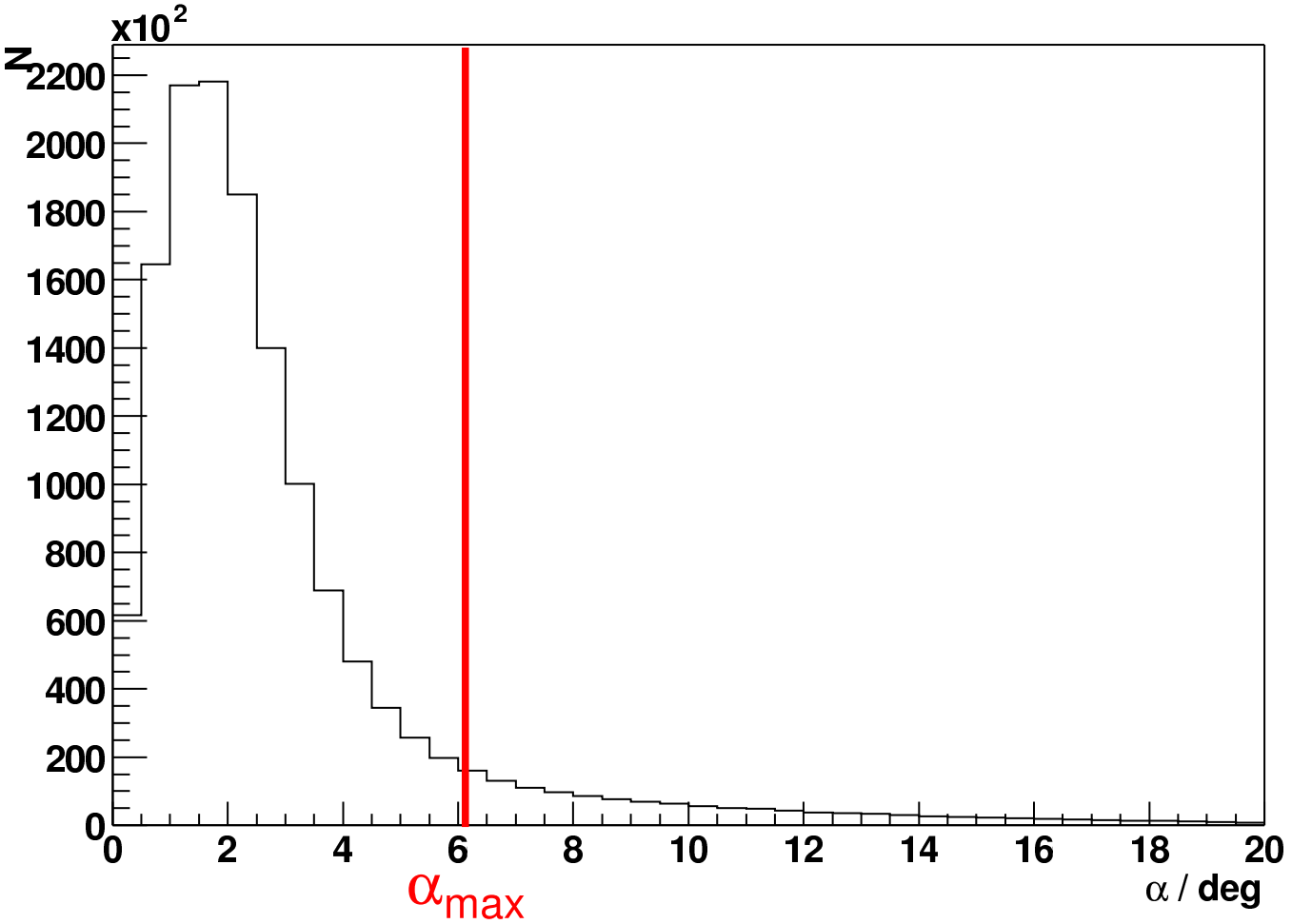
$$\vartheta_{1,cm} + \vartheta_{2,cm} = \pi$$

Data Reconstruction

cm–System: Kinematical Deficite α



Distribution of Kinematical Deficite / Cut

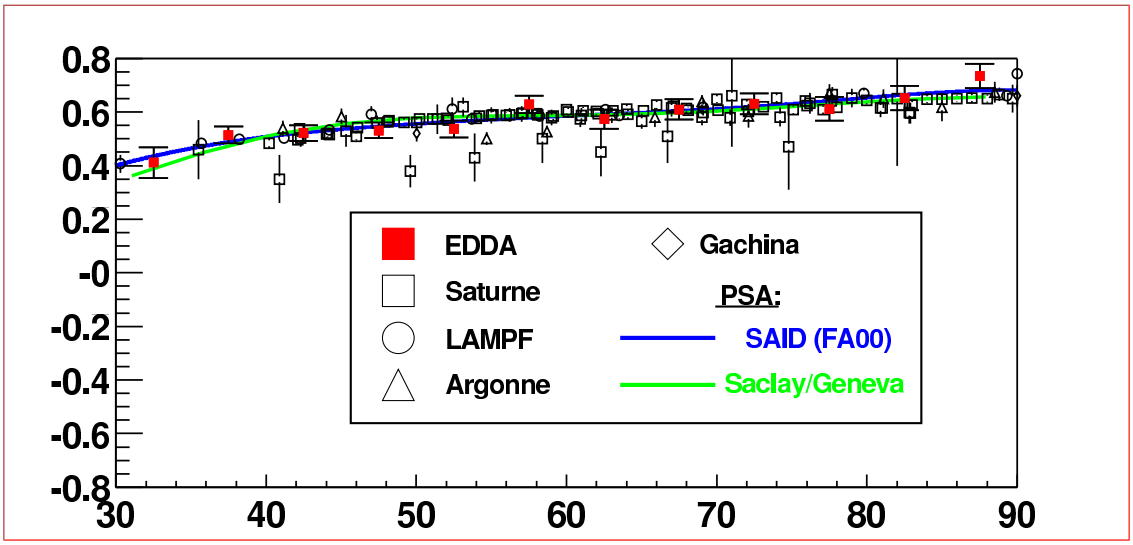


A_{NN}, Angular Distributions

Preliminary Data

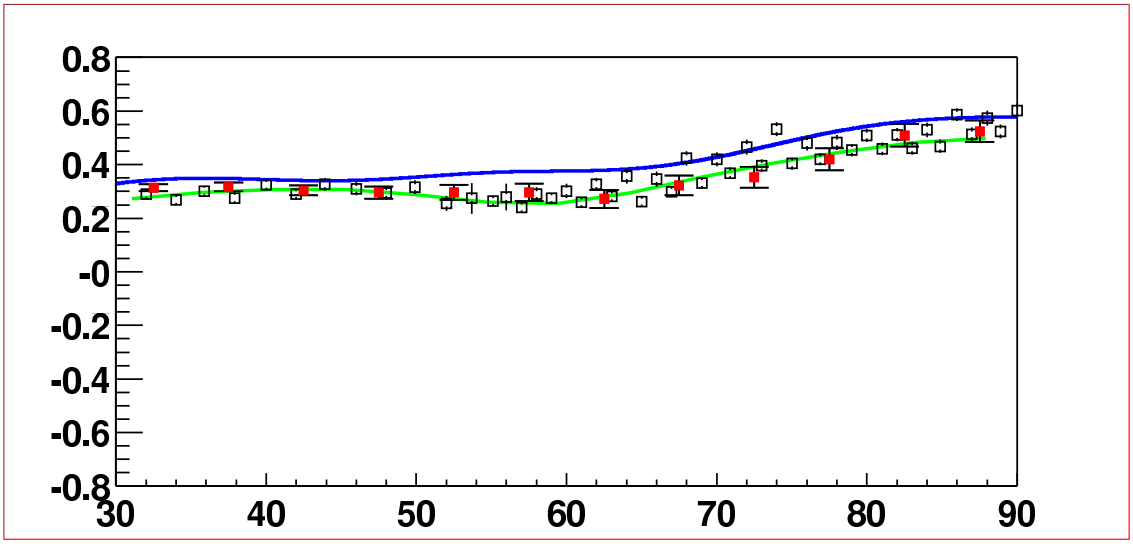
1430 MeV/c

(772 MeV)



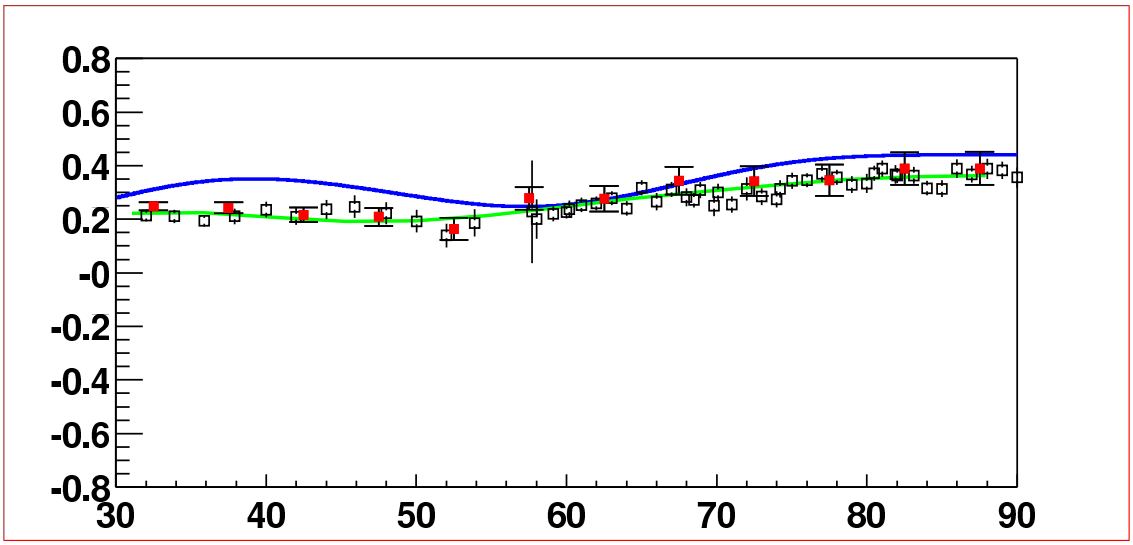
2572 MeV/c

(1800 MeV)



3180 MeV/c

(2377 MeV)



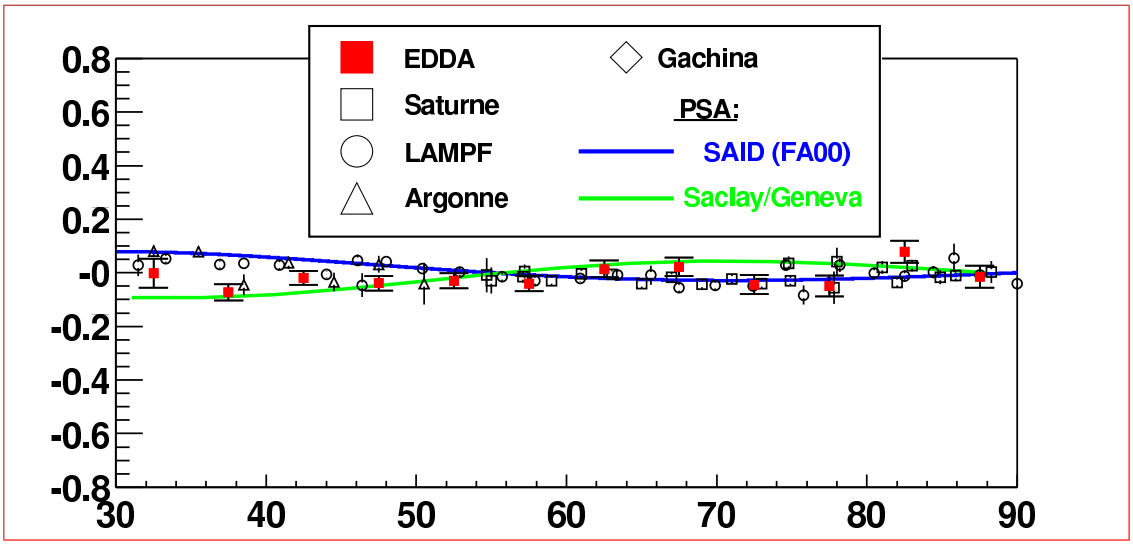
ϑ_{cm}/**deg**

A_{SL}, Angular Distributions

Preliminary Data

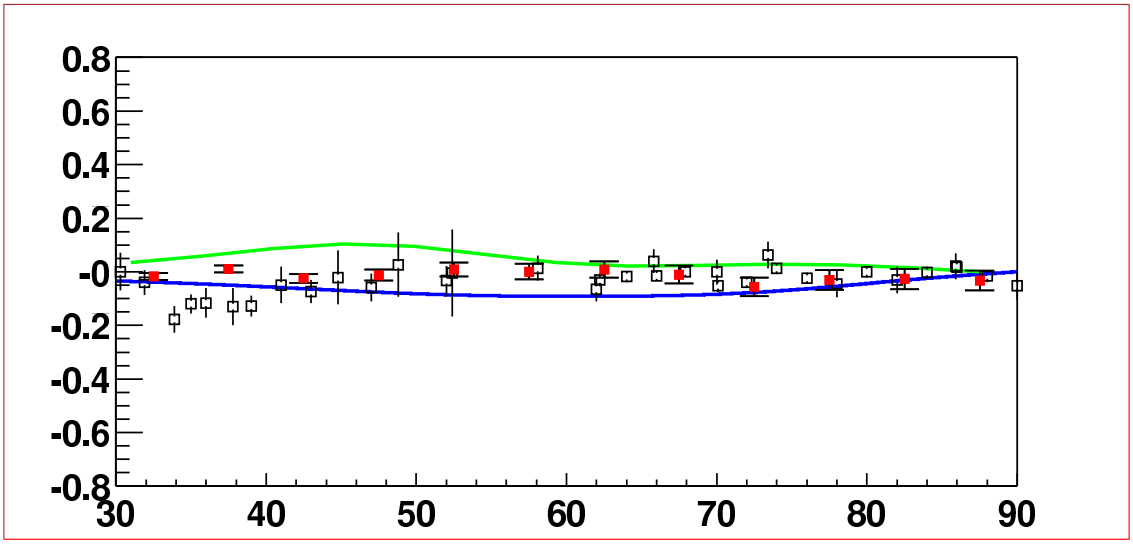
1430 MeV/c

(772 MeV)



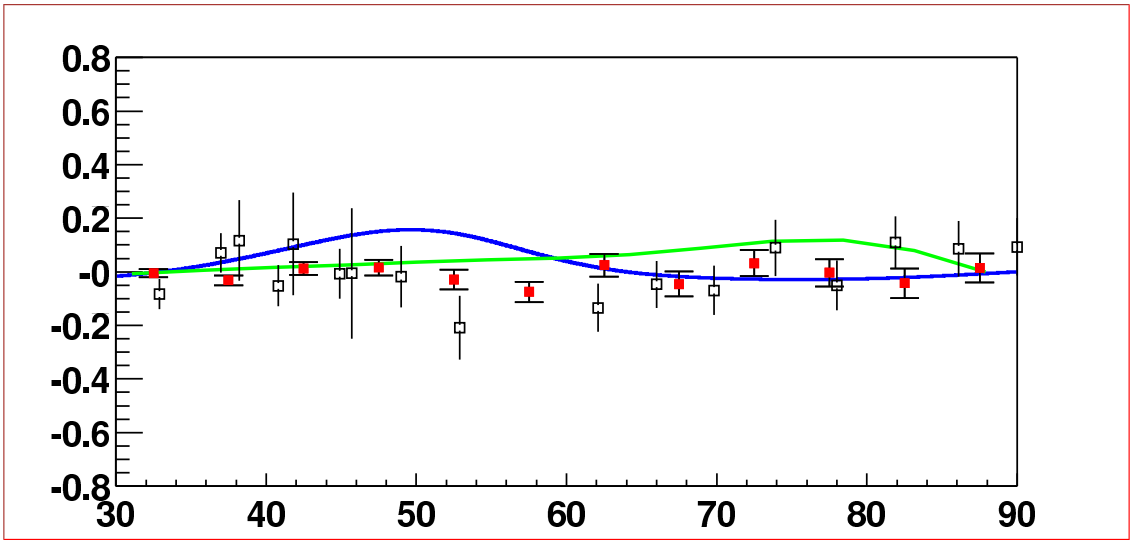
2572 MeV/c

(1800 MeV)



3180 MeV/c

(2377 MeV)



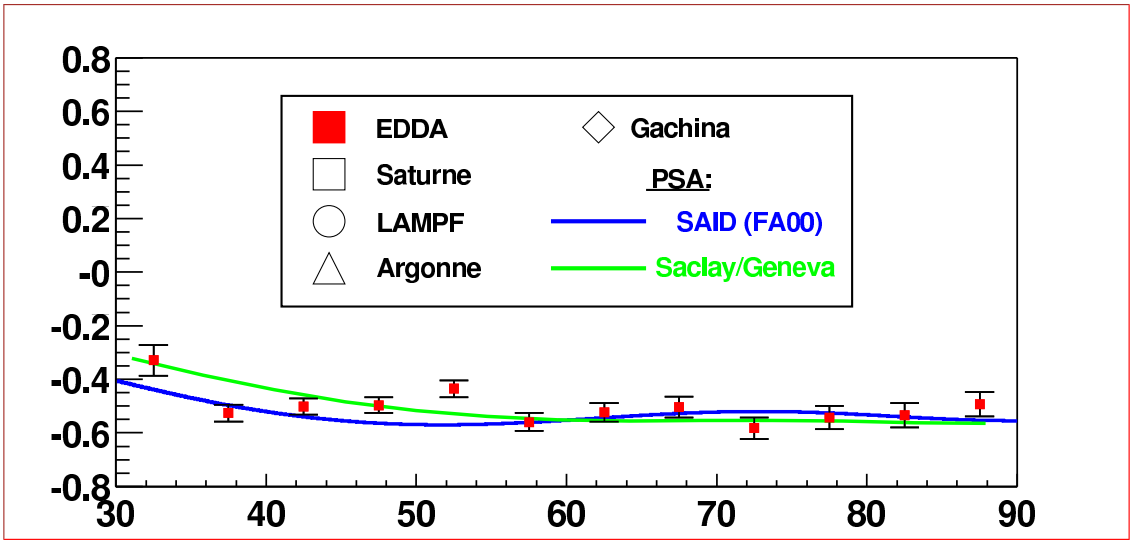
ϑ_{cm}/**deg**

A_{SS}, Angular Distributions

Preliminary Data

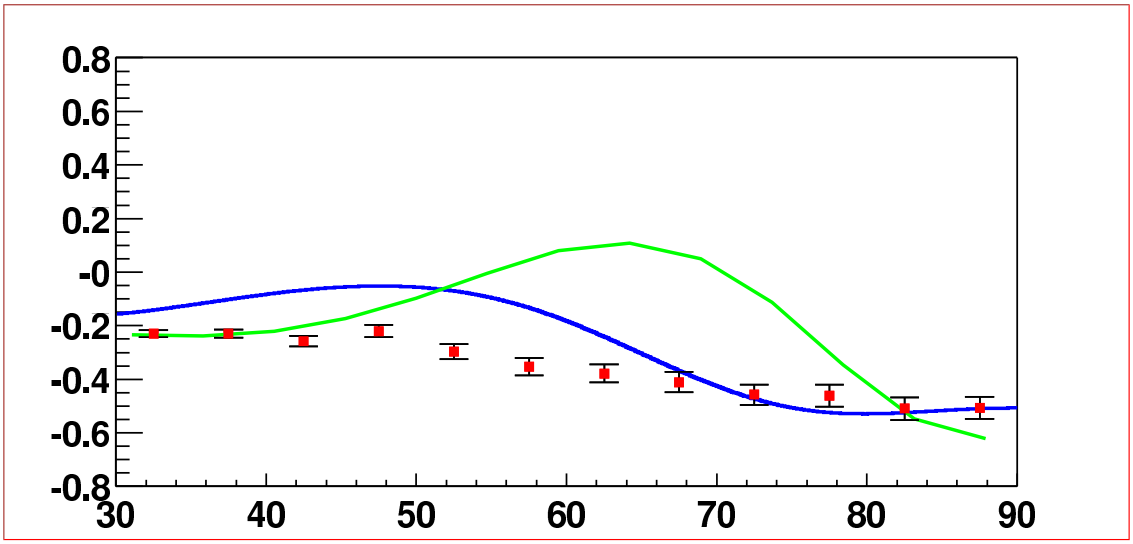
1430 MeV/c

(772 MeV)



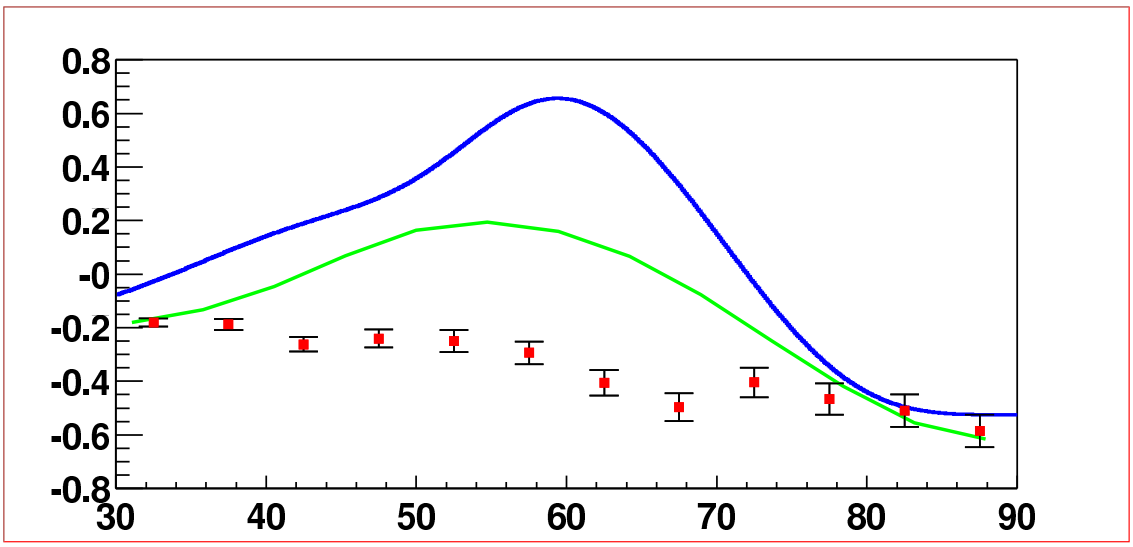
2572 MeV/c

(1800 MeV)



3180 MeV/c

(2377 MeV)

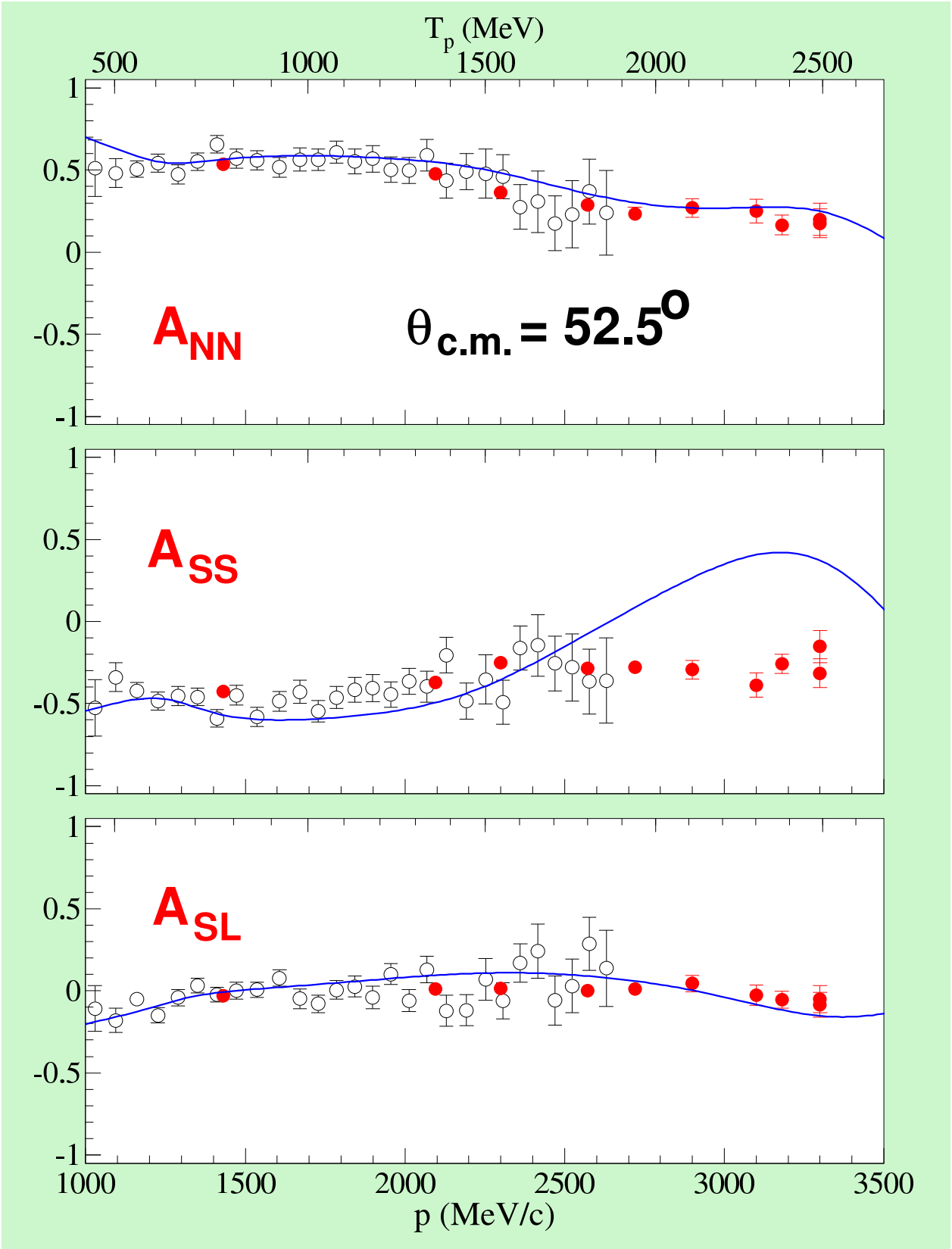


ϑ_{cm}/**deg**

EDDA Collaboration: F.Bauer et al., Phys.Rev.Lett. 90, 142301 (2003)

Excitation Functions

EDDA preliminary



PSA (SAID SM00)

Summary

A_N

- consistent polarisation standard over covered energy range
- impact on PSA

A_{NN}, A_{SS}, A_{SL}

- A_{NN}: good consistency with existing data
- A_{SS}: first measurements in EDDA energy range
- important step for improve–ment of PSA

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