

Progress on JPAC projects with CLAS

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Indiana University

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Joint Physics Analysis Center

CLAS collaboration meeting
March 2017



INDIANA UNIVERSITY



Outline

How JPAC or any theorist can collaborate with CLAS or any collaboration ?

- providing model for MC simulations

$$\gamma p \rightarrow \pi p \quad \gamma p \rightarrow \eta p \quad \gamma^{(*)} p \rightarrow K \Lambda \quad \text{See J. Nys talk}$$

$$\gamma^* p \rightarrow \pi \pi p$$

- Joint analysis of data

$$\gamma p \rightarrow K \bar{K} p$$

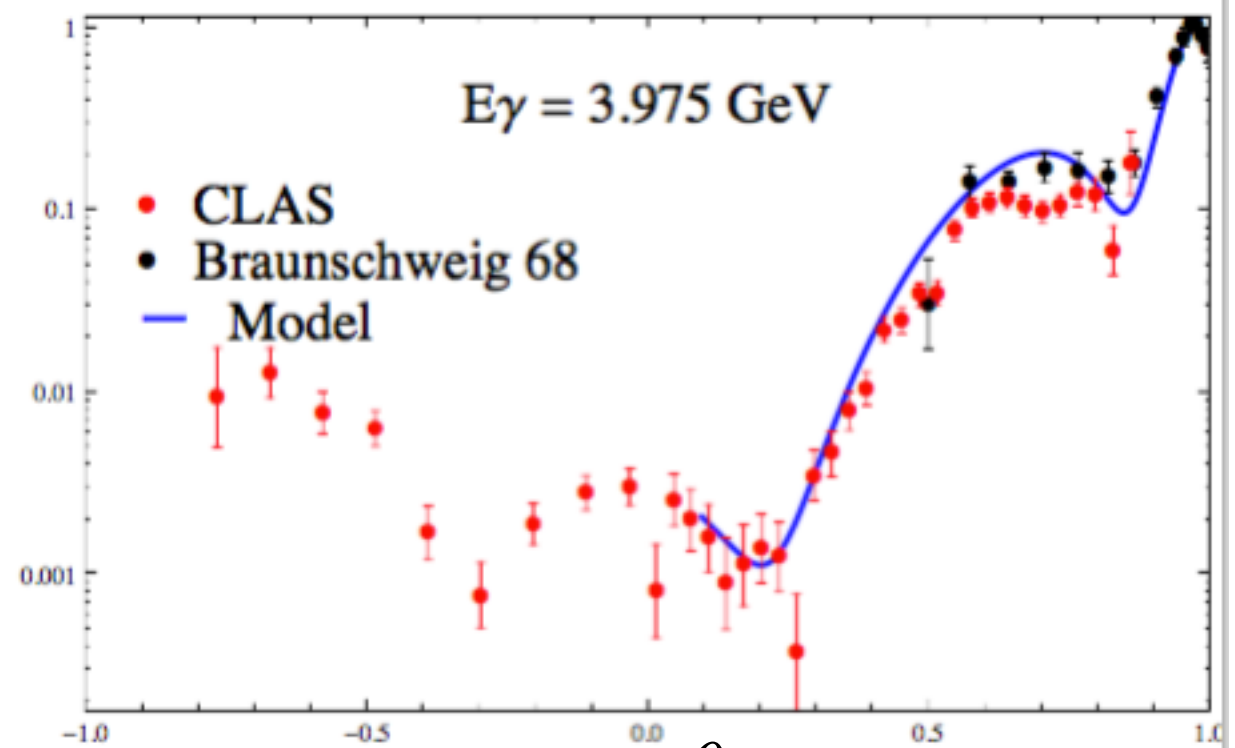
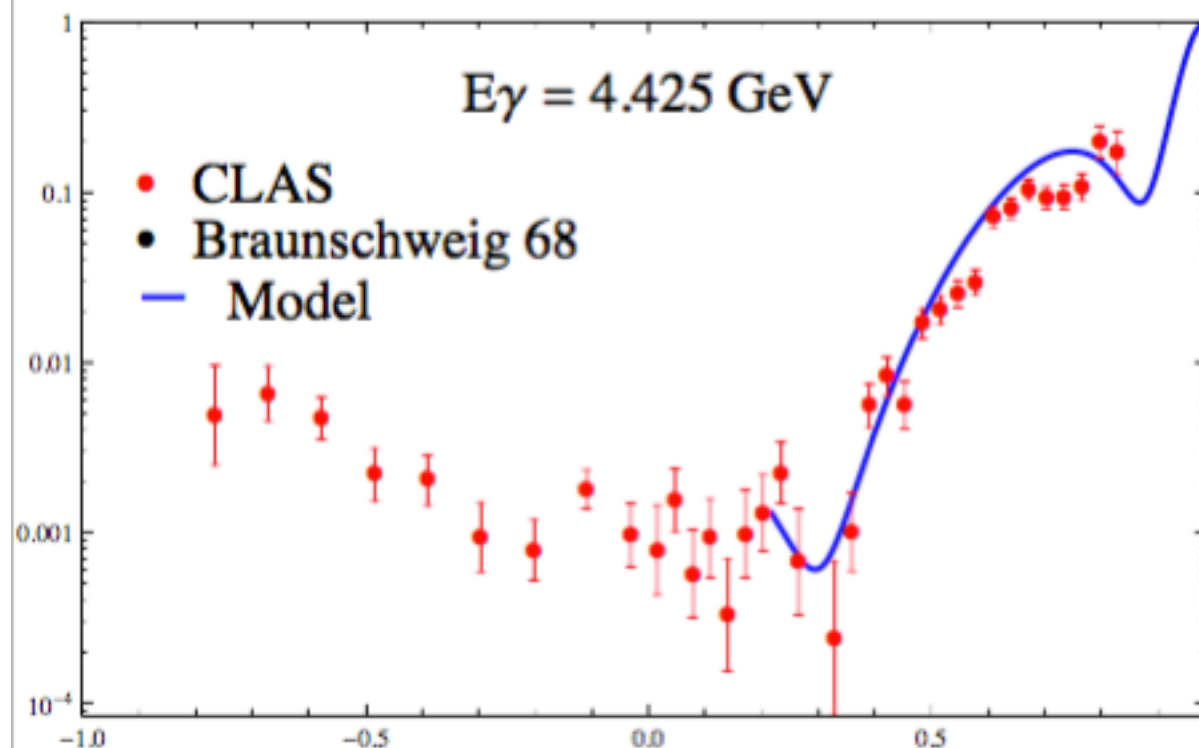
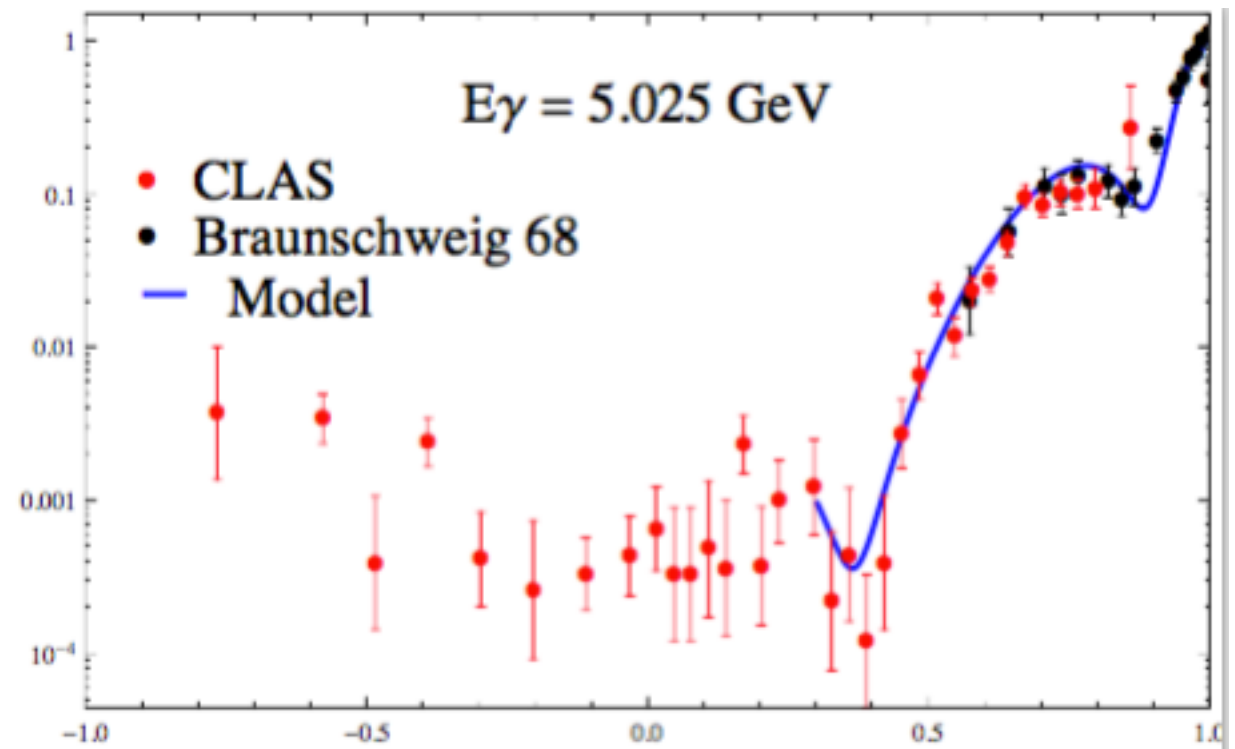
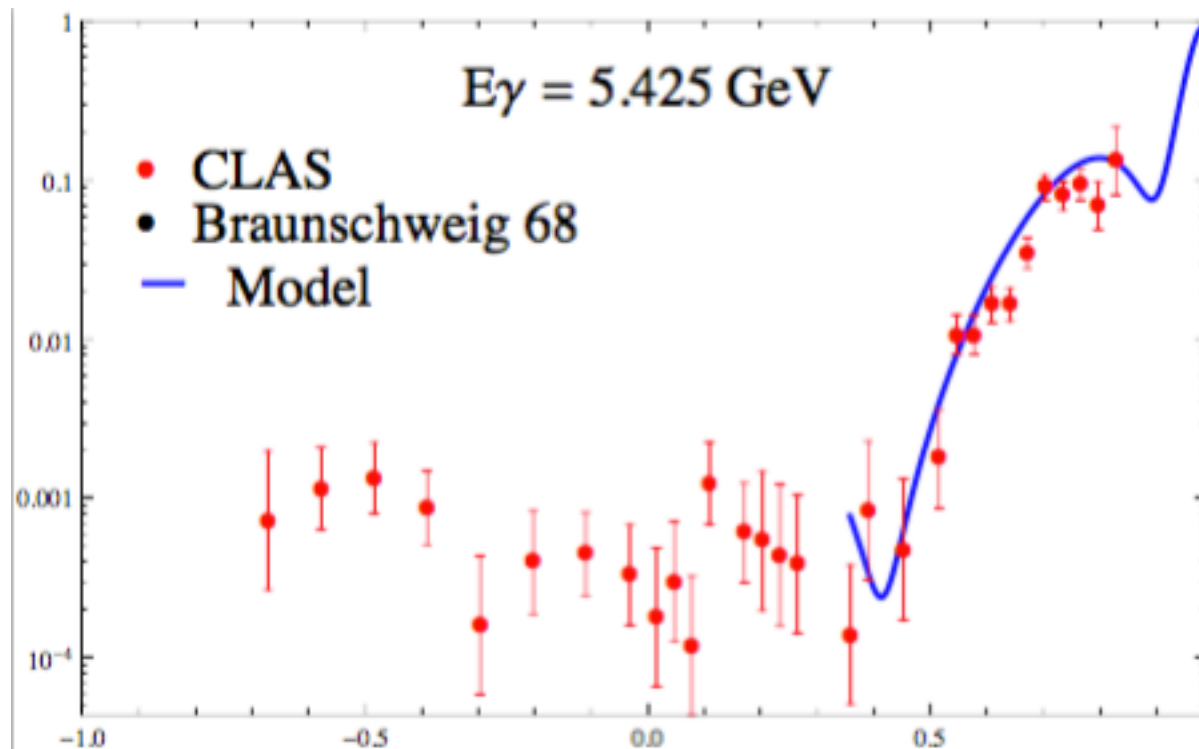
$$\pi p \rightarrow \eta \pi p \quad \pi p \rightarrow \pi \pi \pi p \quad \text{with COMPASS}$$

- Summer school / website

$$\gamma p \rightarrow \pi^0 p$$

Blue line: Predictions from VM et al
Phys. Rev. D92 074013

Red points: Data from CLAS (in preparation)
Courtesy of M. Kunkel



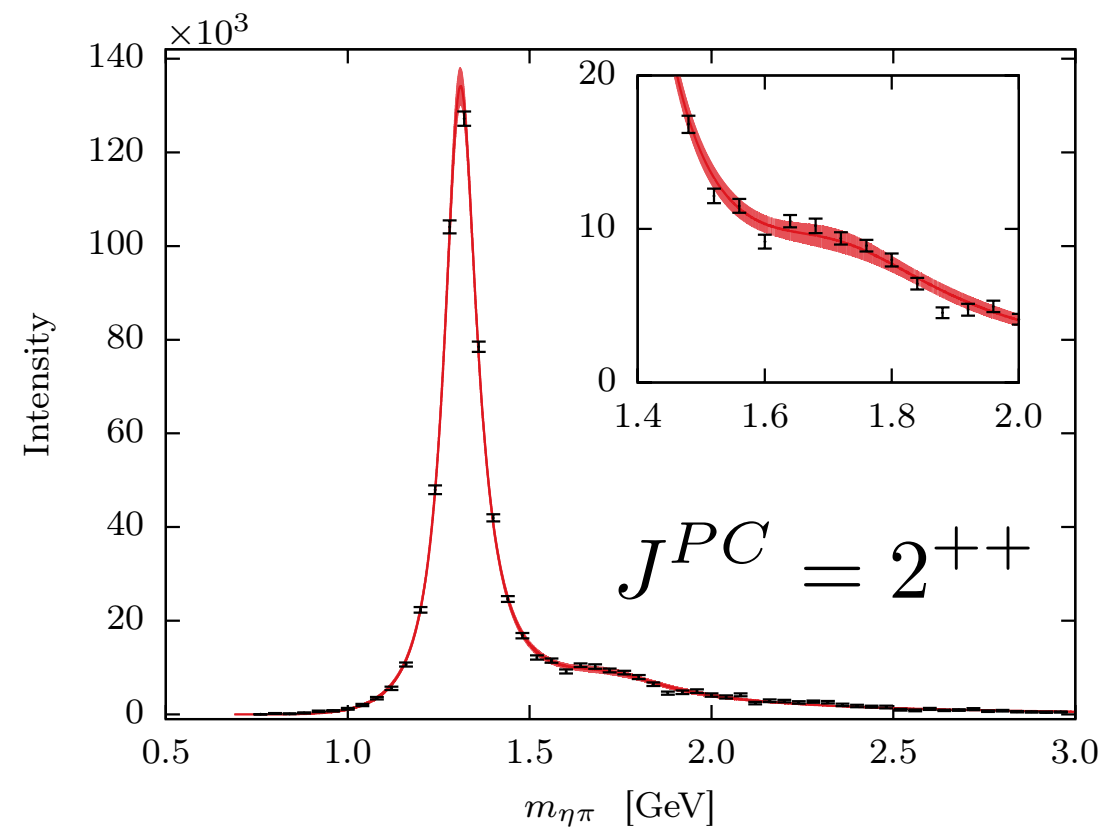
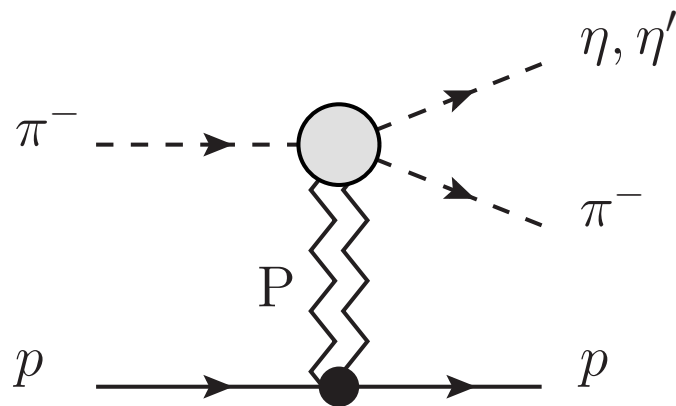
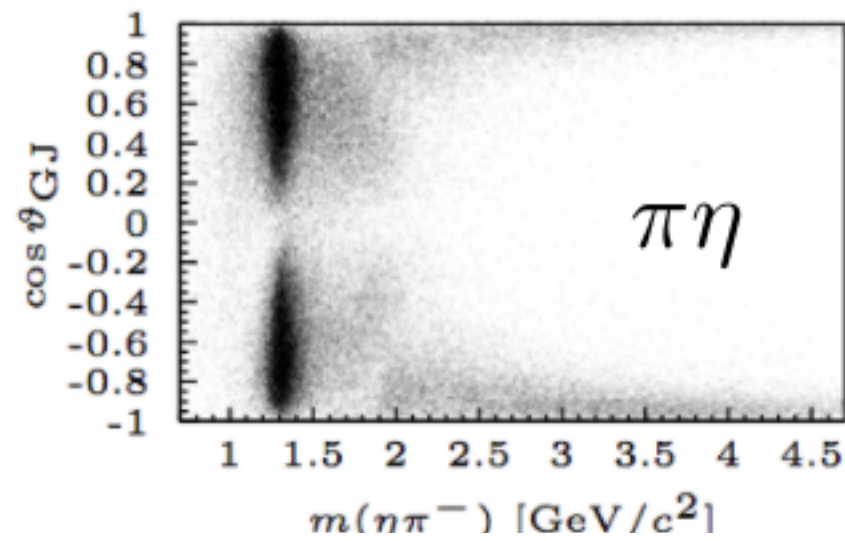
$\cos \theta$

$\cos \theta$

Eta-Pi@COMPASS

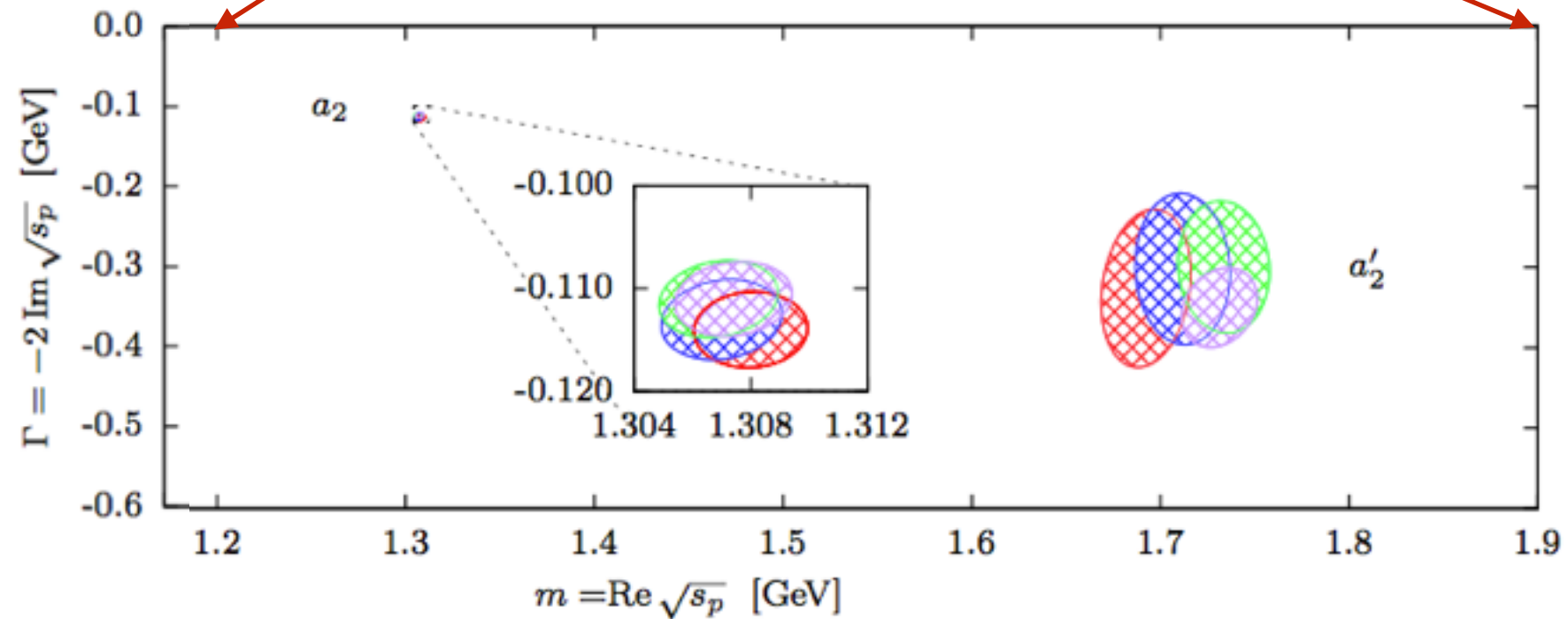
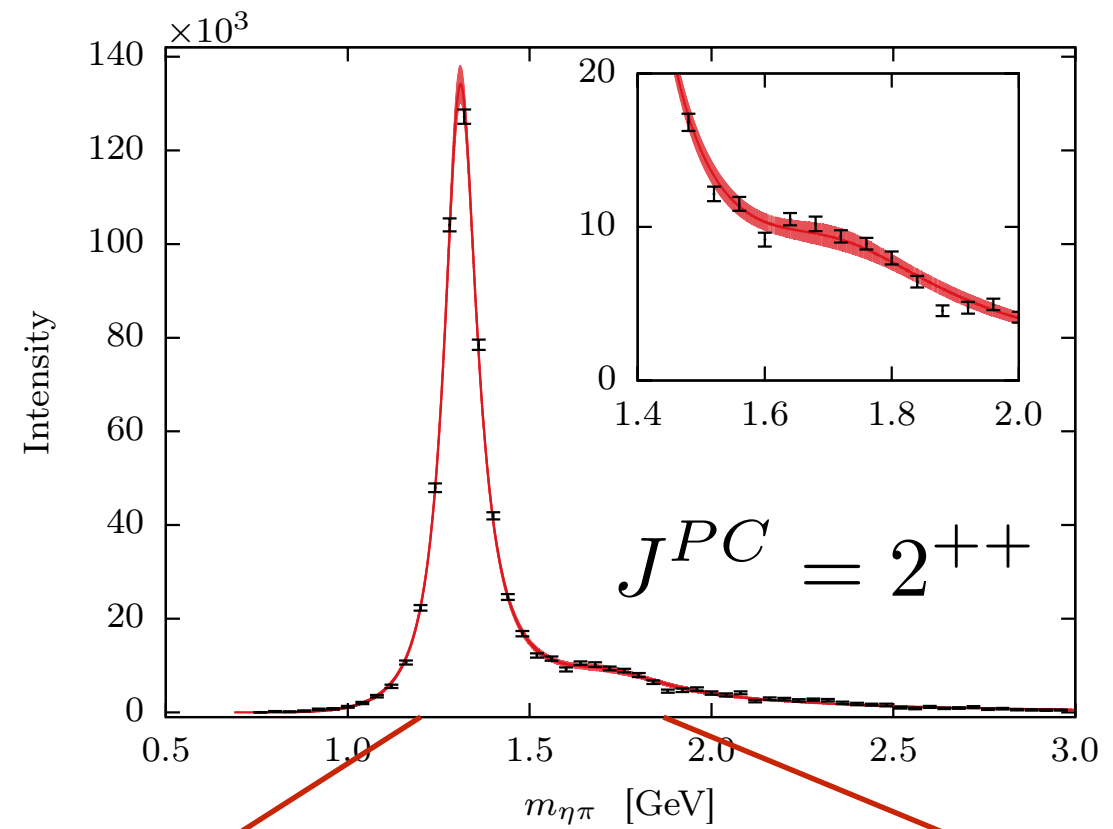
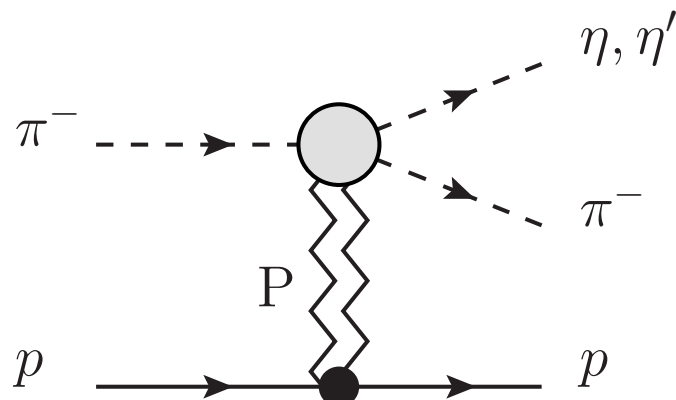
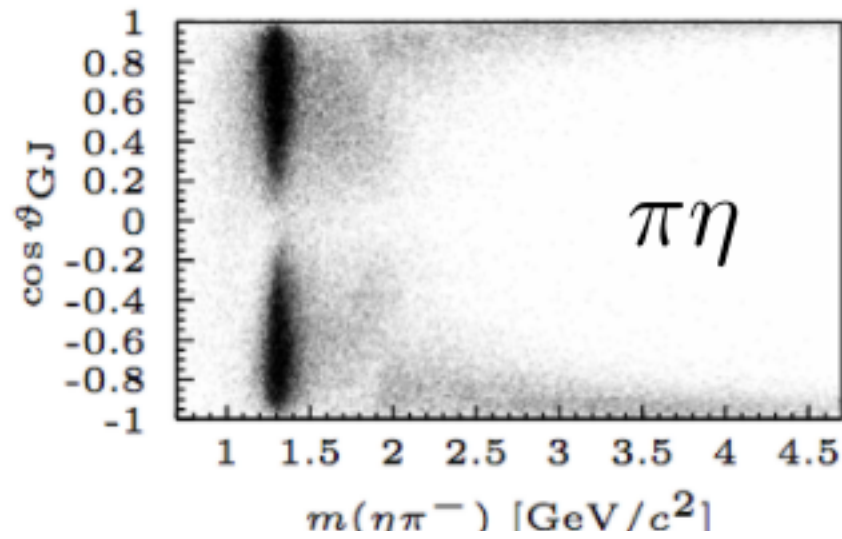
COMPASS PLB740

ArXiv:1408.4286



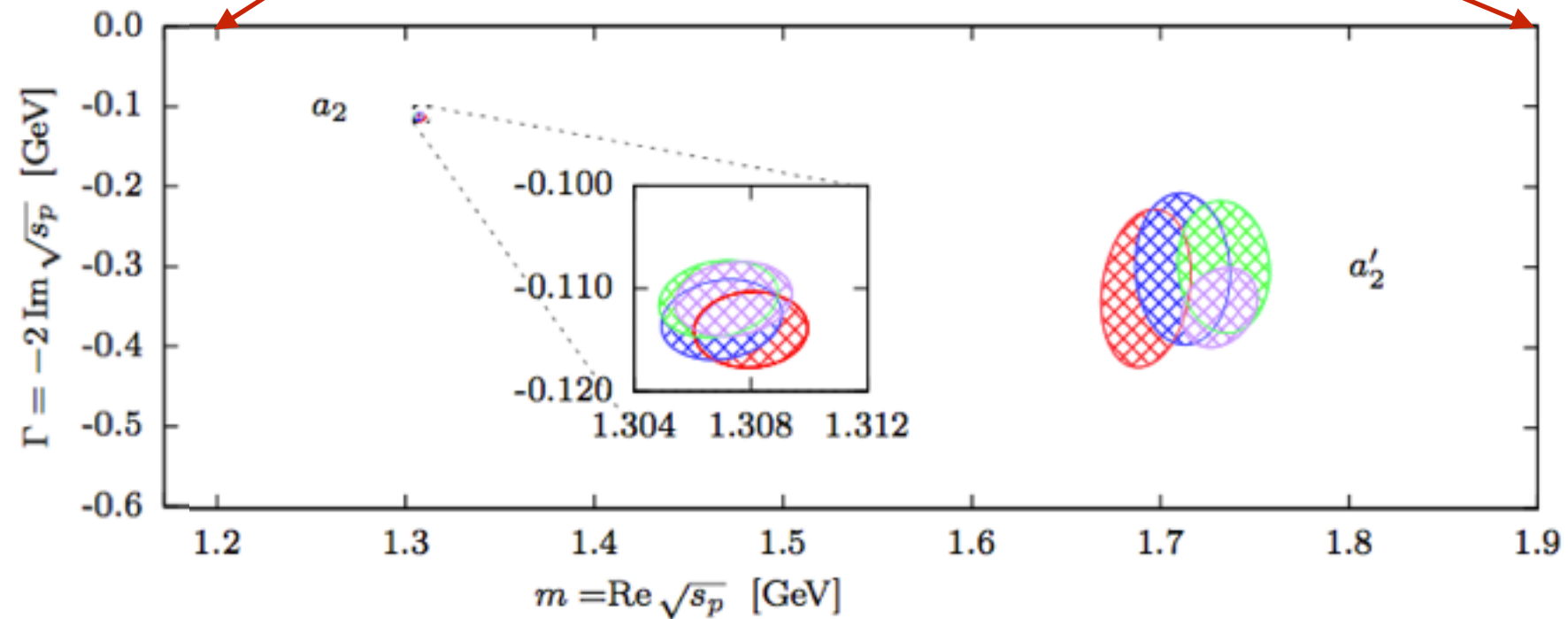
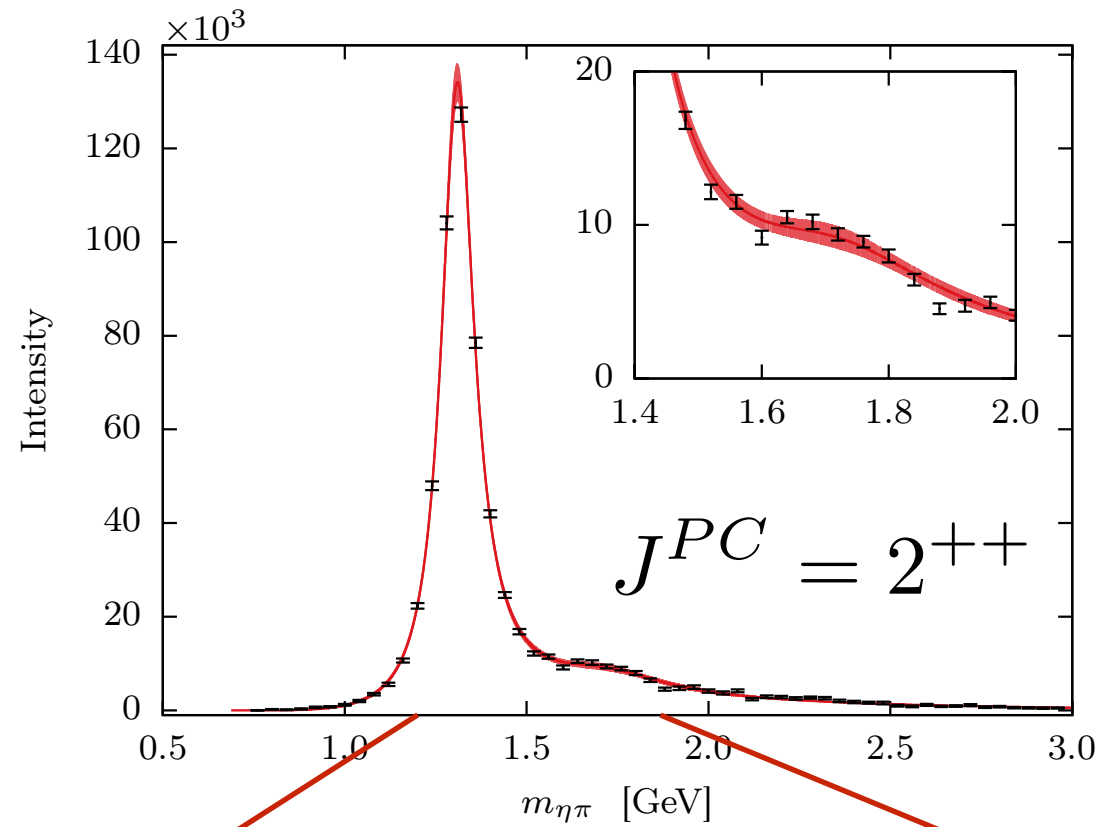
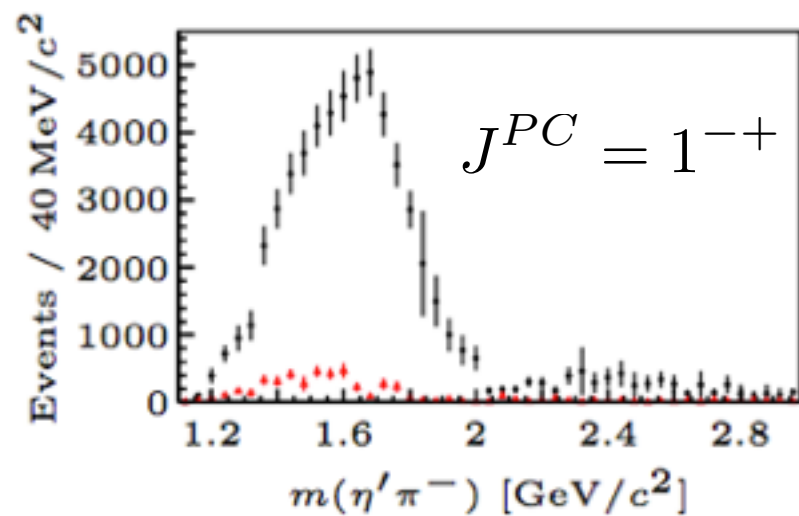
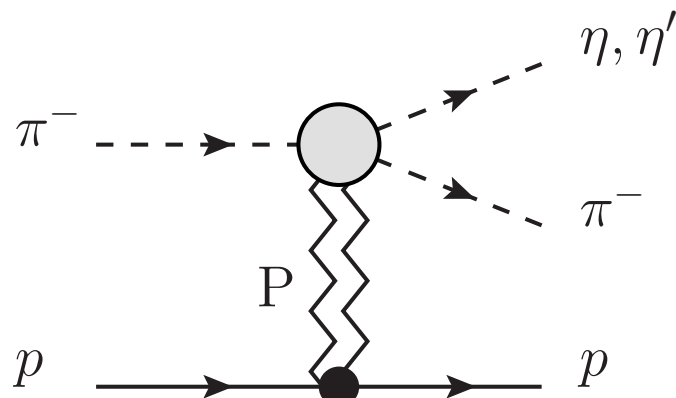
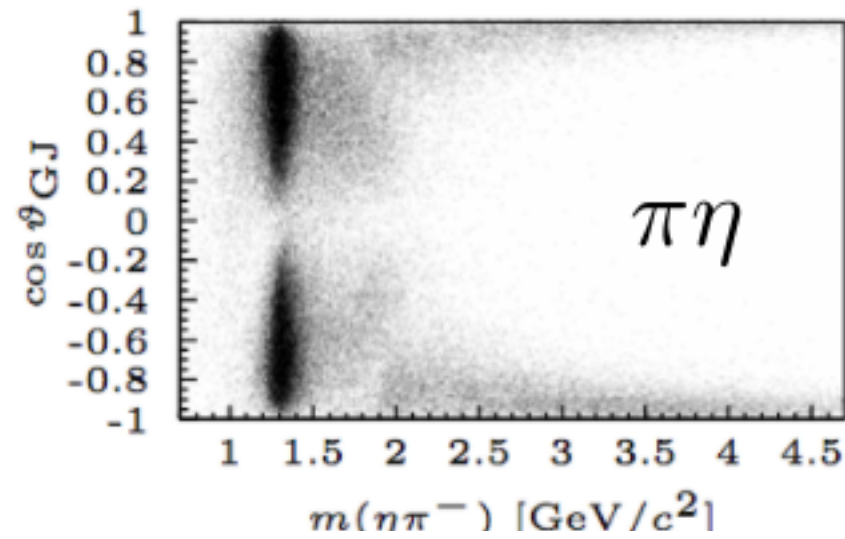
Eta-Pi@COMPASS

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Eta-Pi@COMPASS

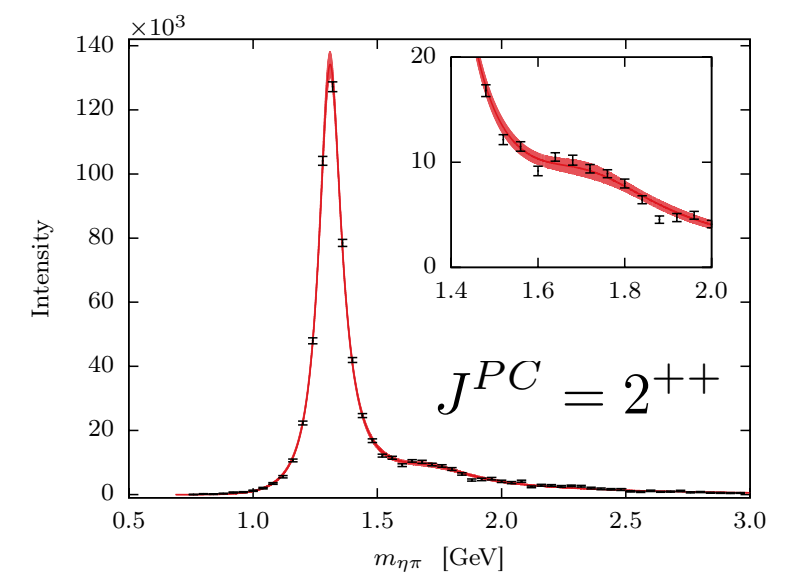
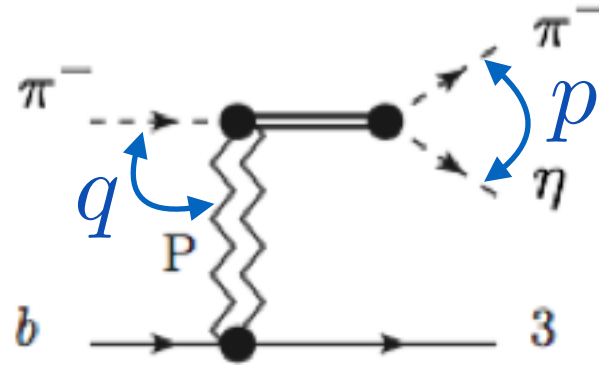
COMPASS PLB740
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A. Jackura et al (JPAC), in preparation

Eta-Pi@COMPASS

$$\frac{d\sigma}{d\sqrt{s}} = \overset{\text{normalization}}{N} p |a(s)|^2$$



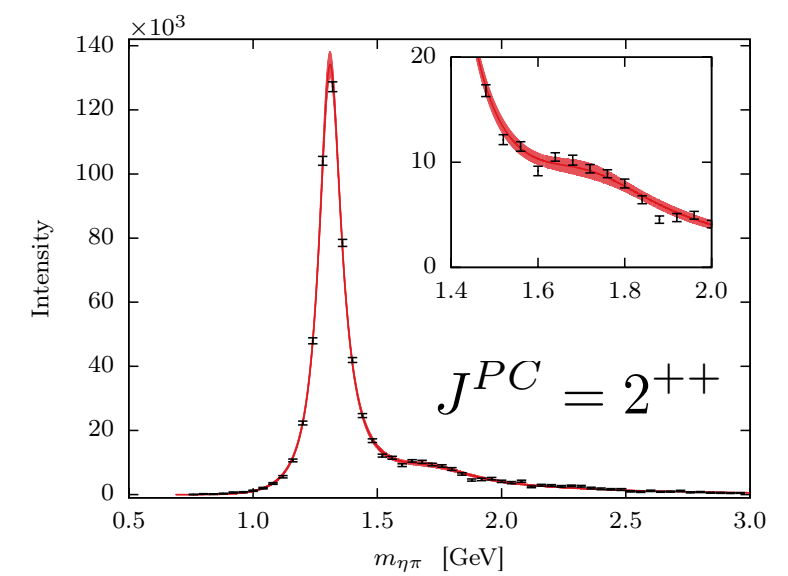
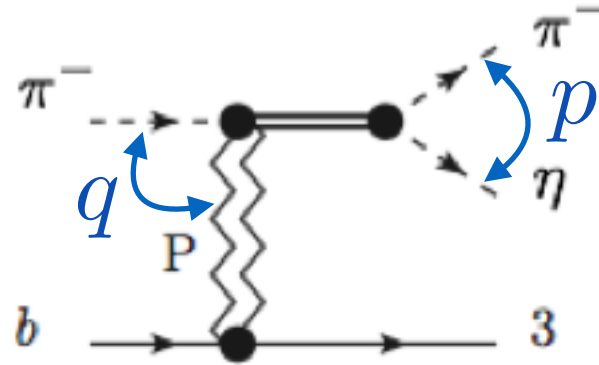
$$a(s) = p^2 \frac{n(s)}{D(s)}$$

production

dynamics (poles)

Eta-Pi@COMPASS

$$\frac{d\sigma}{d\sqrt{s}} = \overset{\text{normalization}}{N} p |a(s)|^2$$



$$a(s) = p^2 \frac{n(s)}{D(s)}$$

production

dynamics (poles)

$$D(s) = D_0(s) - \frac{1}{\pi} \int_{s_{th}}^{\infty} ds' \frac{\rho(s') N(s')}{s' - s}$$

real (masses)

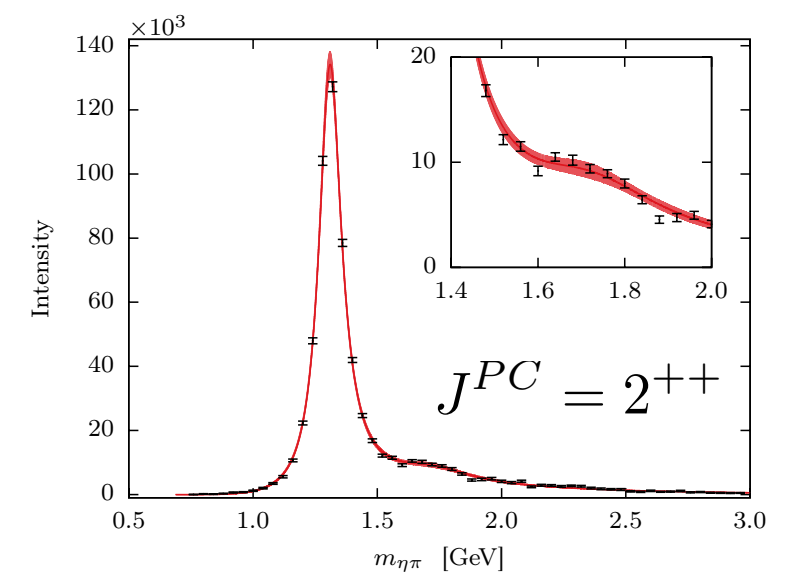
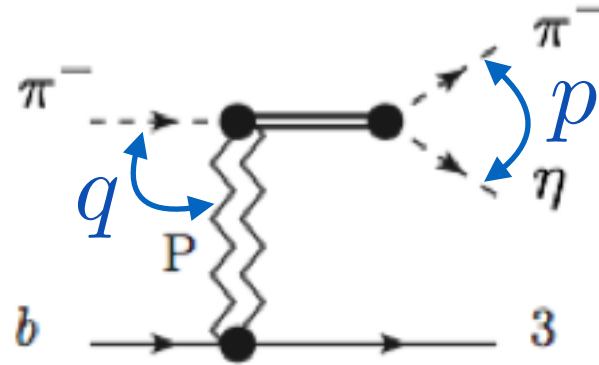
imaginary (widths)

$$D_0(s) = c_0 - c_1 s$$

$$\rho(s) N(s) = g \frac{\lambda^{J+\frac{1}{2}}(s, m_\eta^2, m_\pi^2)}{(s + s_R)^{2J+3}}$$

Eta-Pi@COMPASS

$$\frac{d\sigma}{d\sqrt{s}} = \overset{\text{normalization}}{N} p |a(s)|^2$$



$$a(s) = p^2 \frac{n(s)}{D(s)}$$

production

dynamics (poles)

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real (masses)

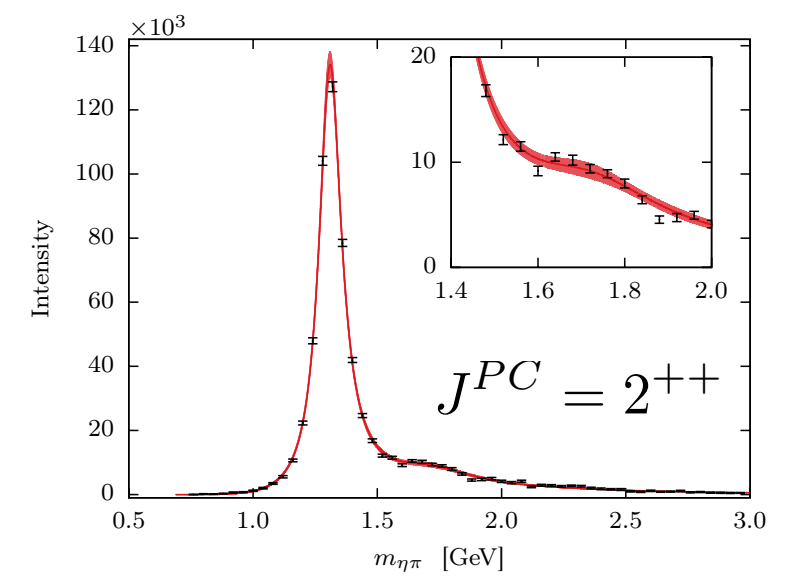
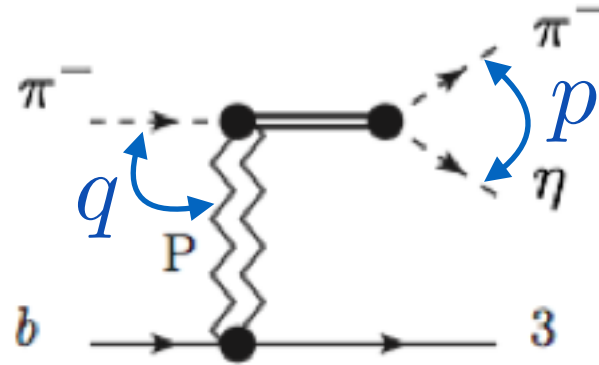
imaginary (widths)

$$D_0(s) = c_0 - c_1 s - \frac{c_2}{c_3 - s}$$

$$\rho(s) N(s) = g \frac{\lambda^{J+\frac{1}{2}}(s, m_\eta^2, m_\pi^2)}{(s + s_R)^{2J+3}}$$

Eta-Pi@COMPASS

$$\frac{d\sigma}{d\sqrt{s}} = \overset{\text{normalization}}{N} p |a(s)|^2$$



$$a(s) = p^2 \frac{n(s)}{D(s)}$$

production

$$n(s) = \frac{q}{c_3 - s} \sum_n a_n T_n(\omega(s))$$

Chebyshev polynomials

$$\omega(s) = \frac{s}{s + \Lambda}$$

dynamics (poles)

$$D(s) = D_0(s) - \frac{1}{\pi} \int_{s_{th}}^{\infty} ds' \frac{\rho(s') N(s')}{s' - s}$$

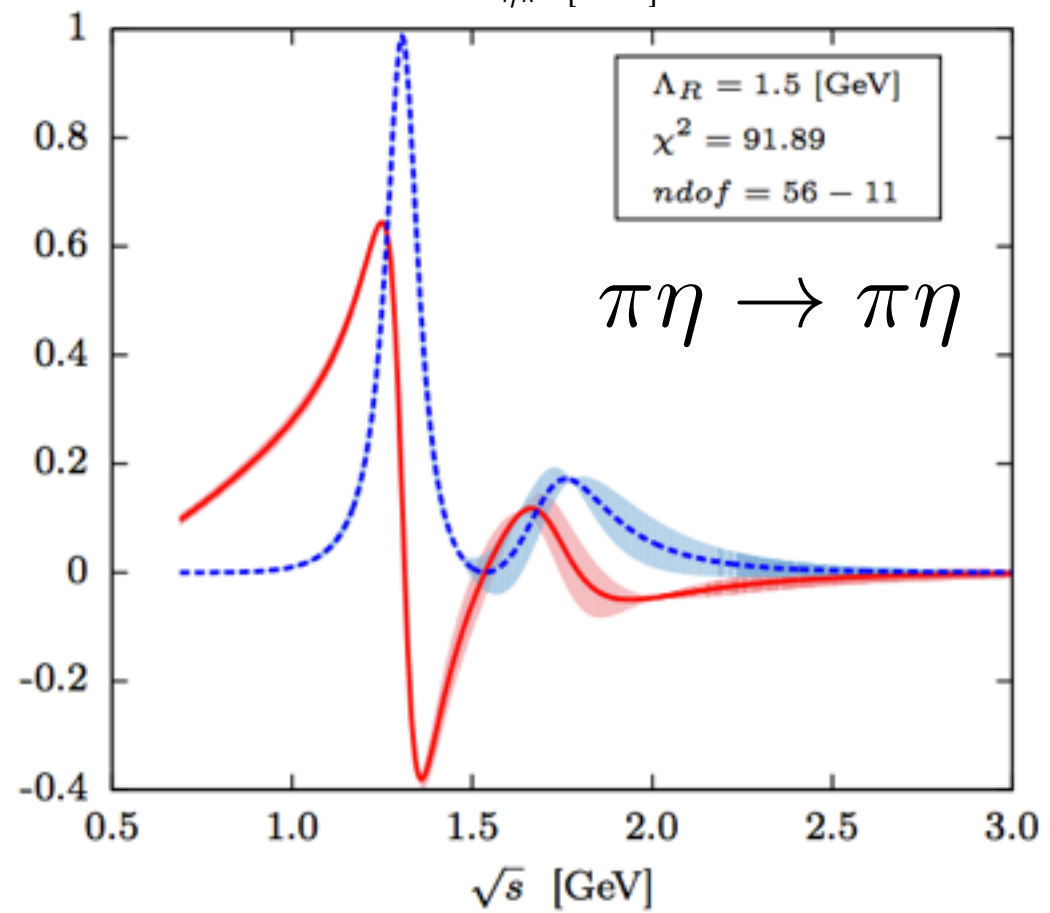
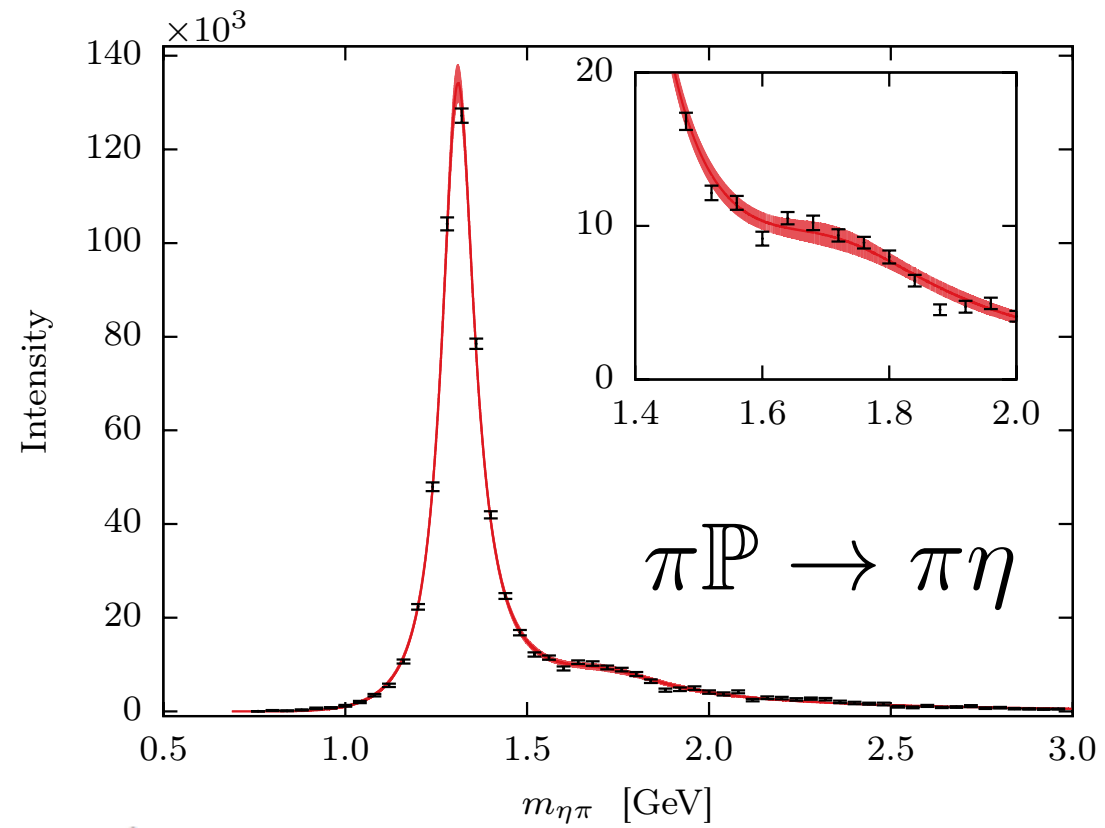
real (masses)

$$D_0(s) = c_0 - c_1 s - \frac{c_2}{c_3 - s}$$

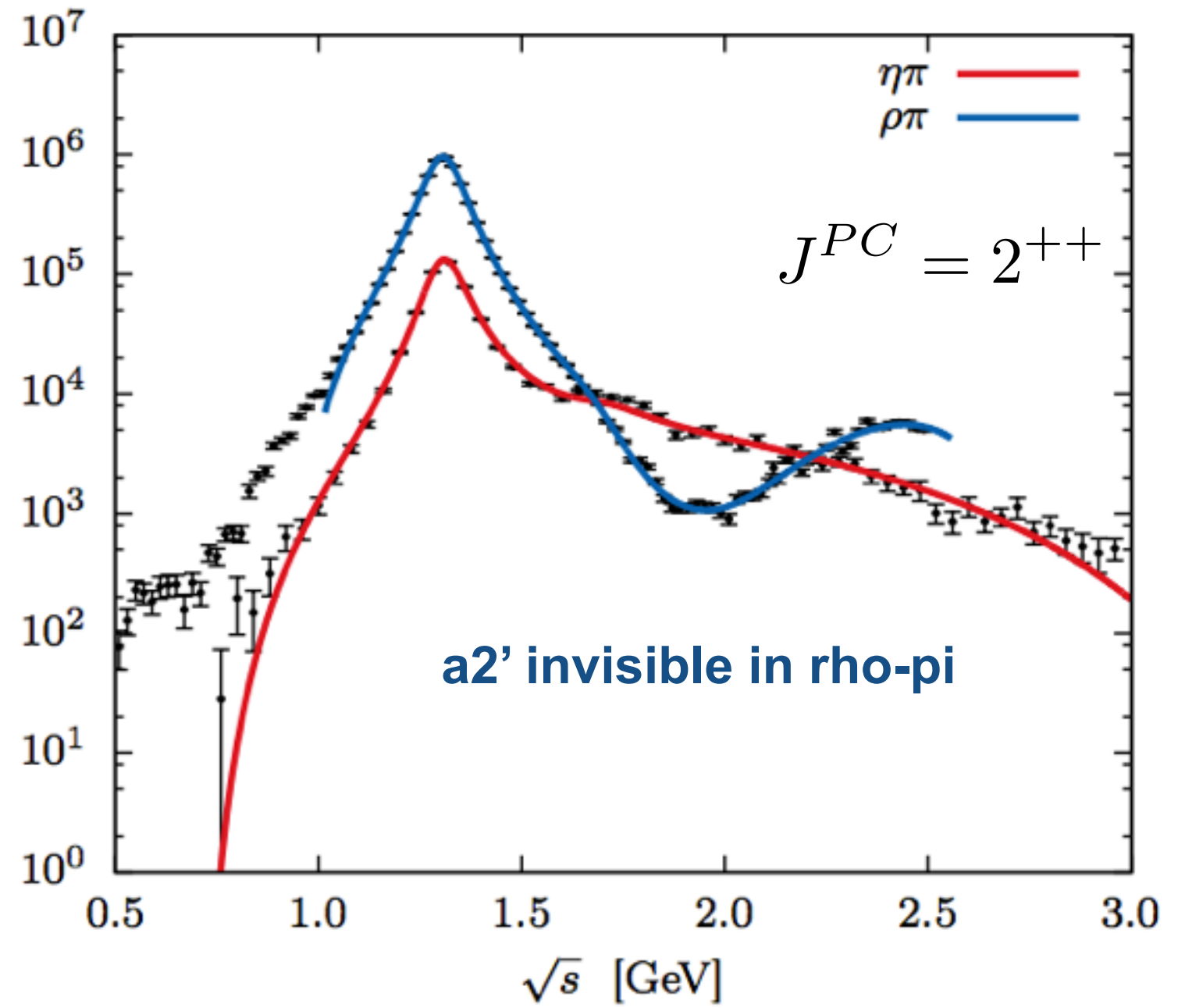
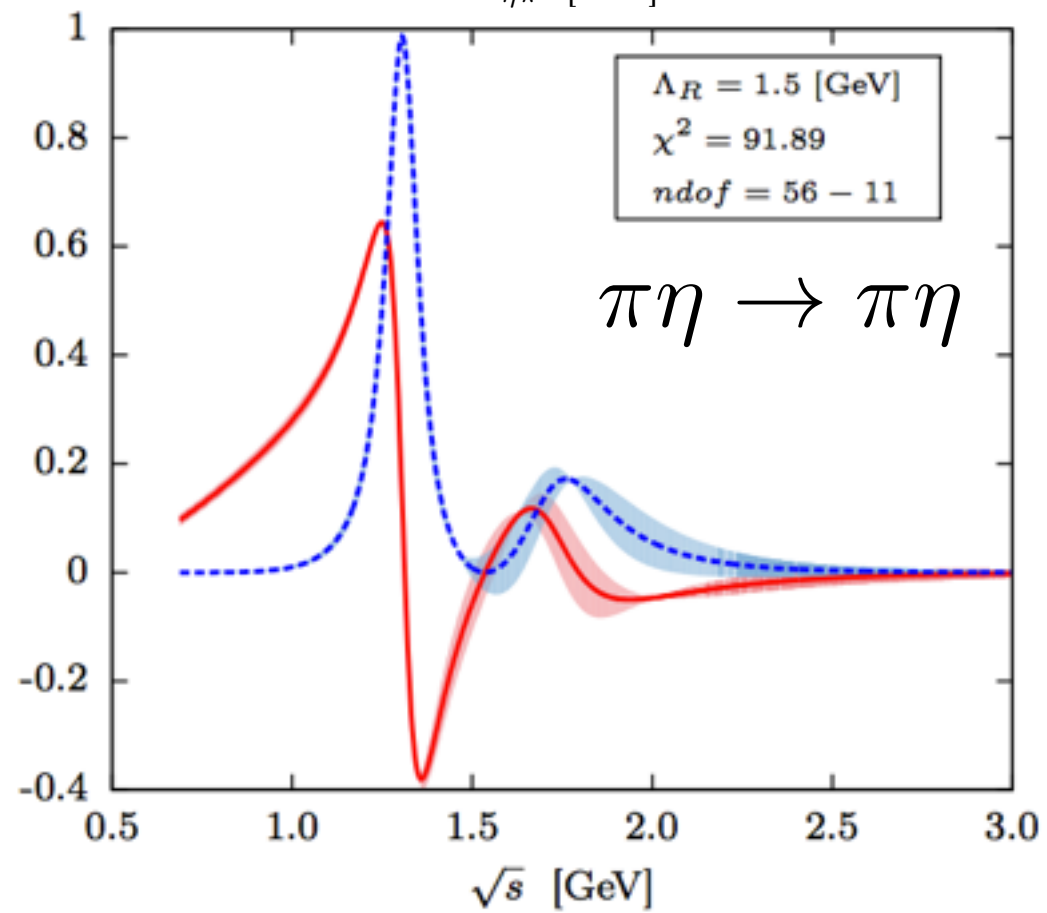
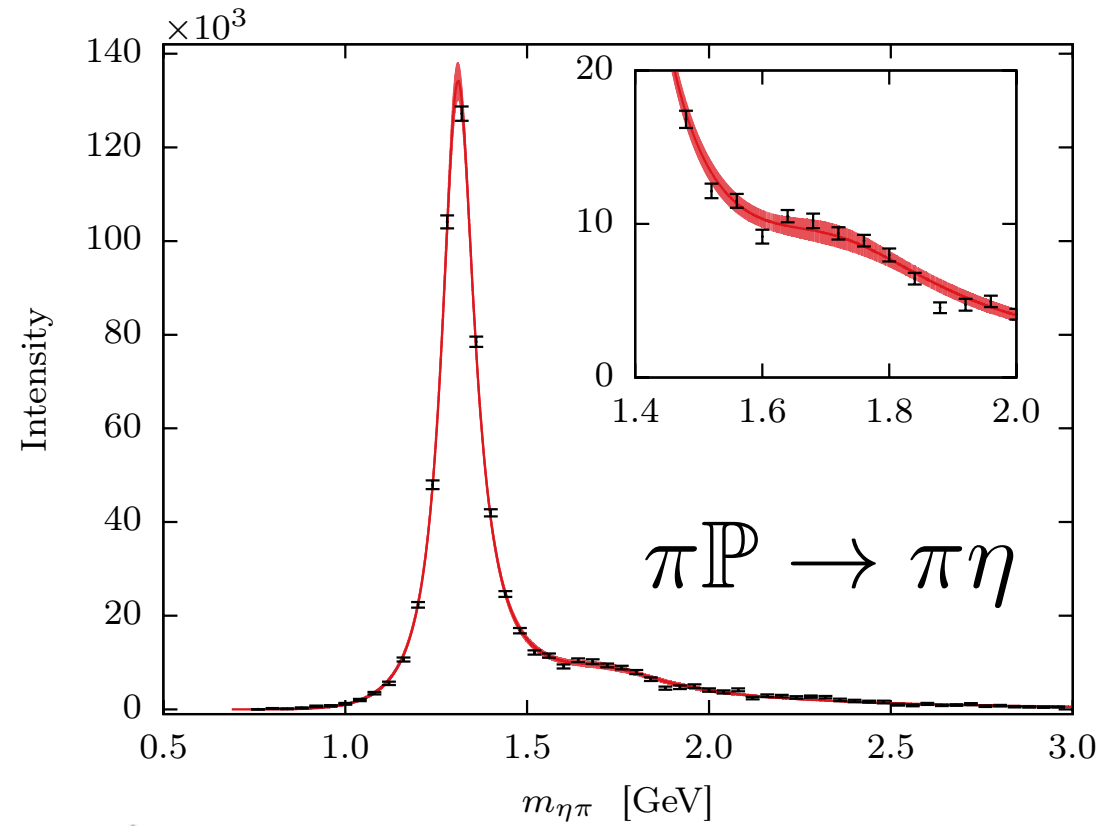
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$$\rho(s) N(s) = g \frac{\lambda^{J+\frac{1}{2}}(s, m_\eta^2, m_\pi^2)}{(s + s_R)^{2J+3}}$$

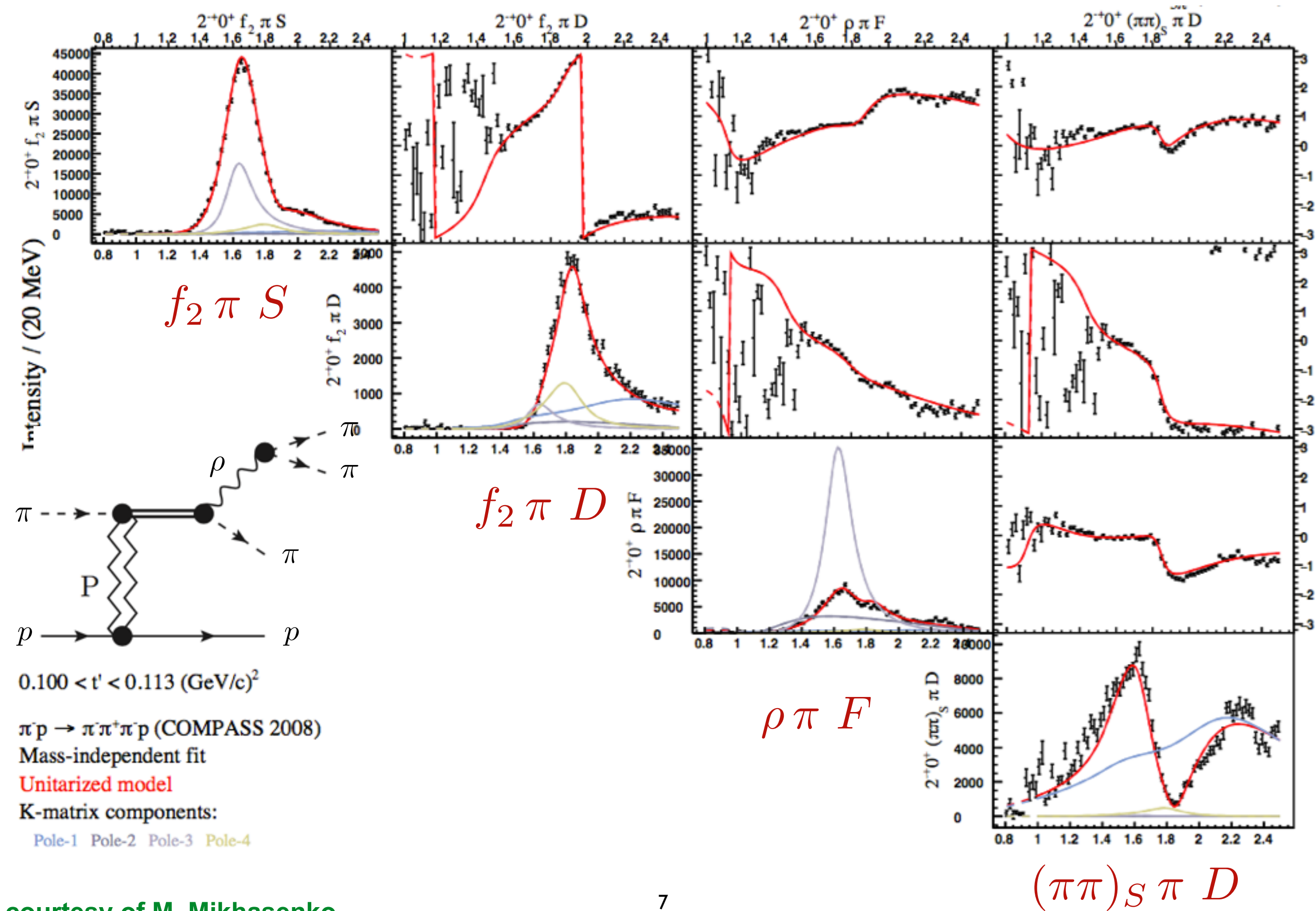
Eta-Pi@COMPASS

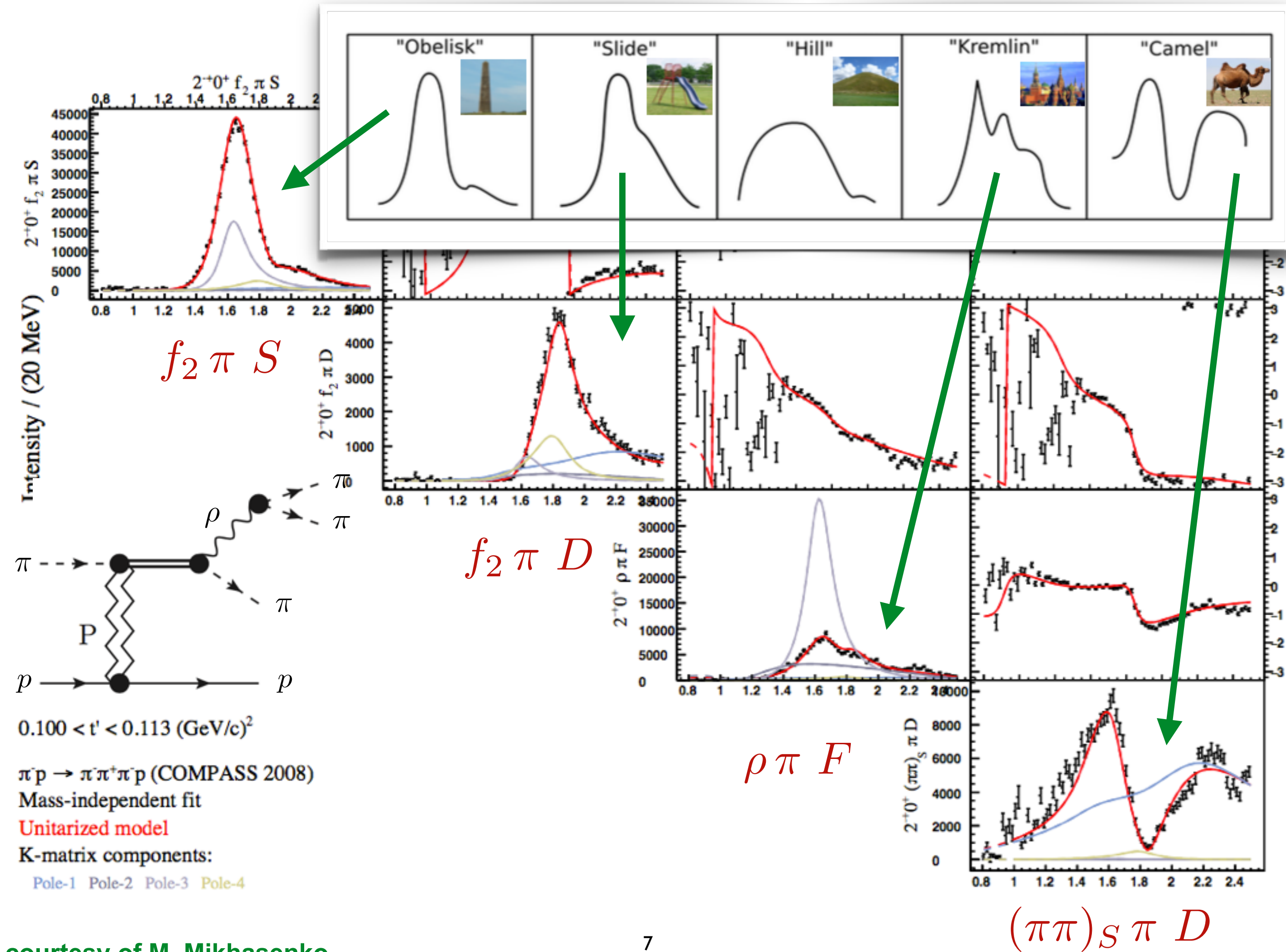


Eta-Pi@COMPASS

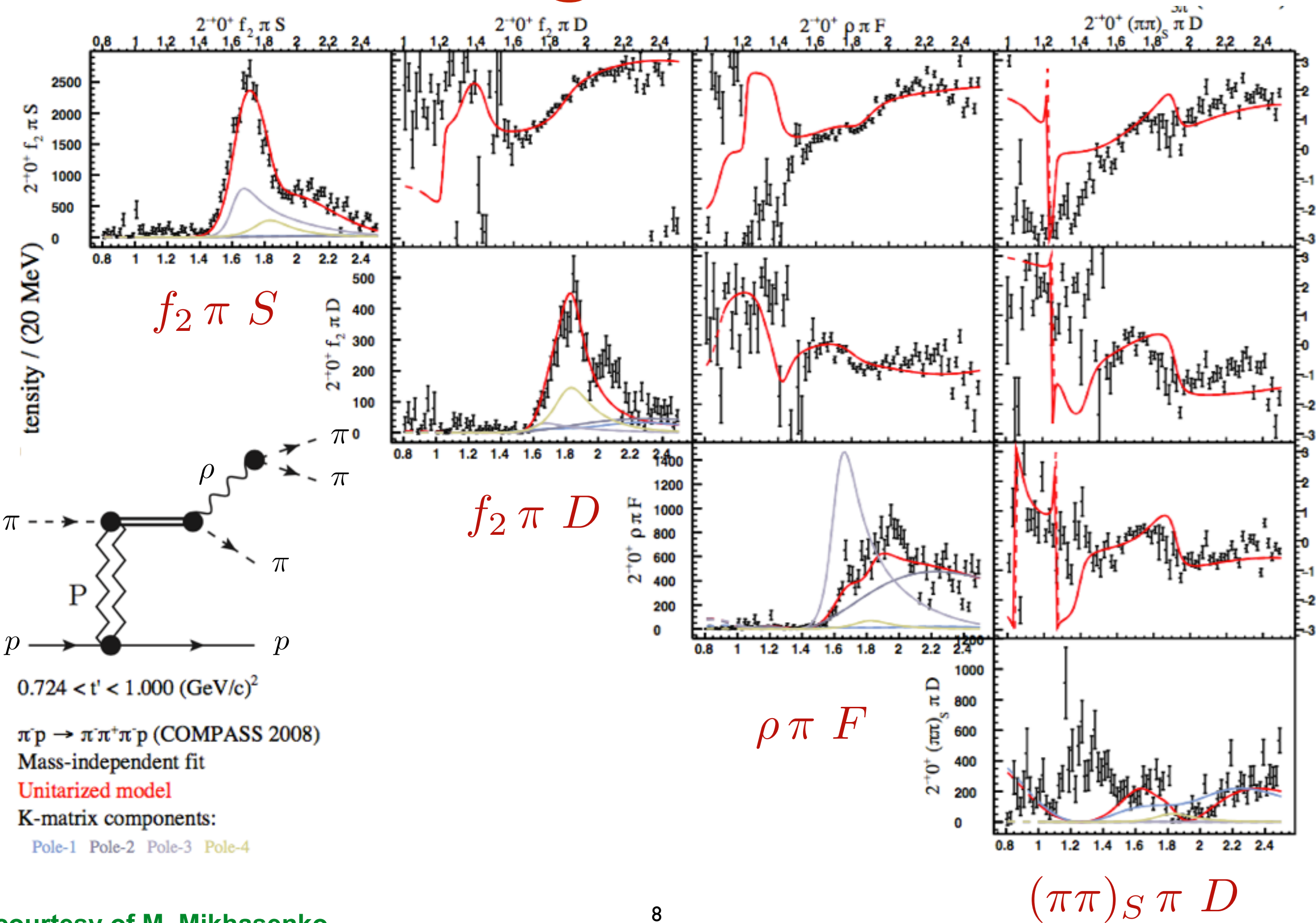


3Pi @COMPASS: 2^{-+}





3Pi @COMPASS: 2⁻⁺



Online Material

2017 International Summer Workshop on Reaction Theory

June 12-22, 2017, Bloomington, Indiana, USA

HOME LECTURERS PROGRAM APPLICATION VENUE ACCOMMODATION VISA INFORMATION
TRANSPORTATION LOCAL INFORMATION PARTICIPANTS RESOURCES CONTACT

2017 edition:

<http://www.indiana.edu/~ssrt/>

2015 edition:

videos, slides, exercices
and references

<http://www.indiana.edu/~jpac/Resources.html>

Joint Physics Analysis Center

HOME PROJECTS PUBLICATIONS LINKS

Interactive webpage:

<http://www.indiana.edu/~jpac/index.html>



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