

# PWG-Exclusive

Summary report  
B.Ramstein , P. Salabura

- Known updates since last HADES CM
- (PWG meetings and MESON talks preparation)
- Further updates to be discussed during this meeting

Significant progress of all analyses thanks to gen4 simulations.

Thank you, Jochen !

# Em. Transition Form Factor $N^*$

The paper on exclusive  $\pi^-p \rightarrow ne^+e^-$  has been published (PLB, April 2026)!

**First measurement of massive virtual photon emission from  $N^*$  baryon resonances**

*R. Abou Yassine et al. Phys.Lett.B 875 (2026) 140338*

# Elastic scattering @4.5 GeV

- Provides normalization to all analysis at 4.5 GeV (based on known cross section in Hades-Forward region)
- Provides first measurement of elastic scattering in Hades region (1.6 GeV and 4.5 GeV)
- **Draft of paper passed collaboration review**
- Notes on normalisation procedure prepared by Marvin and Iza
- *Paper based on gen3 results → decision was taken to wait for the analysis of **gen4 simulations** : see Konrad's presentation at this Analysis Meeting*

# Meson physics: pp@4.5 GeV

- **Szymon Trelinski (PhD: Iza Ciepala, James Ritman) : omega and eta exclusive production**

Differential and total cross sections of  $\eta$  exclusive production, [PWG meeting + talk at MESON](#) : cross-section, comparison of differential distributions with

- [Meson exchange models \( \$\rho, \omega, \pi\$ \)](#) experimental data show importance of  $\pi$  exchange
- [SMASH](#): N(1535) contribution strongly underestimated

*acceptance corrections problems solved ? Uncertainties on total cross sections ?*

- **Valentin Kladov (PhD: Jim Ritman) : exclusive pp $\rightarrow$ ppK $^+$ K $^-$  : talk at MESON**

non resonant and resonant K $^+$ K $^-$  (phi meson)

- Amplitude analysis  $\rightarrow$  pK and KK scattering length
- Coupled Channels Analysis in K-Matrix Formalism:  $\Sigma\pi$  and pK simultaneous fit of non-resonant,  $\Lambda(1405)$ ,  $\Lambda(1520)$  contributions

Close to final results ?

- **K. Prościński (PhD: Marcin Zieliński) : ALP in rare eta decays poster at MESON**

- upper limit for ALP (in particular X17) in  $\eta \rightarrow \pi^+ \pi^- e^+ e^-$  decays.
- Now with SMASH background and  $\eta$  decay simulations with Gen4- $\rightarrow$ close to final results ?

# Meson Physics

- **Saket Kumar (PhD thesis, Jim Ritman)** **exclusive**  $pp \rightarrow p n \pi^+$ ,  $pp\pi^0$  talk at MESON
  - ✓ Resonance ( $N^*/\Delta$ ) excitation  $\Delta(1232)$ ,  $N(1520)$ ,  $N(1575)$  very visible
  - ✓ comparison to Juelich-Bonn model and SMASH
  - ✓ **SMASH**:  $\Delta(1232)$  contribution strongly dominant,  $N^*$  contributions underestimated
- **Lena Albohn (Master thesis, Claudia Hohne)**  $\eta'$  **exclusive production** :  
  
Clear signal in  $\eta \pi^+\pi^-$  channel [updates at this meeting](#)
- **Yehor Bondar (postdoc, Izabela Ciepal)** **Studies of  $\eta'$  and  $f_1(1285)$  production** poster at MESON
  - ✓ Exclusive cross section for the  $\eta'$  production in agreement with COSY-11 and calculations (P. Lebiedowicz et al.)
  - ✓ upper limit for  $f_1(1285)$  production larger than predictions

# Hyperon Physics

- **Konrad Sumara (PHD defended, now post-doctoral work. Piotr Salabura): inclusive production of  $\Sigma(1385)^+$**  [talk at MESON](#)
  - ✓ total and differential inclusive cross sections, strong difference (production mechanism) between  $\Sigma(1385)^+$  and  $\Sigma(1385)^-$
  - ✓ comparison with SMASH and PLUTO
  - ✓ Close to final ? Paper could be drafted ?
- **Anna Władyszewska (PhD, Piotr Salabura): exclusive  $p\Lambda(1405)$**  [talk at MESON](#)
  - ✓  $\Lambda(1405)$  in  $\Sigma^0 \pi^0$  decay channel with KinFit, distributions in function of inv. Mass and momentum transfer (t)
  - ✓ peak position consistent with [pp@3.5GeV](#) (much larger statistics !)
  - ✓ incoherent decomposition into  $\Lambda(1405)$ ,  $\Lambda(1520)$ ,  $\Lambda(1600)$ /  $\Lambda(1690)$ / and non resonant  $\Sigma^0 \pi^0$
  - ✓ Simultaneous fit of invariant mass distributions of  $\Sigma\pi$  and  $pK^-$  (K-matrix) joint analysis with Valentin
- **Snehankit Pattnaik (PhD : Jim Ritmann)** [updates to be discussed at this meeting](#)
  - ✓  $pp \rightarrow \Lambda K_s^0 p \pi^+$  final state differential distributions
  - ✓ Status at the last Collab. Meeting: incoherent decomposition into  $\Lambda K_s^0 \Delta^{++}$ ,  $\Lambda pK^*$ ,  $\Sigma(1385)+p K_s^0$ , background subtracted (side-band) distributions, angular distributions  $\rightarrow$  spin of  $K^*$ ,  $N^*$  contribution,

# Hyperon Physics

- $\Lambda$ - $\Lambda$  correlations (**Gandharva Appagere, PHD, Per-Erik Tenger**) [updates to be discussed at this meeting](#)

Upper limit for  $\Lambda$ - $\Lambda$  extracted, systematic errors estimated, analysis of single  $\Lambda$ ,  $\Lambda K^0$  to verify cross section?

- $\Sigma \rightarrow \Lambda e^+e^-$  (**PhD Jana Rieger defended, K. Schonning**) Dalitz decay, em. transition form factors, branching ratio

continuation towards a paper?

- $\Sigma \rightarrow \Lambda \gamma$  **Malin Bohman (PhD, Karin Schonning)** [talk at MESON](#)

Motivation, some elements of Jana's PhD , on-going analysis on  $\Sigma \rightarrow \Lambda \gamma$ , signal reconstruction.