

Comparing $\gamma n \rightarrow \rho^- p$ and $\gamma p \rightarrow \rho^0 p$ Cross Sections

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Daily SRC/CT Analysis Meeting

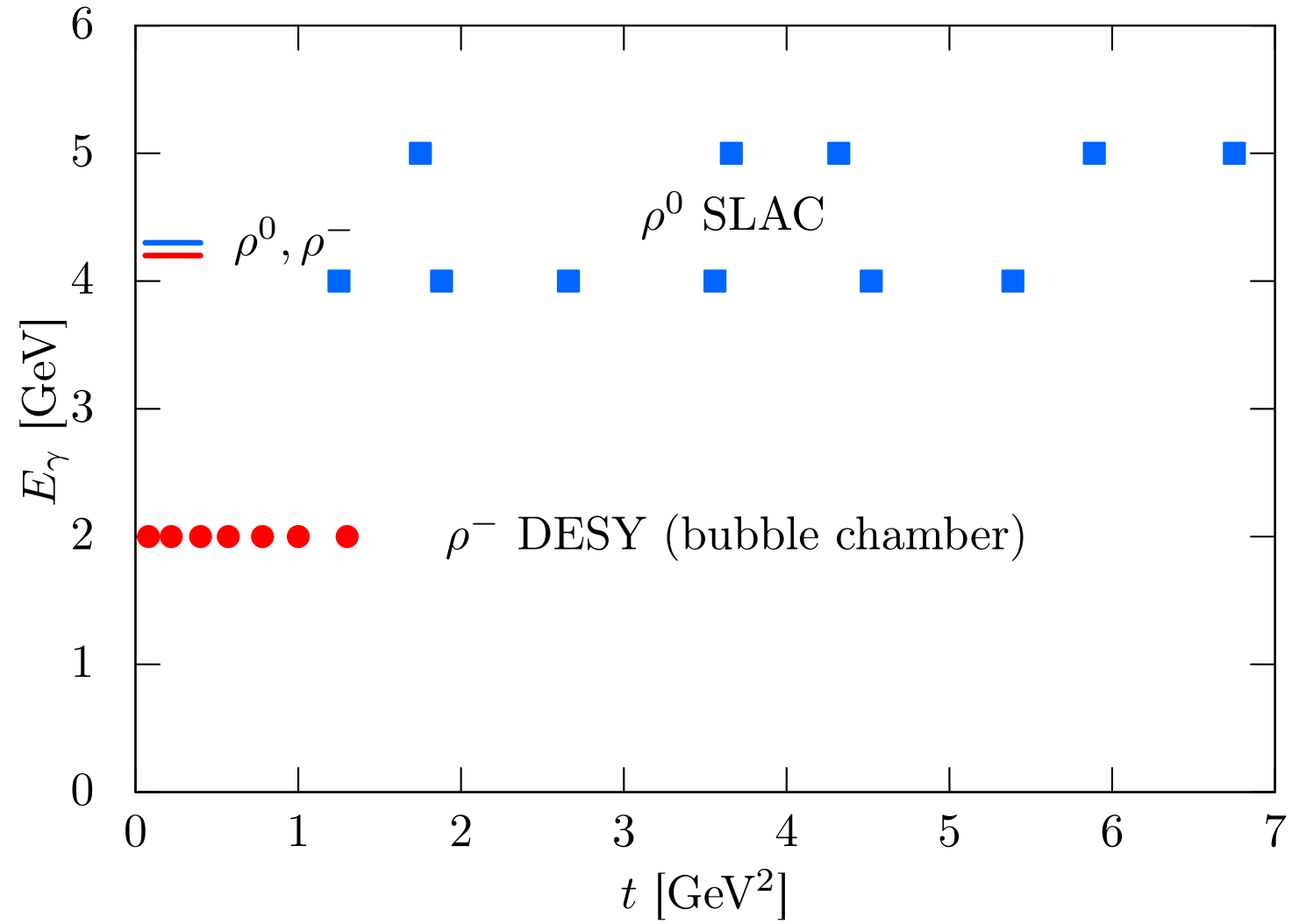
Summary

- ρ^- photoproduction has only been measured in the 1970s using bubble chambers at low $|t|$.
- In the measured kinematics, ρ^0 has 15x higher cross section than ρ^- .
- These data are consistent with our high $|t|$ model.

References

- SLAC high- $|t|$ $\gamma p \rightarrow \rho^0 p$ data (informing our generator)
 - [R. L. Anderson et al., Phys. Rev. D 14, p. 680 \(1976\)](#)
- SLAC bubble chamber measurement of $\gamma N \rightarrow \rho p$
 - [Y. Eisenberg et al., Nucl. Phys. B 42, p. 349 \(1972\)](#)
- DESY bubble chamber measurement of $\gamma n \rightarrow \rho^- p$
 - [H. G. Hilpert et al., Nucl. Phys. B 21, p. 93 \(1970\)](#)

Kinematics



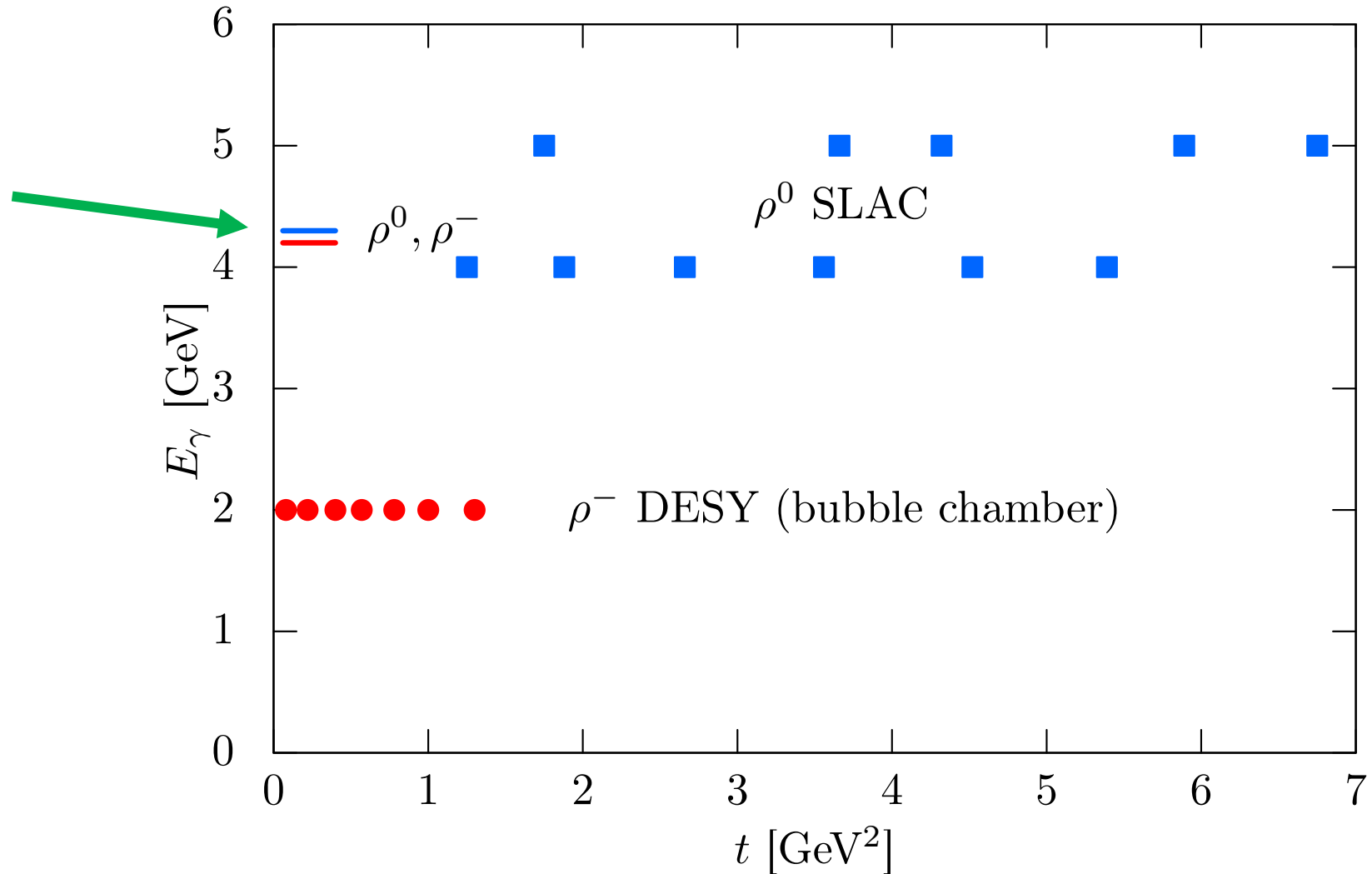
Kinematics

We can compare
 $\gamma n \rightarrow \rho^- p$ and
 $\gamma p \rightarrow \rho^0 p$ in the
same kinematics!

$\gamma p \rightarrow \rho^0 p$:
 $\sigma = 15.9 \pm 1.4 \mu\text{b}$

$\gamma n \rightarrow \rho^- p$:
 $\sigma = 1.1 \pm 0.4 \mu\text{b}$

15 x difference!



ρ^0 differential cross section comparison

- Our model for $\gamma p \rightarrow \rho^0 p$:

$$\frac{d\sigma}{dt} = A e^{-B|t|} + C s^{-7} (1.2 - \cos\theta_{CM})^D (1.05 + \cos\theta_{CM})^E$$

- SLAC bubble chamber paper's model

$$\frac{d\sigma}{dt} = \alpha e^{-\beta|t|}$$

ρ^0 differential cross section comparison

