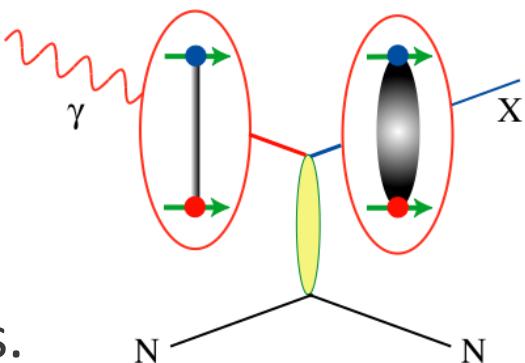


The **GLUE χ** Experiment

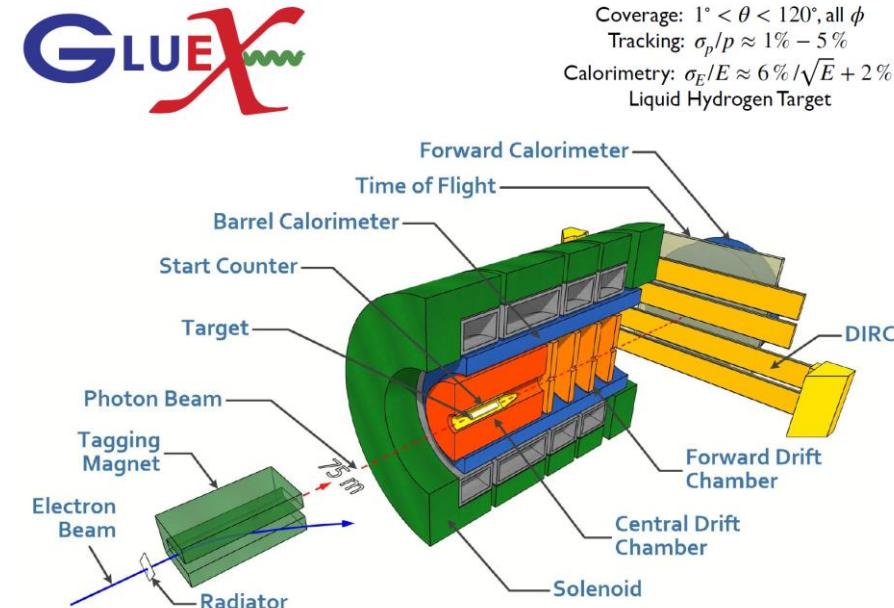
- **Search for hybrid mesons.**

- Gluonic DOF.
- Predicted by LQCD.



- Linearly-polarized 9GeV photons.
 - Unexplored regime.

- Hermetic detector.
 - Exclusive reaction.
- Very high statistics.
 - 125 pb^{-1} in Phase I
(Phase II $\times 10^{15}$)

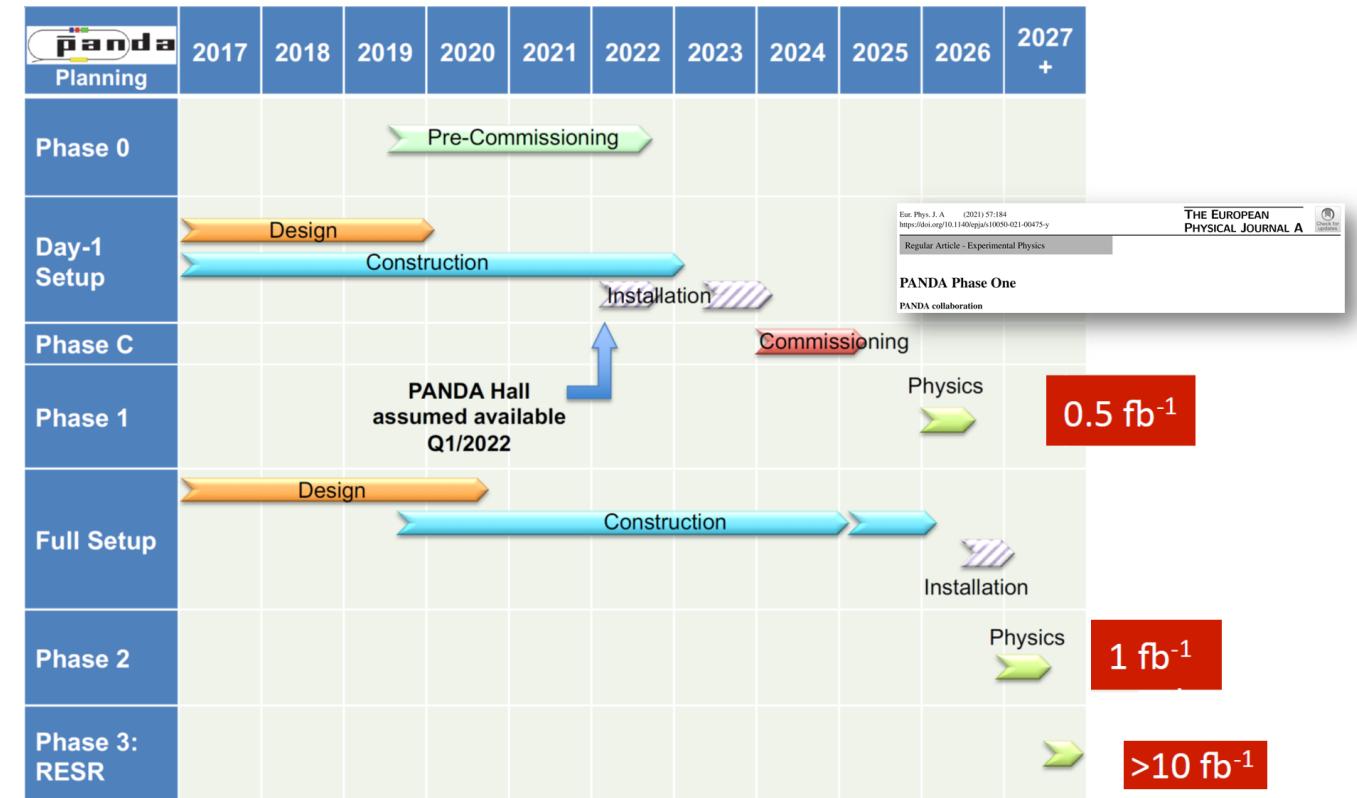
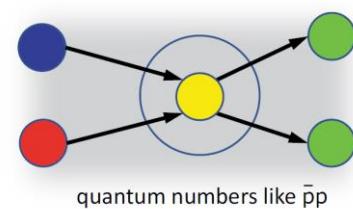
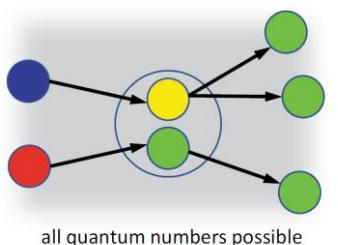
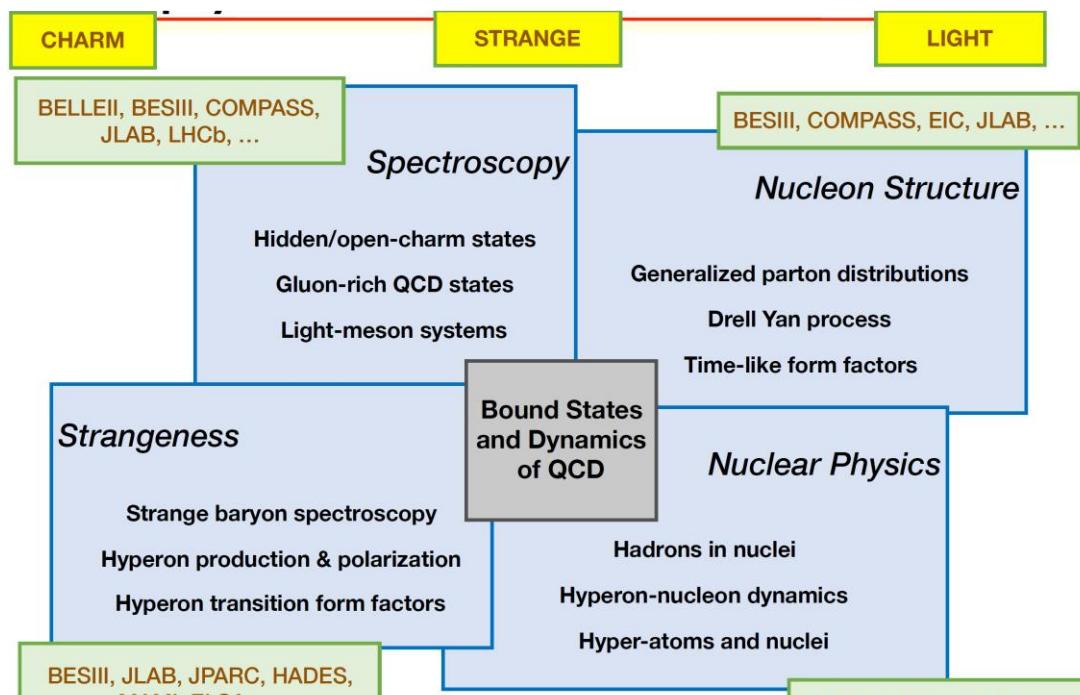


NIM A987, 164807 (2021)

中国参加单位：武汉大学，高能所

- EMC 系统误差研究
- Forward EMC 升级 (JEF 晶体检测)
- GlueX首篇物理文章 (π^0, η 束流不对称度测量. PR C95, 042201(R), (2017)) 张振宇做出主要贡献

The **PANDA** experiment



中国参加单位：高能所、近物所、中科大、南开、南华

- TDAQ L1 prototype
- EMC 离线软件(**PANDA Outstanding achievement 2020**)

强子谱学

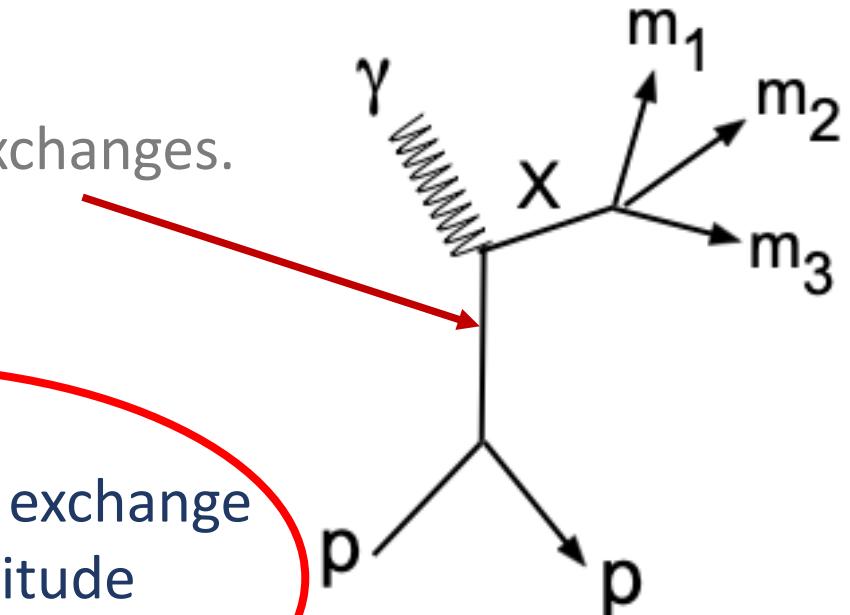
- 高统计量数据
- 多种产生机制和衰变过程
- 理论-实验合作

感谢各位理论家、实验家的支持
期望可以开展更多合作

Searching for Hybrids

- Understand production mechanisms:
 - Natural $J^P=0^+, 1^-, 2^+, \dots$ and unnatural $J^P=0^-, 1^+, 2^-, \dots$ exchanges.
 - Linear Photon Polarization!
 - Beam asymmetry Σ , SDMEs ρ_{jk}^i, \dots
- Understand Acceptance
 - SDMEs, Cross sections ,
- Reproduce known results
 - Start with $\eta\pi$ and $\eta'\pi$

Understanding the exchange
simplifies the amplitude
analysis.

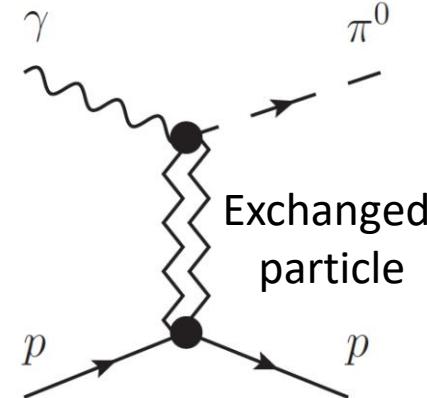
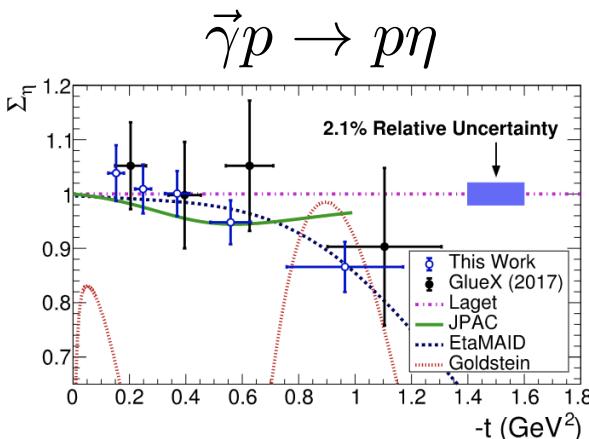
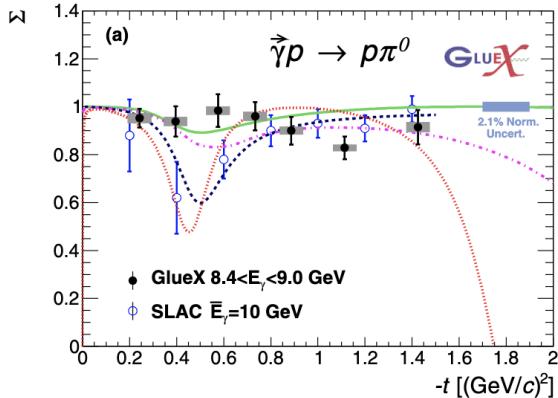


Beam asymmetry Σ

$$\Sigma = \frac{\sigma_{\parallel} - \sigma_{\perp}}{\sigma_{\parallel} + \sigma_{\perp}}$$

$$Y_{\parallel}(\phi, \phi_{\gamma} = 0) \propto (1 - P_{\parallel} \Sigma \cos 2\phi)$$

$$Y_{\perp}(\phi, \phi_{\gamma} = 90) \propto (1 + P_{\perp} \Sigma \cos 2\phi)$$

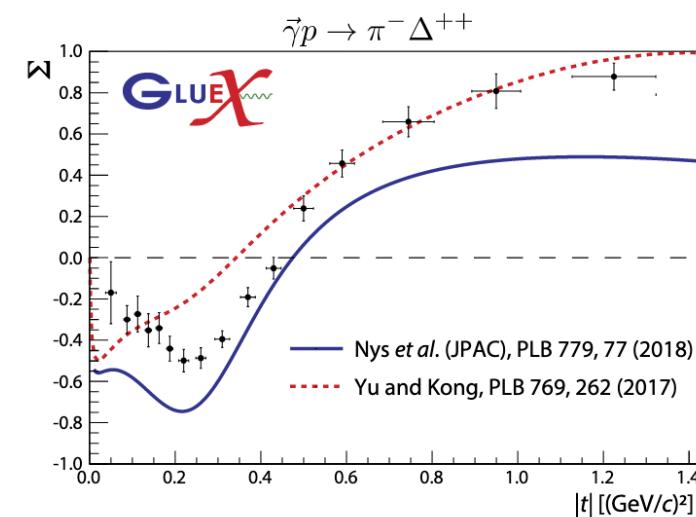


Exchange J^{PC}

$1^{--} : \omega, \rho$

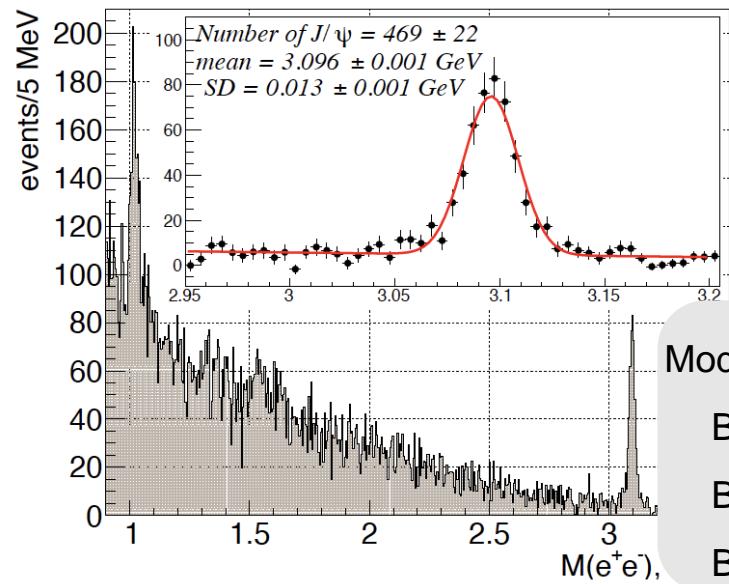
$1^{+-} : b, h$

Phys. Rev. C95, 042201(R), (2017)
Phys. Rev. C100, 052201(R) (2019)



Production mechanism:
unnatural at low $|t|$,
natural at high $|t|$.

Opportunistic Physics



$\gamma p \rightarrow p J/\psi$

Model-dependent upper limits at 90% CL:

$\text{Br}(P_c(4312) \rightarrow J/\psi p) < 4.6\%$

$\text{Br}(P_c(4440) \rightarrow J/\psi p) < 2.3\%$

$\text{Br}(P_c(4457) \rightarrow J/\psi p) < 3.8\%$

- Published a portion (469 J/ψ events) of the Phase-I data.
- 27% Normalization uncertainty.
- Set upper limits on LHCb pentaquark production.
- The full data set is nearing publication.

