



兰州大学
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BES III

Hyperon CPV and Baryon pair production

王雄飞
兰州大学

第八届粒子物理天文论坛，2026年8月28日，广西·桂林

Outline

□ Introduction

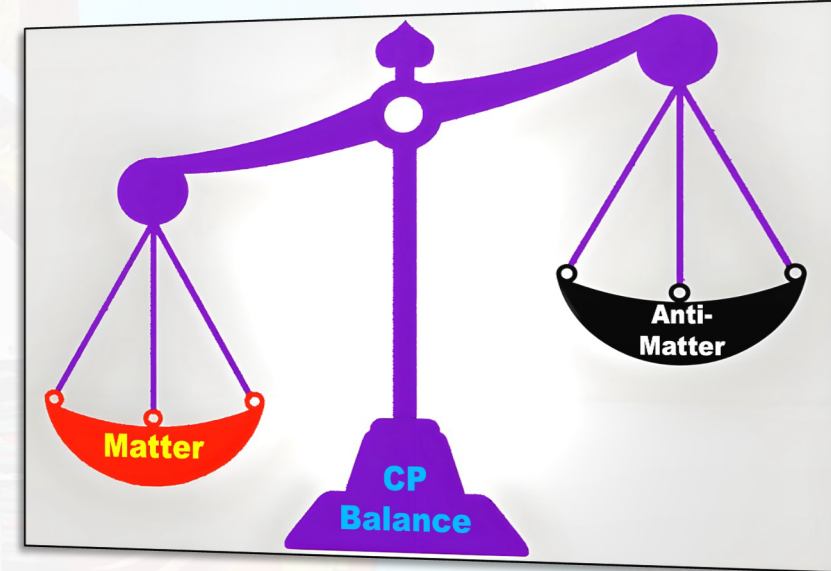
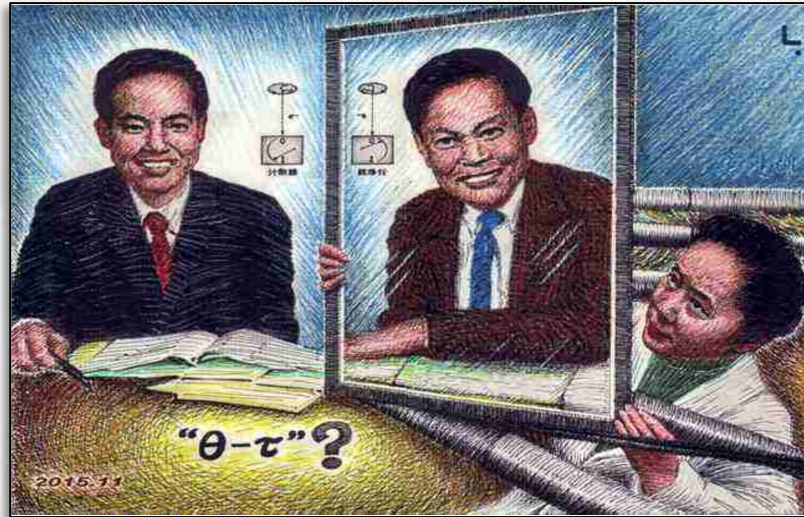
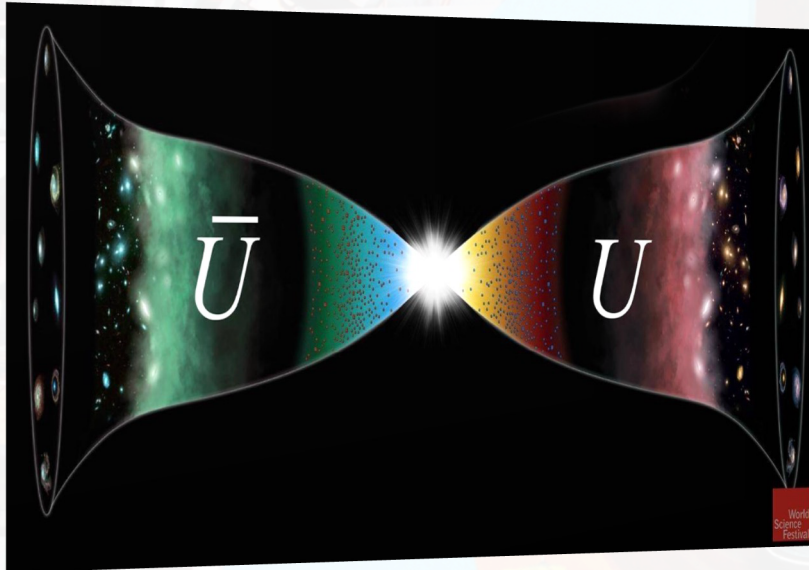
□ Hyperon/Baryon physics

- **Hyperon polarization/CPV/EDM**
 - $J/\psi, \psi(3686) \rightarrow H\bar{H}$
- **Hyperon/Baryon pair production**
 - $e^+e^- \rightarrow B\bar{B}$ near threshold
 - $e^+e^- \rightarrow B\bar{B}$ above open-charm
- ~~Hyperon nucleon interaction~~
- ~~Hyperon rare decay~~
- ~~Baryon spectroscopy~~

□ Summary

Matter-antimatter Asymmetry

□ One of the greatest mysteries of modern physics is to figure out why there is so much more matter than antimatter in the Universe

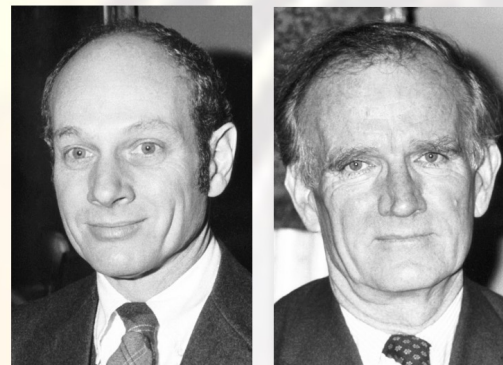
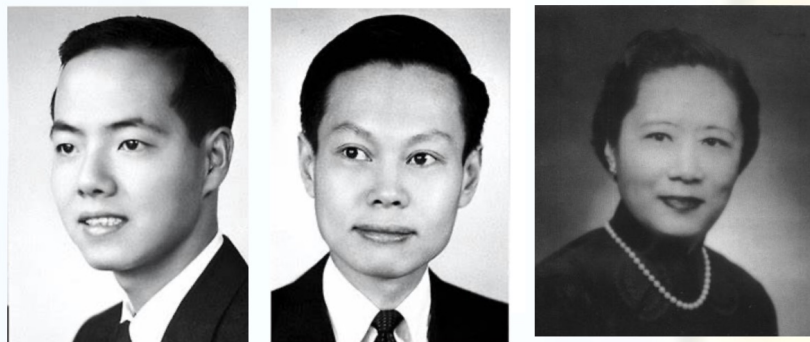


Sakharov three conditions

1. Baryon number **B** violation
2. **C** and **CP** symmetry violation
3. Interactions out of thermal equilibrium

CPV in collider experiment is the most fundamental one

History of CPV



**Parity Violation
in weak decay**
T.D. Lee and C.N. Yang
C.S. Wu *et al.*

**CP Violation
in K meson decay**
J.W. Cronin and
V.L. Fitch *et al.*

**CP Violation
in B^0 meson decay**
[BABAR] and [Belle]

**CP Violation
in D^0 meson decay**
[LHCb]

**CP Violation
in Λ_b^0 baryon decay**
[LHCb]

Cabibbo Mixing
N. Cabibbo

CKM Matrix
M. Kobayashi and
T. Maskawa

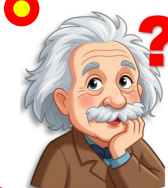
**CP Violation
in B_s^0 meson decay**
[LHCb]

**CP Violation
in neutrino oscillation**
[T2K]

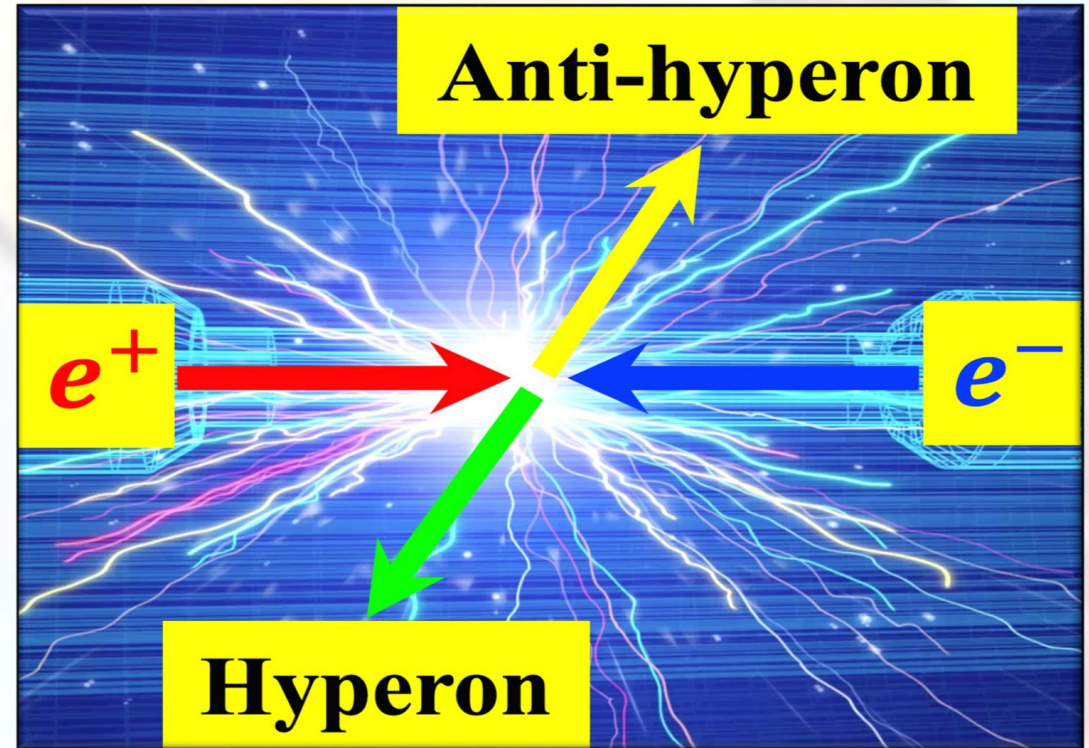
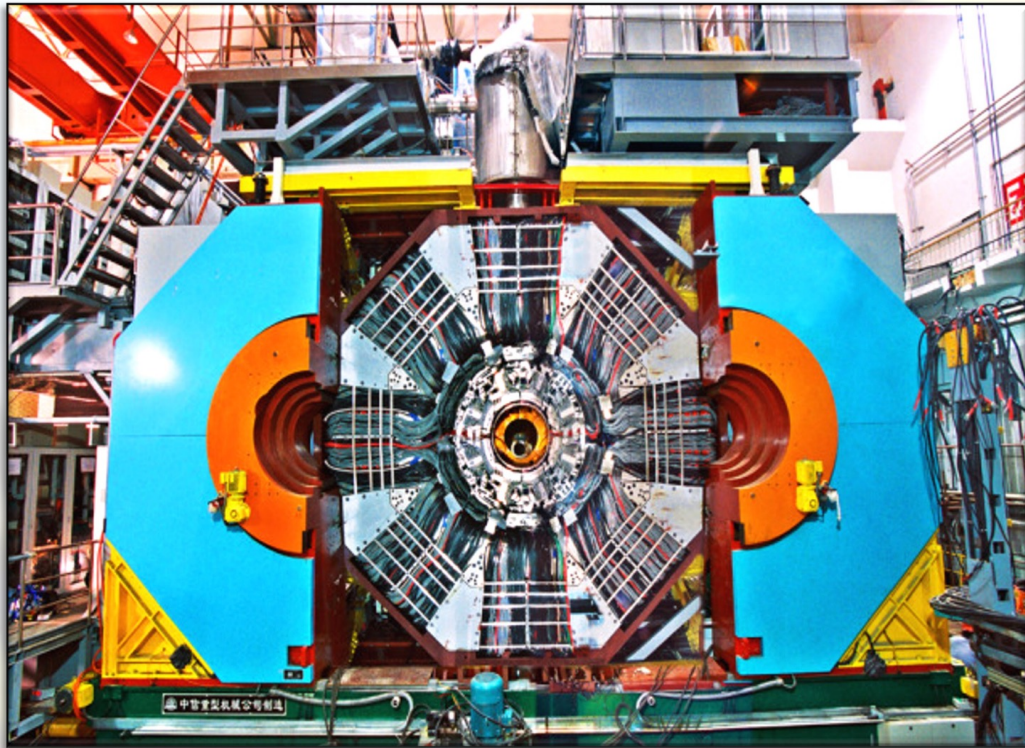
**Hyperon
CPV?**



BES III



Why hyperon CPV at BESIII



- ❑ World's largest data samples ★ 10B J/ψ and 3B $\psi(3686)$
- ❑ Large BR for hyperon pair production in J/ψ and $\psi(3686)$
- ❑ Quantum entangled pair production
- ❑ Clean background, etc.

100B J/ψ and 30B $\psi(3686)$?

Hyperon polarization and CPV

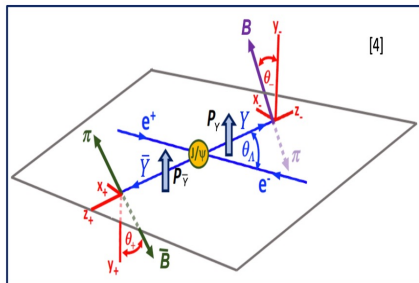
物理信息丰富，如何提取是关键

$$\mathcal{W}(\xi) = (1 + \alpha_\psi \cos^2 \theta) \sum_{\bar{\mu}\nu} C_{\bar{\mu}\nu}(\theta) \hat{n}_{\bar{\mu}} \hat{n}_\nu,$$

$$C_{\bar{\mu}\nu}(\theta) = 1/N \sum_i^{N(\cos \theta)} \hat{n}_{\bar{\mu}} \hat{n}_\nu,$$

$$\hat{n}_\mu = (1, \sin \theta_\Lambda \cos \phi_\Lambda, \sin \theta_\Lambda \sin \phi_\Lambda, \cos \theta_\Lambda),$$

$$\hat{n}_{\bar{\nu}} = (1, \sin \theta_{\bar{\Lambda}} \cos \phi_{\bar{\Lambda}}, \sin \theta_{\bar{\Lambda}} \sin \phi_{\bar{\Lambda}}, \cos \theta_{\bar{\Lambda}}).$$



$\psi \rightarrow \Xi^- \bar{\Xi}^+ \rightarrow \pi^+ \pi^- \Lambda (\bar{p} \pi^-) \bar{\Lambda} (\bar{p} \pi^+)$

9个角度参数: $\theta_\Xi, \theta_\Lambda, \phi_\Lambda, \theta_{\bar{\Lambda}}, \phi_{\bar{\Lambda}}, \theta_p, \phi_p, \theta_{\bar{p}}, \phi_{\bar{p}}$

8个未知参数: $\alpha_\psi, \Delta\Phi, \alpha_\Xi, \Phi_\Xi, \alpha_\Lambda, \alpha_{\bar{\Xi}}, \Phi_{\bar{\Xi}}, \alpha_{\bar{\Lambda}},$

Transverse polarization

$$P_y(\cos \theta) = \frac{\sqrt{1 - \alpha_\psi^2} \sin(\Delta\Phi) \cos \theta \sin \theta}{1 + \alpha_\psi \cos^2 \theta}$$

Relation of form factors G_M^ψ and G_E^ψ

$$\alpha_\psi = \frac{s |G_M^\psi|^2 - 4M_H^2 |G_E^\psi|^2}{s |G_M^\psi|^2 + 4M_H^2 |G_E^\psi|^2}$$

$$\frac{G_E^\psi}{G_M^\psi} = e^{i\Delta\Phi} \left| \frac{G_E^\psi}{G_M^\psi} \right|$$

Construct CPV observables

□ Amplitude: $H_{1/2} \rightarrow H_{1/2} + M_{pse}$:

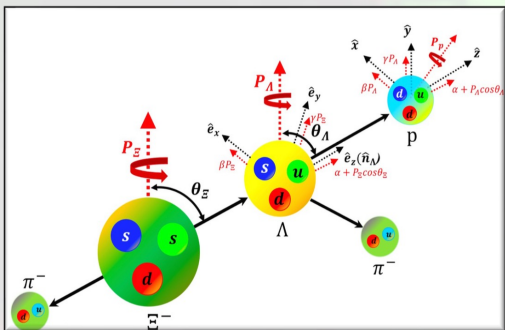
$$\mathcal{A} = \mathcal{S} + \mathcal{P} \sigma \cdot \hat{n}$$

$$\mathcal{S} = |\mathcal{S}| e^{i(\delta_S + \xi_S)}$$

$$\mathcal{P} = |\mathcal{P}| e^{i(\delta_P + \xi_P)}$$

■ Lee–Yang parameters^[3]

$$\begin{cases} \alpha_H = \frac{2\text{Re}(S^* P)}{|S|^2 + |P|^2} \\ \beta_H = \frac{2\text{Im}(S^* P)}{|S|^2 + |P|^2} \\ \gamma_H = \frac{|S|^2 - |P|^2}{|S|^2 + |P|^2} \end{cases} \begin{cases} \alpha_H^2 + \beta_H^2 + \gamma_H^2 = 1 \\ \beta_H = \sqrt{1 - \alpha_H^2} \sin \phi_H \\ \gamma_H = \sqrt{1 - \alpha_H^2} \cos \phi_H \\ \phi_H = \tan^{-1} \frac{\beta_H}{\gamma_H} \end{cases}$$



■ If CP conservation:

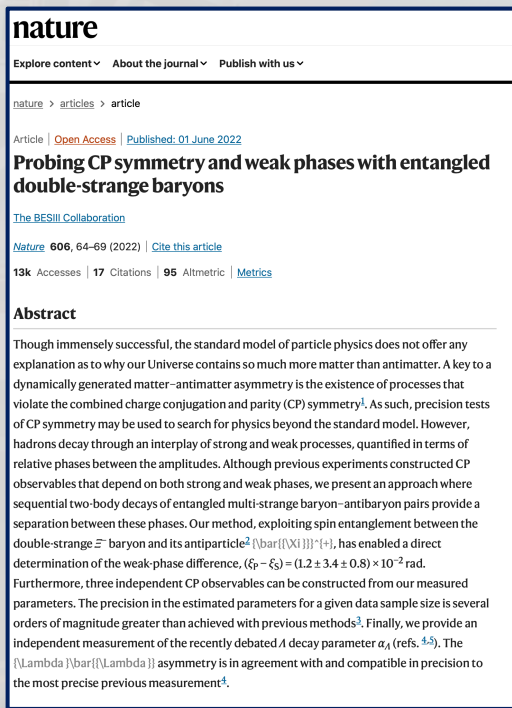
$$\alpha_H = -\alpha_{\bar{H}}, \dots$$

■ Then, one can construct CPV observables ($\Xi \rightarrow \pi\Lambda$)^[4]:

$$\begin{cases} A_{CP}^\Xi = \frac{a_\Xi + a_{\bar{\Xi}}}{a_\Xi - a_{\bar{\Xi}}} \\ B_{CP}^\Xi = \frac{\beta_\Xi + \beta_{\bar{\Xi}}}{\beta_\Xi - \beta_{\bar{\Xi}}} \\ C_{CP}^\Xi = \frac{\gamma_\Xi + \gamma_{\bar{\Xi}}}{\gamma_\Xi - \gamma_{\bar{\Xi}}} \end{cases} \begin{cases} \Delta\Phi_{CP}^\Xi = \frac{\Phi_\Xi + \Phi_{\bar{\Xi}}}{2} \\ \delta_P - \delta_S \approx \arctan\left(\frac{\beta_\Xi}{\alpha_\Xi}\right) \\ \approx \arctan\left(\frac{\sqrt{1 - \alpha_\Xi^2}}{\langle \alpha_\Xi \rangle}\right) < \Phi_\Xi > \\ \xi_P - \xi_S \approx \arctan\left(\frac{\beta_\Xi + \beta_{\bar{\Xi}}}{\alpha_\Xi - \alpha_{\bar{\Xi}}}\right) \\ \approx \frac{\sqrt{1 - \alpha_\Xi^2}}{\langle \alpha_\Xi \rangle} \Delta\Phi_{CP}^\Xi \end{cases}$$

$$e^+ e^- \rightarrow J/\psi \rightarrow \Xi^- \bar{\Xi}^+ \rightarrow \pi^+ \pi^- \Lambda \bar{\Lambda} \rightarrow p \bar{p} \pi^+ \pi^+ \pi^- \pi^-$$

- 首次利用处于量子纠缠的 $\Xi^- \bar{\Xi}^+$ 级联衰变，把导致正反物质不对称的弱作用从强作用里分离，开创了BESIII实验探索正反物质不对称的新方法



Nature 606, 64(2022)

参数	$J/\psi \rightarrow \Xi^- \bar{\Xi}^+$
α_ψ	$0.586 \pm 0.012 \pm 0.010$
$\Delta\Phi(\text{rad})$	$1.213 \pm 0.046 \pm 0.016$
α_Ξ	$-0.376 \pm 0.007 \pm 0.003$
$\phi_\Xi(\text{rad})$	$0.011 \pm 0.019 \pm 0.009$
$\alpha_{\bar{\Xi}}$	$0.371 \pm 0.007 \pm 0.002$
$\phi_{\bar{\Xi}}(\text{rad})$	$-0.021 \pm 0.019 \pm 0.007$
α_Λ	$0.757 \pm 0.011 \pm 0.008$
$\alpha_{\bar{\Lambda}}$	$-0.763 \pm 0.011 \pm 0.007$
$\xi_P - \xi_S(\text{rad})$	$0.012 \pm 0.034 \pm 0.008$
$\delta_P - \delta_S(\text{rad})$	$-0.040 \pm 0.033 \pm 0.017$
$A_{CP}^\Xi = \frac{\alpha_\Xi + \alpha_{\bar{\Xi}}}{\alpha_\Xi - \alpha_{\bar{\Xi}}}$	$0.006 \pm 0.013 \pm 0.006$
$A_{CP}^\Lambda = \frac{\alpha_\Lambda + \alpha_{\bar{\Lambda}}}{\alpha_\Lambda - \alpha_{\bar{\Lambda}}}$	$-0.004 \pm 0.012 \pm 0.009$
$\Delta\phi_{CP}^\Xi = \frac{\phi_\Xi + \phi_{\bar{\Xi}}}{2}(\text{rad})$	$-0.005 \pm 0.014 \pm 0.003$

~1B J/ψ

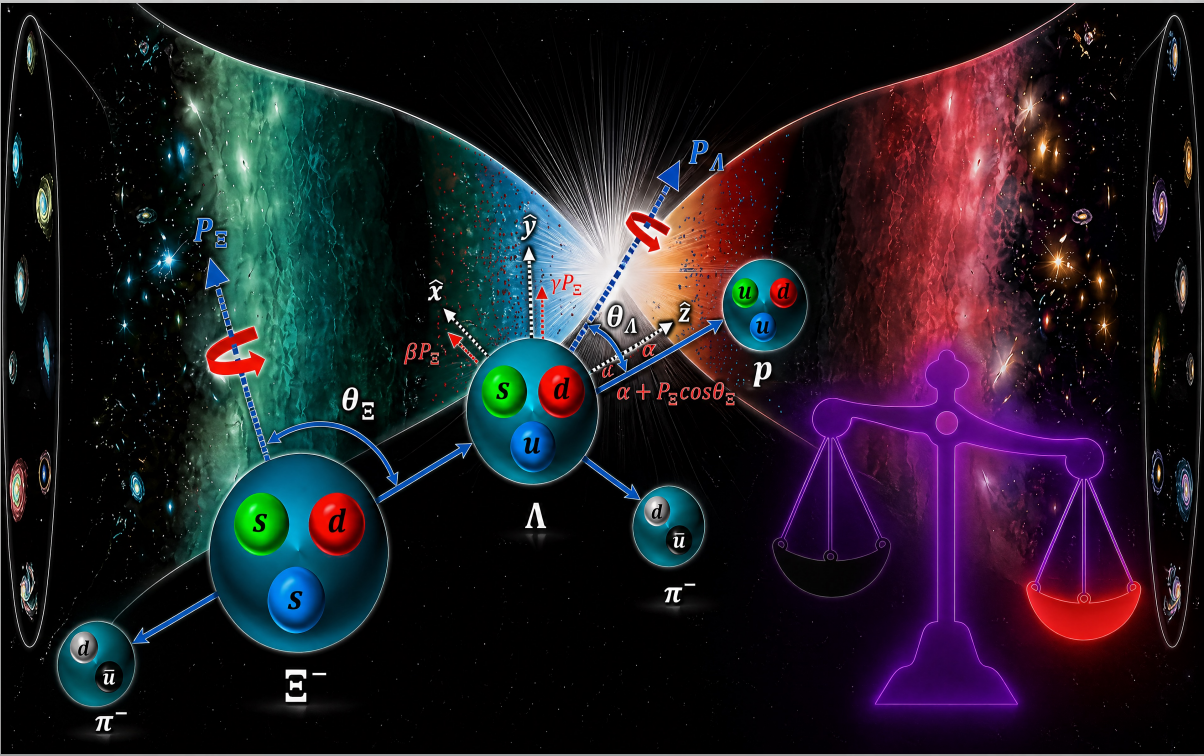
① 8个关键参数的精确测量

② 2个强弱相角差的首次和精确测量

③ 3个表征正反物质不对称性特征量的首次和精确测量 (10^{-2})

发展了九维角分布拟合方法，开创了BESIII实验探索正反物质不对称的新方法

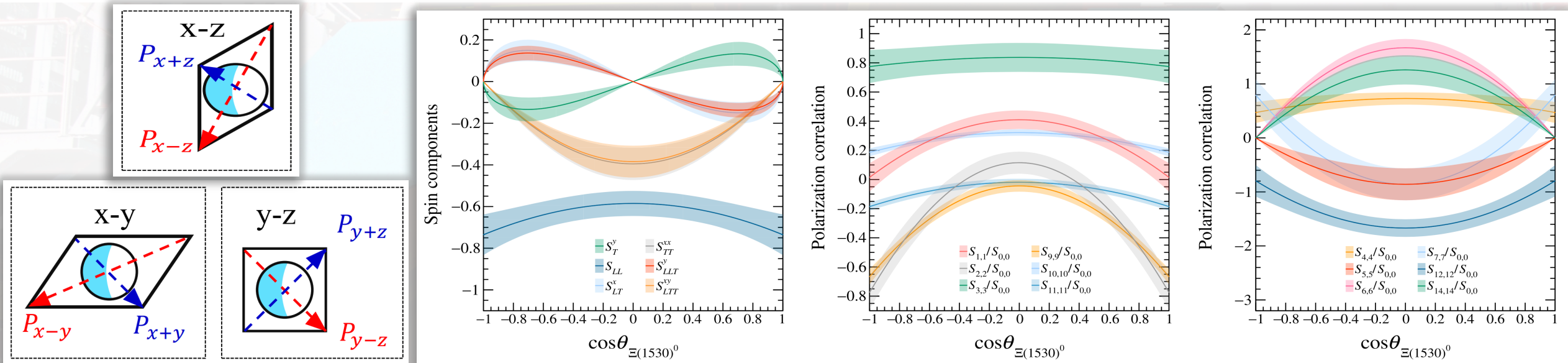
Precise Measurement of Matter-Antimatter Asymmetry with Entangled
Hyperon-Antihyperon Pair ~10 B J/ψ (580,000)



Parameter	This Letter	Previous best result
α_ψ	$0.5851 \pm 0.0044 \pm 0.0034$	$0.611 \pm 0.007^{+0.013}_{-0.007}$ [15]
$\Delta\Phi$ (rad)	$1.2205 \pm 0.0159 \pm 0.0056$	$1.30 \pm 0.03^{+0.02}_{-0.03}$ [15]
α_Ξ	$-0.3813 \pm 0.0026 \pm 0.0005$	$-0.367 \pm 0.004^{+0.003}_{-0.004}$ [15]
$\bar{\alpha}_\Xi$	$0.3873 \pm 0.0026 \pm 0.0006$	$0.374 \pm 0.004^{+0.003}_{-0.004}$ [15]
ϕ_Ξ (rad)	$-0.0008 \pm 0.0072 \pm 0.0010$	$-0.016 \pm 0.012^{+0.004}_{-0.008}$ [15]
$\bar{\phi}_\Xi$ (rad)	$0.0020 \pm 0.0072 \pm 0.0006$	$0.010 \pm 0.012^{+0.003}_{-0.013}$ [15]
α_Λ	$0.7434 \pm 0.0039 \pm 0.0015$	$0.7519 \pm 0.0036 \pm 0.0024$ [45]
$\bar{\alpha}_\Lambda$	$-0.7478 \pm 0.0038 \pm 0.0015$	$-0.7559 \pm 0.0036 \pm 0.0030$ [45]
$(\xi_P - \xi_S) \times 10^{-2}$ (rad)	$-0.2 \pm 1.2 \pm 0.1$	$0.7 \pm 2.0^{+1.8}_{-0.5}$ [15]
$(\delta_P - \delta_S) \times 10^{-2}$ (rad)	$0.3 \pm 1.2 \pm 0.2$	$3.3 \pm 2.0^{+0.8}_{-1.2}$ [15]
$A_{CP}^\Xi \times 10^{-3}$	$-7.8 \pm 4.8 \pm 0.8$	$-9 \pm 8^{+7}_{-2}$ [15]
$\Delta\phi_{CP}^\Xi \times 10^{-3}$ (rad)	$0.6 \pm 5.1 \pm 0.2$	$-3 \pm 8^{+3}_{-7}$ [15]
$A_{CP}^\Lambda \times 10^{-3}$	$-2.9 \pm 4.3 \pm 0.7$	$-2.5 \pm 4.6 \pm 1.2$ [45]
$\langle\alpha_\Xi\rangle$	$-0.3843 \pm 0.0018 \pm 0.0005$	$-0.373 \pm 0.005 \pm 0.002$ [16]
$\langle\phi_\Xi\rangle$ (rad)	$-0.0014 \pm 0.0050 \pm 0.0008$	$0.016 \pm 0.014 \pm 0.007$ [16]
$\langle\alpha_\Lambda\rangle$	$0.7456 \pm 0.0022 \pm 0.0014$	$0.7542 \pm 0.0010 \pm 0.0024$ [45]

超子衰变中迄今最精确的CP破坏参数的测量

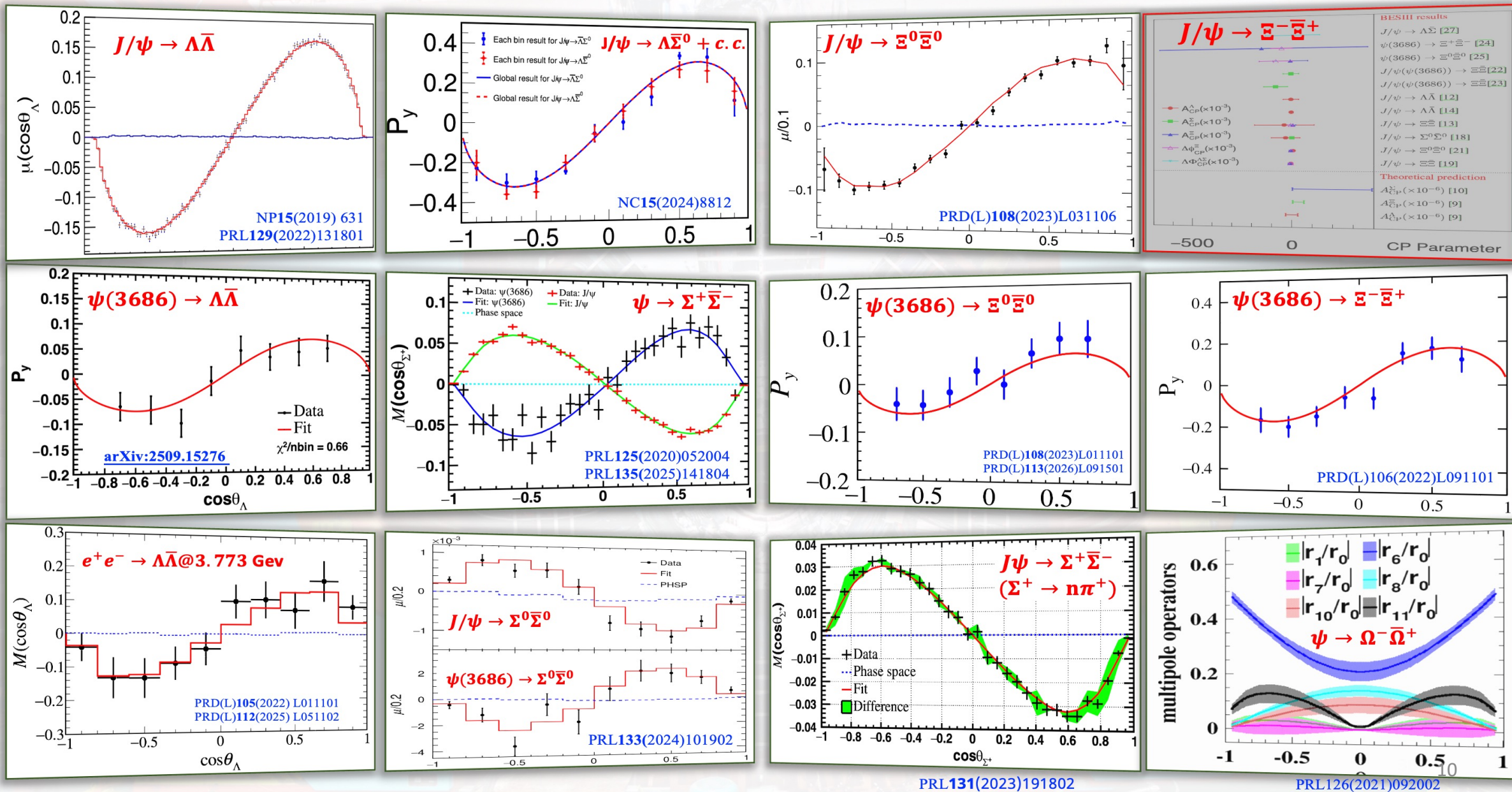
Observation of $\Xi(1530)^0$ Polarization and Determination of Its Electric and Magnetic Moments in $\psi(3686) \rightarrow \Xi(1530)^0 \bar{\Xi}(1530)^0$



- **Spin-3/2 particles exhibit not only vector polarization but also tensor polarization**
- **Four independent form factors: electric charge (G_E), magnetic dipole (G_M), electric quadrupole (G_Q), and magnetic octupole (G_O) moments**
- **A more detailed picture of hyperon internal structure**

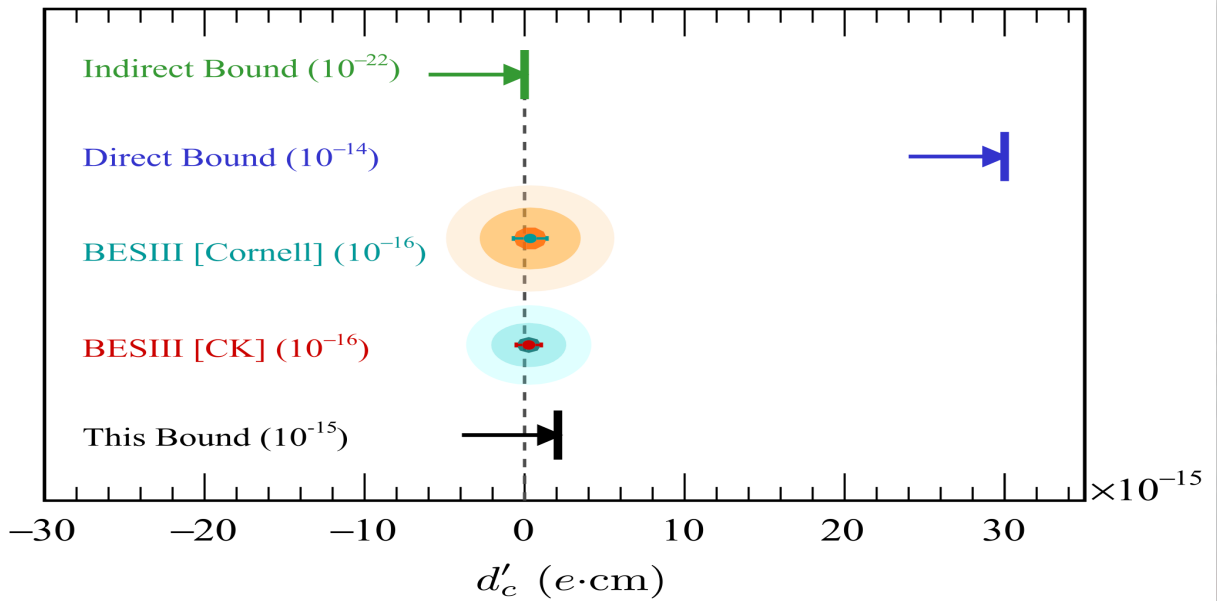
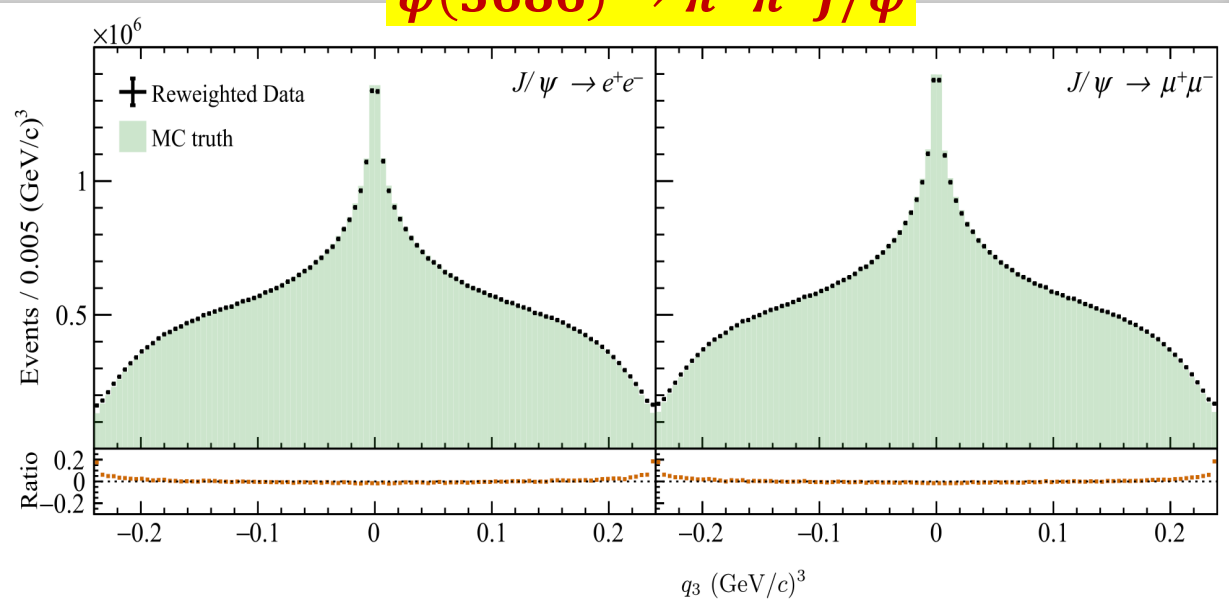
Parameter	Value	Parameter	Value
α_ψ	$0.02 \pm 0.06 \pm 0.06$	h_1	$0.69 \pm 0.05 \pm 0.05$
α_1	$-0.42 \pm 0.08 \pm 0.05$	h_3	$0.43 \pm 0.04 \pm 0.04$
α_2	$0.75 \pm 0.06 \pm 0.06$	h_4	$0.43 \pm 0.03 \pm 0.03$
ϕ_1 (rad)	$-1.81 \pm 0.13 \pm 0.07$	ϕ'_1 (rad)	$0.56 \pm 0.11 \pm 0.06$
ϕ_3 (rad)	$2.37 \pm 0.08 \pm 0.05$	ϕ'_3 (rad)	$2.37 \pm 0.08 \pm 0.05$
ϕ_4 (rad)	$1.02 \pm 0.15 \pm 0.08$	ϕ'_4 (rad)	$-2.90 \pm 0.13 \pm 0.08$
$ G_E $	$0.0035 \pm 0.0006 \pm 0.0004$	$ G_M/G_E $	$1.61 \pm 0.33 \pm 0.22$
$ G_M $	$0.0056 \pm 0.0006 \pm 0.0003$	$ G_Q/G_E $	$3.71 \pm 0.63 \pm 0.38$
$ G_Q $	$0.0129 \pm 0.0007 \pm 0.0005$	$ G_O/G_E $	$1.13 \pm 0.20 \pm 0.13$
$ G_O $	$0.0039 \pm 0.0002 \pm 0.0001$		

More studies for hyperon polarization and CPV



Precise Measurement of the Chromoelectric Dipole Moment of the Charm Quark

$\psi(3686) \rightarrow \pi^+\pi^-J/\psi$



Y.P. Kuang, J.P. Ma et al, PRD 85, 114010(2012)

$$q_3 \equiv \vec{p}_{e^+} \cdot (\vec{p}_{\pi^+} - \vec{p}_{\pi^-}) \vec{p}_{e^+} \cdot \frac{\vec{p}_{\pi^+} \times \vec{p}_{\pi^-}}{|\vec{p}_{\pi^+} \times \vec{p}_{\pi^-}|}$$

$$A_{CP} = \frac{N_{\text{events}}(q_3 > 0) - N_{\text{events}}(q_3 < 0)}{N_{\text{events}}(q_3 > 0) + N_{\text{events}}(q_3 < 0)}$$

Parameter	$J/\psi \rightarrow e^+e^-$	$J/\psi \rightarrow \mu^+\mu^-$
$A_{CP} (\times 10^{-4})$	$3.3 \pm 2.9 \pm 0.4$	$-1.2 \pm 2.4 \pm 0.1$
$\langle A_{CP} \rangle (\times 10^{-4})$	$0.6 \pm 1.8 \pm 0.1$	
$d'_c [\text{CK}] (e \text{ cm})$	$(2.6 \pm 7.8 \pm 0.4 \pm 0.6) \times 10^{-16}$	
$d'_c [\text{Cornell}] (e \text{ cm})$	$(3.5 \pm 10.5 \pm 0.6 \pm 0.5) \times 10^{-16}$	
$ d'_c (e \text{ cm})$	$< 2.1 \times 10^{-15}$	

迄今最精确粲夸克色电偶极矩的测量，强相互作用电荷宇称破缺的首次探索

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□ Introduction

□ Hyperon/Baryon physics

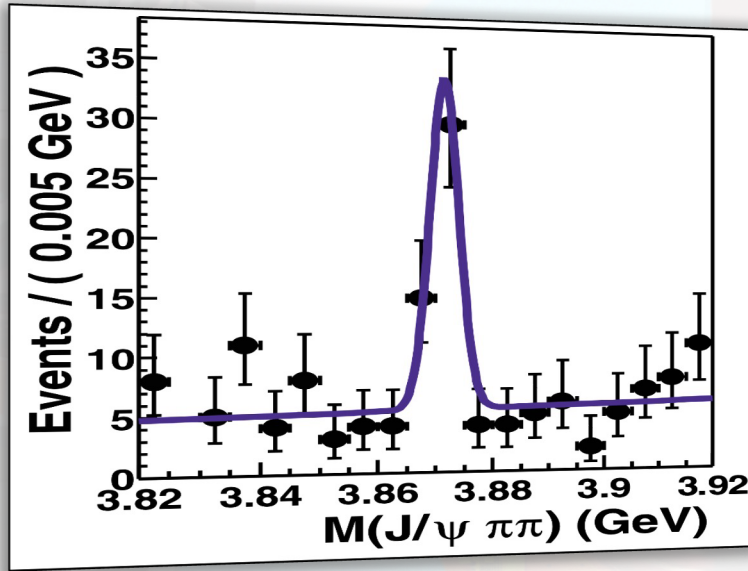
- Hyperon polarization/CPV/EDM
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- ~~Hyperon nucleon interaction~~
- ~~Hyperon rare decay~~
- ~~Baryon spectroscopy~~

□ Summary

XYZ/Charmonium(-like)

□ A series of XYZ states observed in past decades

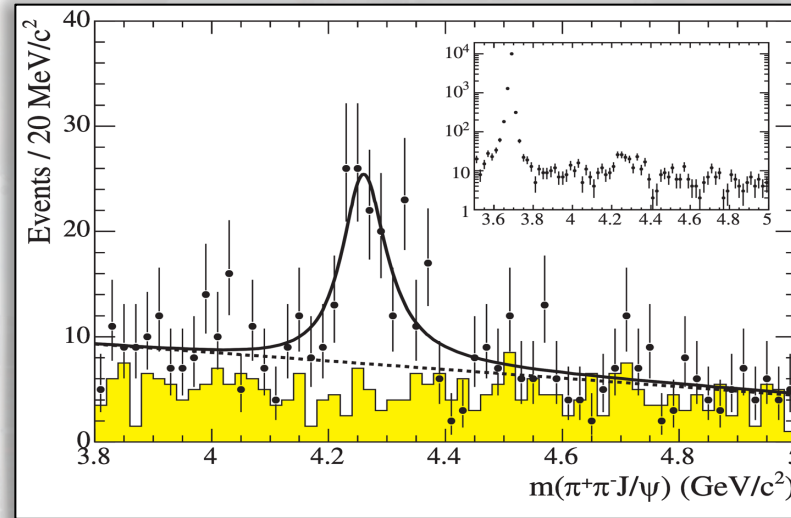
$X(3872)$



Phys. Rev. Lett. **91**, 262001(2003)



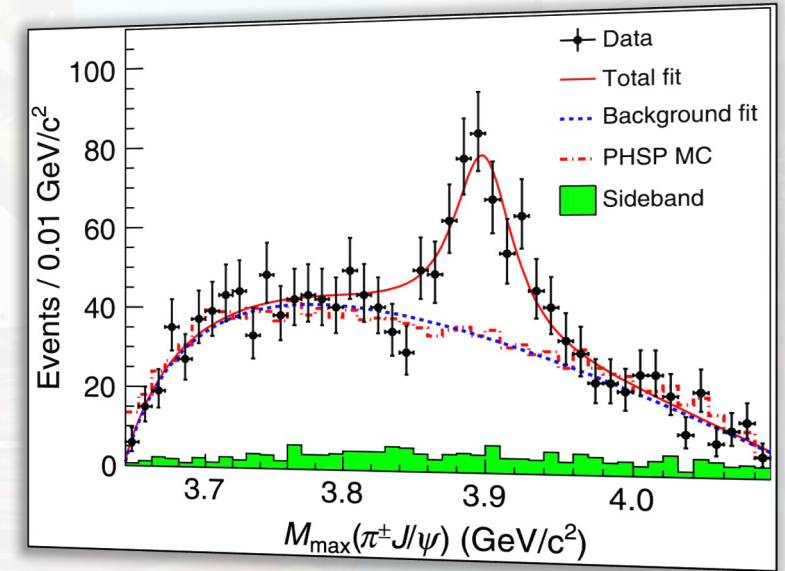
$Y(4260)$



Phys. Rev. Lett. **95**, 142001(2005)



$Z_c(3900)$

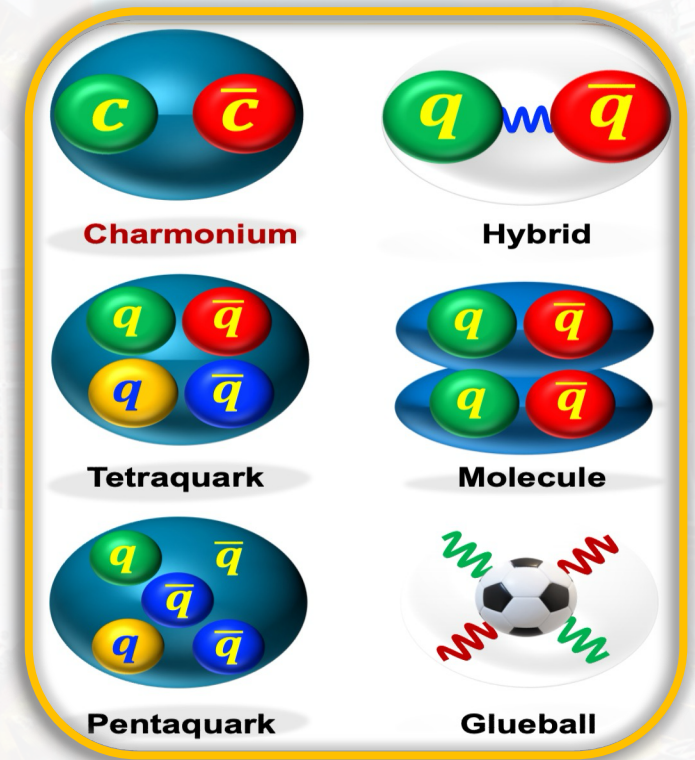
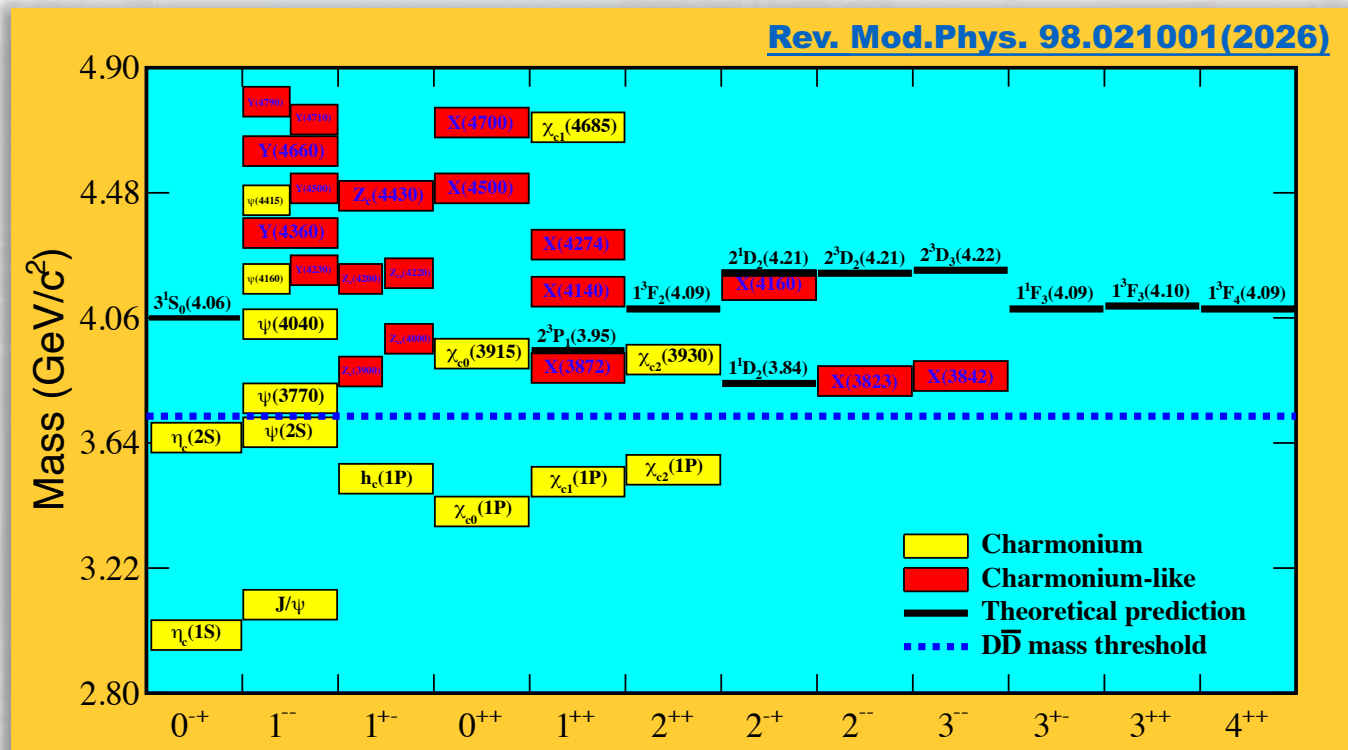


Phys. Rev. Lett. **110**, 252001(2013)



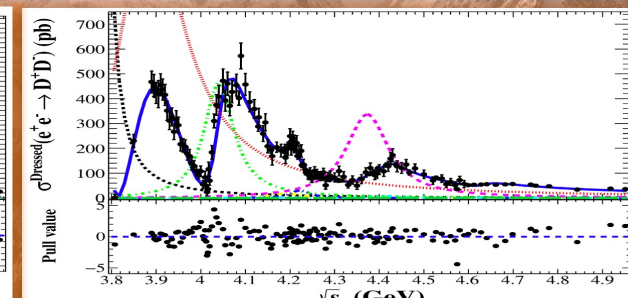
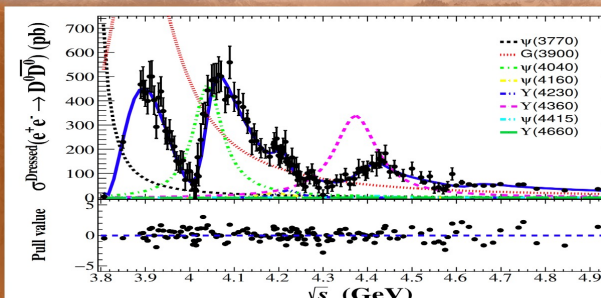
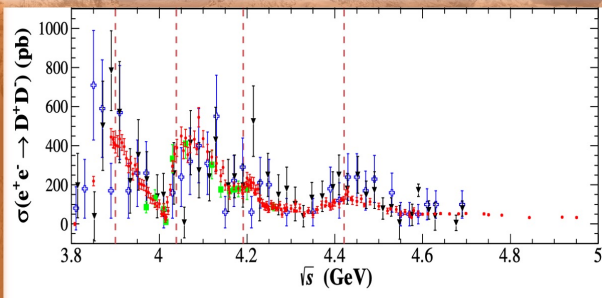
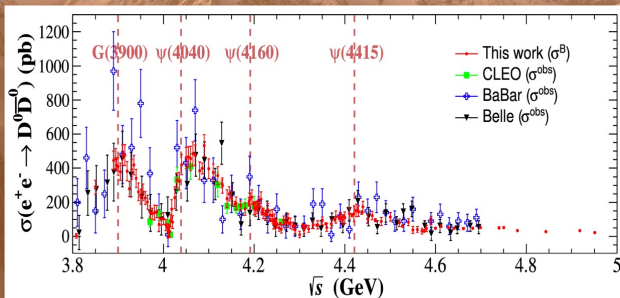
XYZ/Charmonium-like

- ❑ **Conventional Charmonium states: Nonrelativistic $c\bar{c}$ bound state**
- ❑ **XYZ/Charmonium-like states: Various scenarios, such as molecule state, hybrid states, tetraquark states, etc., have been proposed**



➤ **Popular study : hidden/open charm decay mode, Still needs more effort in theory and experiment**

正负电子对湮灭到 $D\bar{D}$ 玻恩截面的精确测量



Physical Review Letters

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Precise Measurement of Born Cross Sections for $e^+e^- \rightarrow D\bar{D}$ at $\sqrt{s} = 3.80\text{--}4.95$ GeV

Phys. Rev. Lett. **133**, 081901 – Published 21 August, 2024

DOI: <https://doi.org/10.1103/PhysRevLett.133.081901>

BESII

迄今最精确粲介子对产生截面测量，为理解
(类)粲偶素提供了关键的实验信息！

在《现代物理学评论》发表综述文章

Reviews of Modern Physics

Recent Accepted Authors Referees Editorial Policies Press About Editorial Team RSS

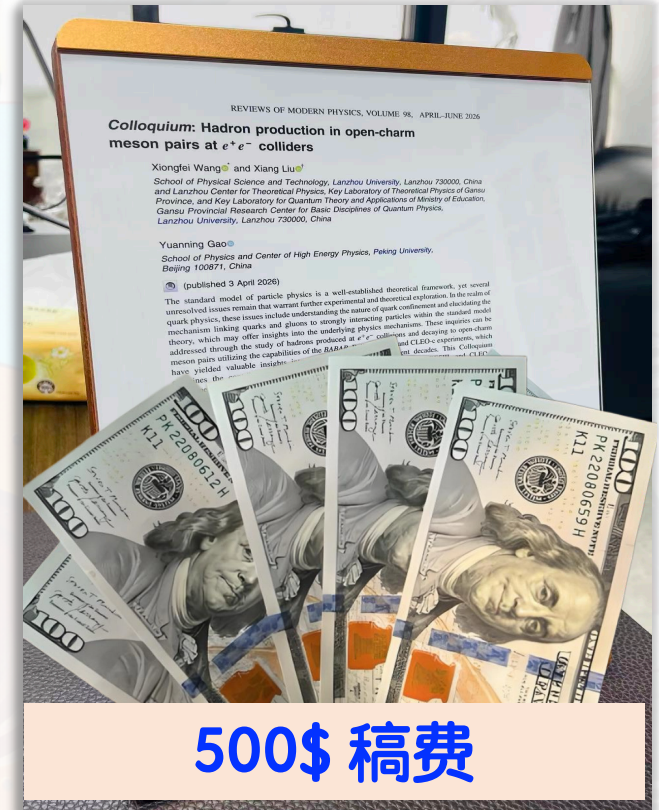
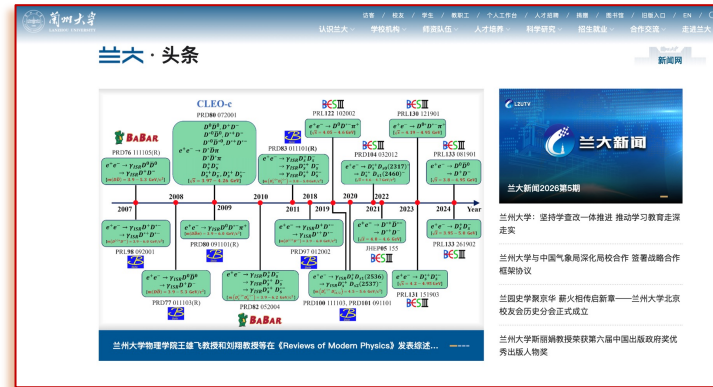
Colloquium: Hadron production in open-charm meson pairs at e^+e^- colliders

Xiongfei Wang^{*}, Xiang Liu[†], and Yuanning Gao^{id}

Show more

Rev. Mod. Phys. **98**, 021001 – Published 3 April, 2026

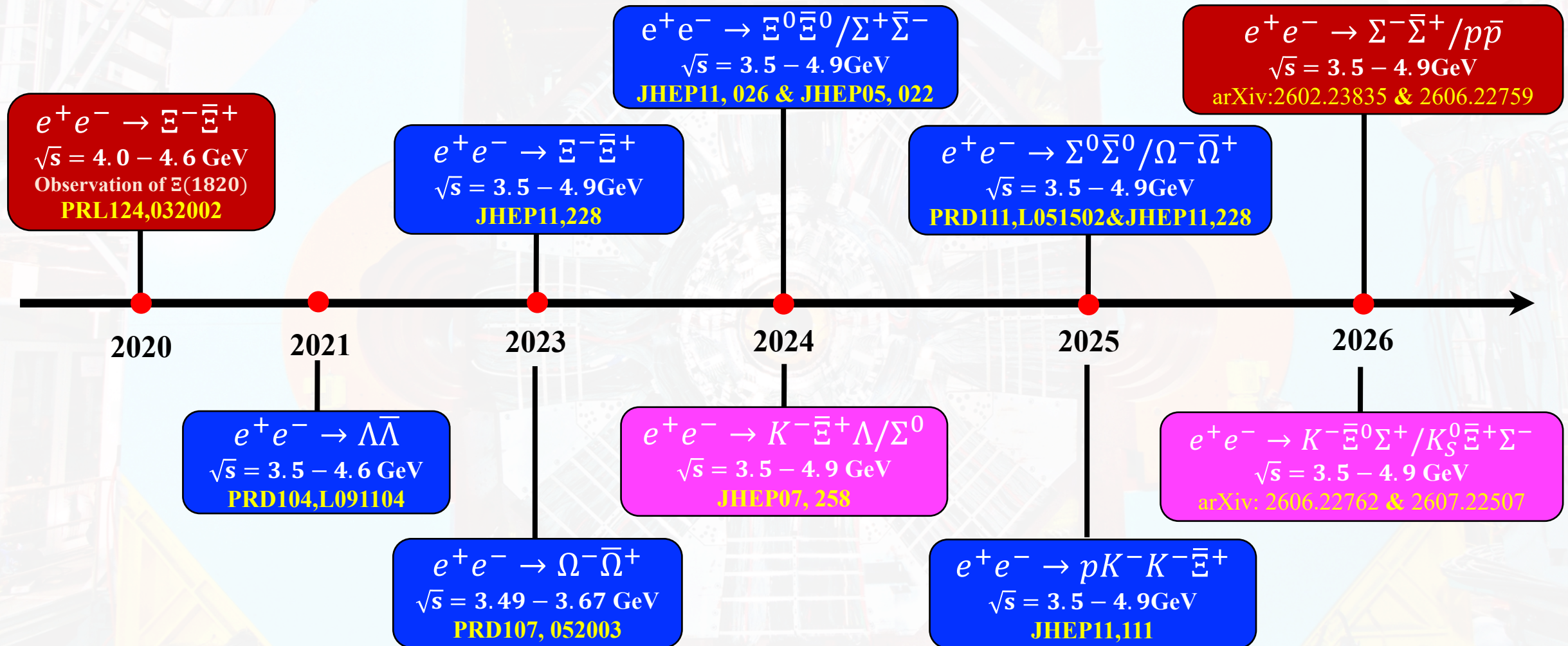
DOI: <https://doi.org/10.1103/2mrp-chly>



系统阐述了正负电子对撞机上粲介子对末态强子产生的研究进展
全面梳理了粲偶素物理领域过去 50 年的实验成果，是该领域的首个全面专题综述
对理解XYZ粒子性质提供了重要的实验信息

$$e^+e^- \rightarrow H\bar{H} @ \sqrt{s} = 3.5 - 4.9 \text{ GeV}$$

□ Study for baryon/hyperon pair production, **test for pQCD, VMD dominated theoretical models**

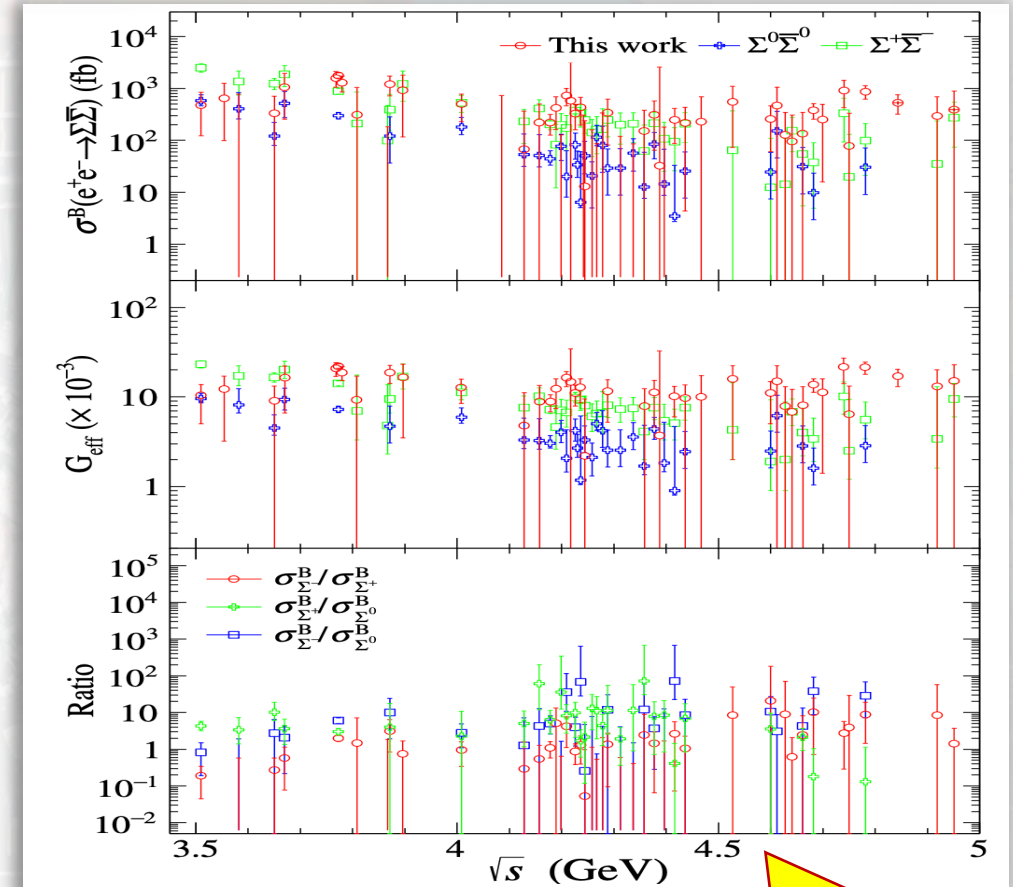
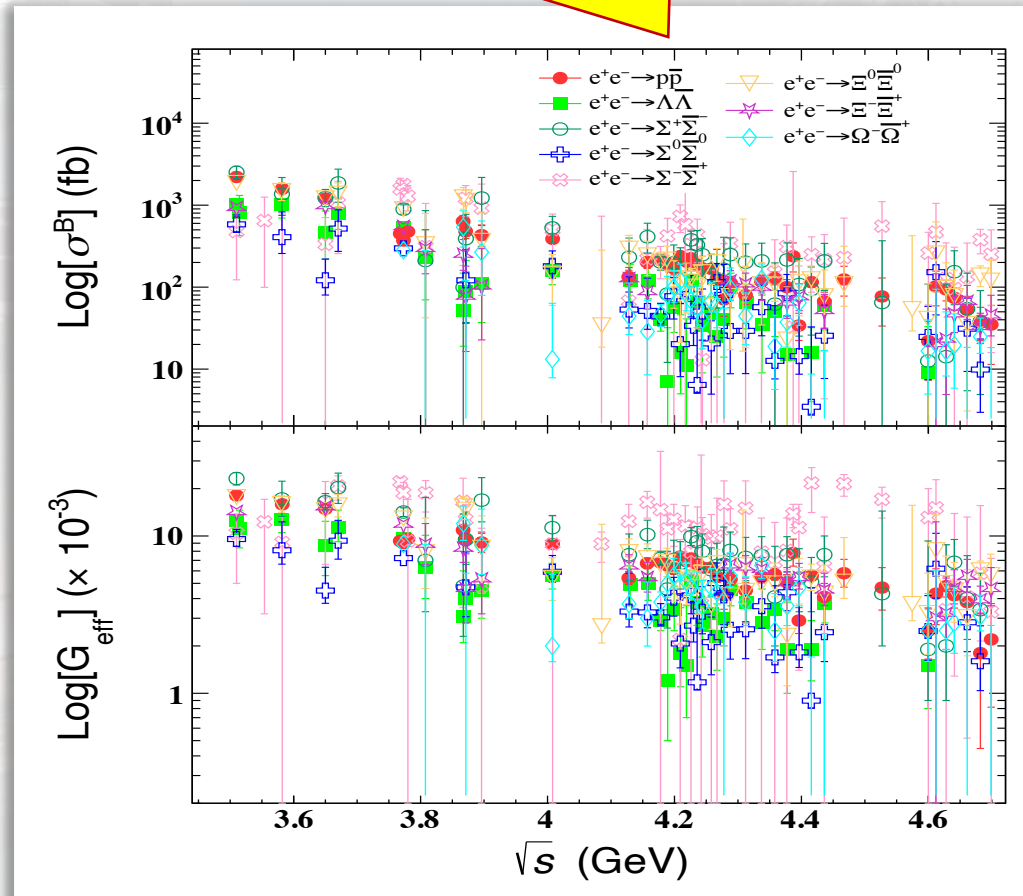


$$e^+e^- \rightarrow H\bar{H} @ \sqrt{s} = 3.5 - 4.9 \text{ GeV}$$

PRL124(2020) 032002
 PRD(L)104(2021)L091104
 JHEP11(2023)228
 JHEP11(2024)062
 JHEP05(2024)022
 PRD(L)111(2025)L051502
 arXiv: 2602.23835

Study for hyperon pair production, test for VMD dominated theoretical models

重子对产生截面的系统扫描/研究



Validate the VMD dominated theoretical models

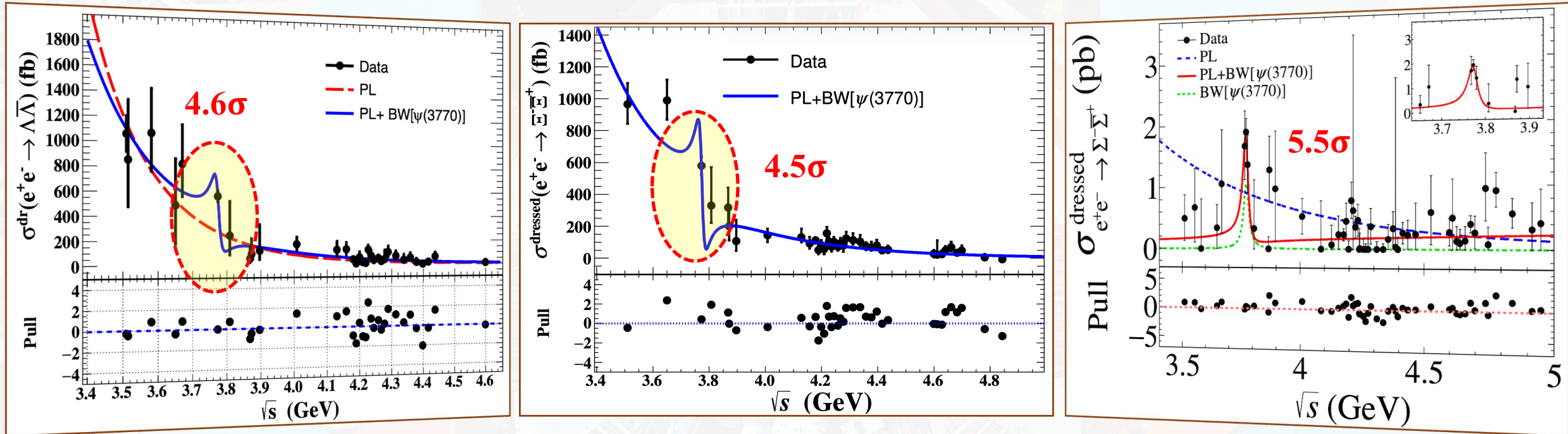
$$e^+e^- \rightarrow H\bar{H} @ \sqrt{s} = 3.5 - 4.9 \text{ GeV}$$

PRD(L)104(2021)L091104

JHEP11(2023)228

arXiv: 2602.23835

□ Study for hyperon pair production, **search for charmonium(-like) resonance**

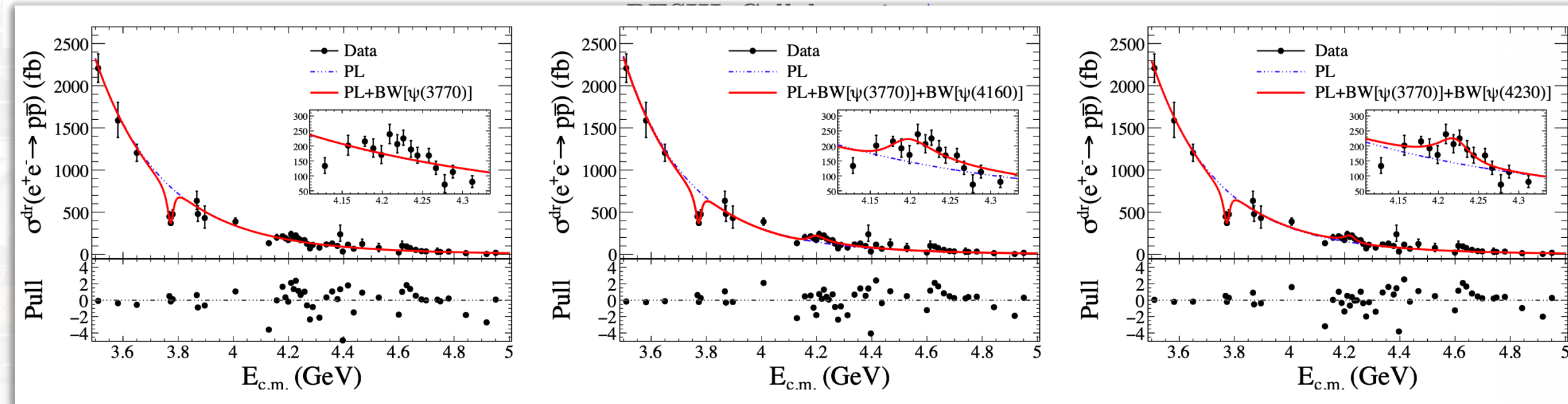


- **Observation of $\psi(3770) \rightarrow \Sigma^-\bar{\Sigma}^+$ and Evidence of $\psi(4160) \rightarrow \Lambda\bar{\Lambda}, \Xi^-\bar{\Xi}^+$**
- **No significance for other Charmonium(-like) observed**
- **More experiment information for constraint for pQCD**

Observation of $\psi(3770) \rightarrow p\bar{p}$ and Measurement of Electromagnetic Form Factors of Proton at $\sqrt{s} = 3.510 - 4.946$ GeV

[arXiv: 2606.22759](#)

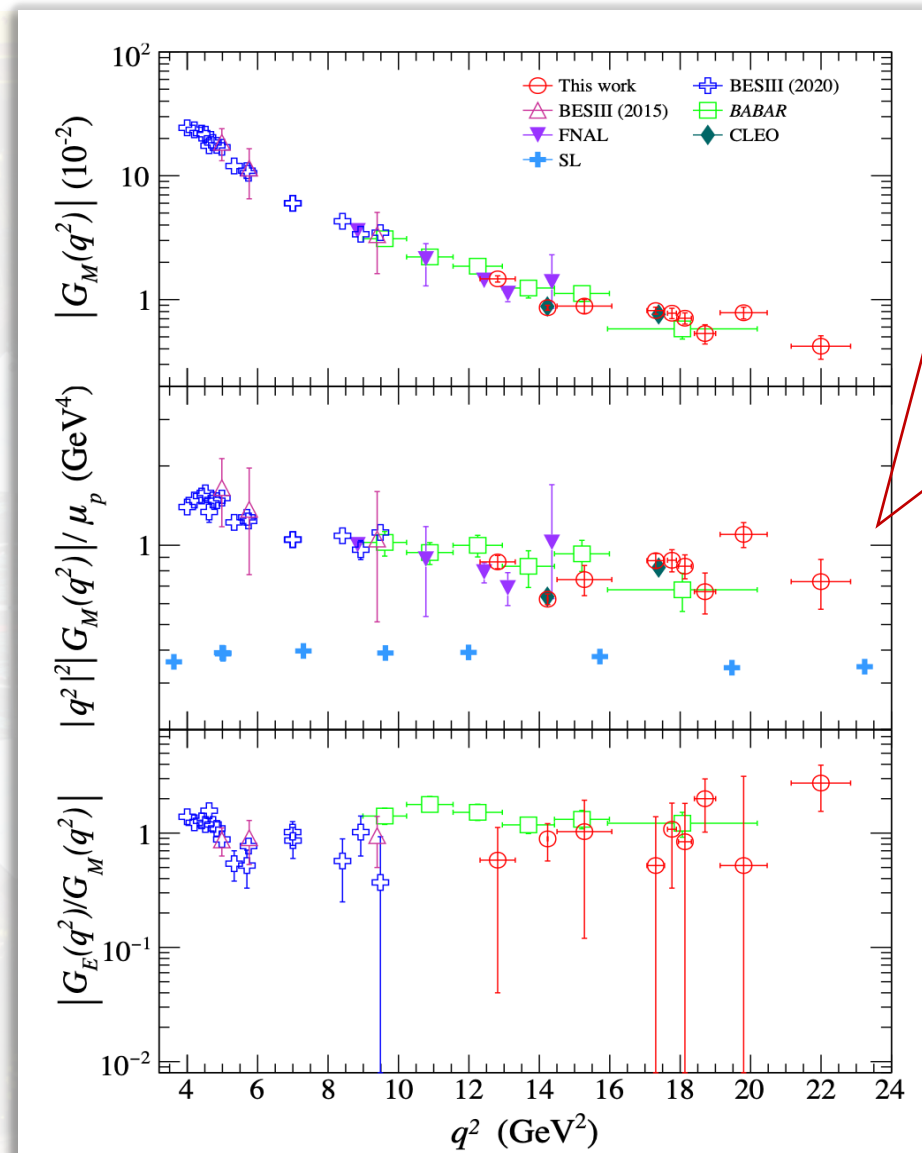
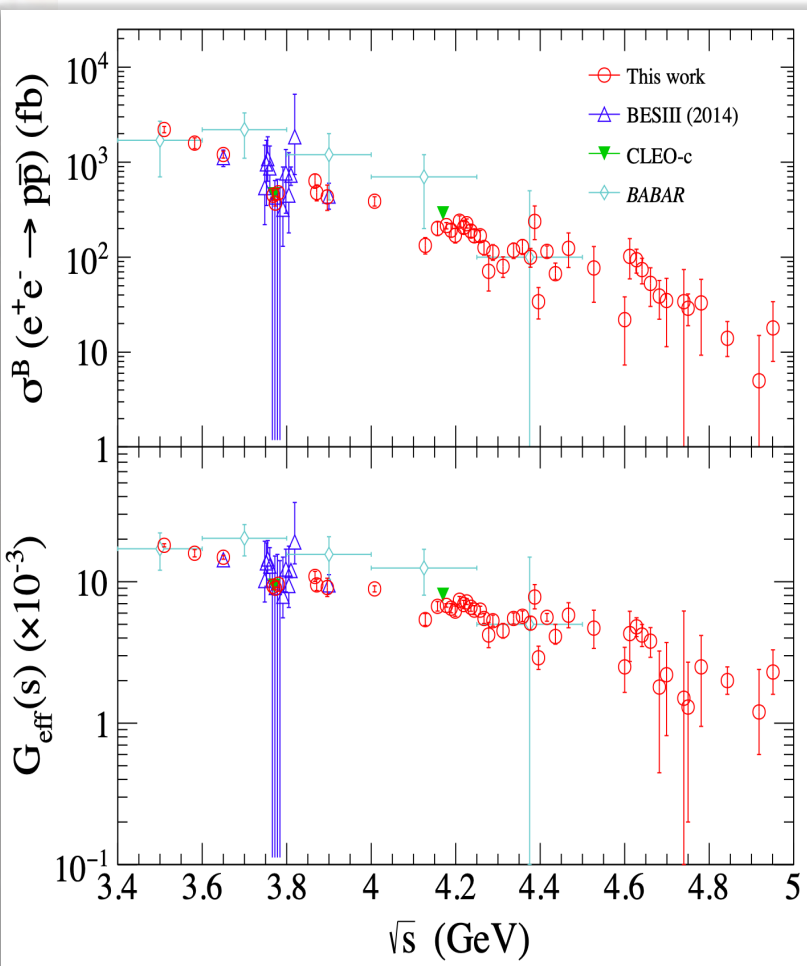
[arXiv: 2606.22762](#)



➤ **Observation of $\psi(3770) \rightarrow p\bar{p}$ (6.6σ)**

➤ **A structure near 4.2 GeV is observed with significances of 4.6σ or 4.8σ for the $\psi(4160)$ or $Y(4230)$ hypotheses including systematic uncertainties**

Observation of $\psi(3770) \rightarrow p\bar{p}$ and Measurement of Electromagnetic Form Factors of Proton at $\sqrt{s} = 3.510 - 4.946$ GeV



➤ 在大动量转移能区 ($\sim 20 \text{ GeV}^2$)，实验测得的Time-like 电磁形状因子比 Space-like 值高出约两倍，这与QCD预言的二者近似一致存在明显偏离。

➤ 需进一步理解背后的物理！

[arXiv: 2606.22759](https://arxiv.org/abs/2606.22759)
[arXiv: 2606.22762](https://arxiv.org/abs/2606.22762)

$$e^+e^- \rightarrow pK^-\bar{\Lambda}/K\bar{\Xi}\Lambda(\Sigma)/\phi(\omega)\Lambda\bar{\Lambda} @ \sqrt{s} = 3.5 - 4.9 \text{ GeV}$$

□ More study for **three-body** baryonic final states production, search for **Charmonium(-like) states**

[JHEP12\(2023\)027](#)

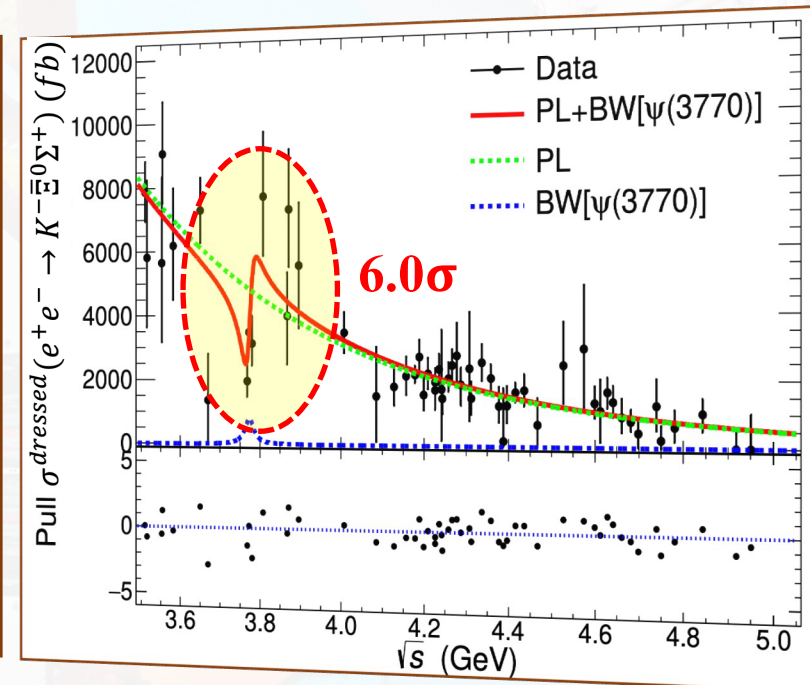
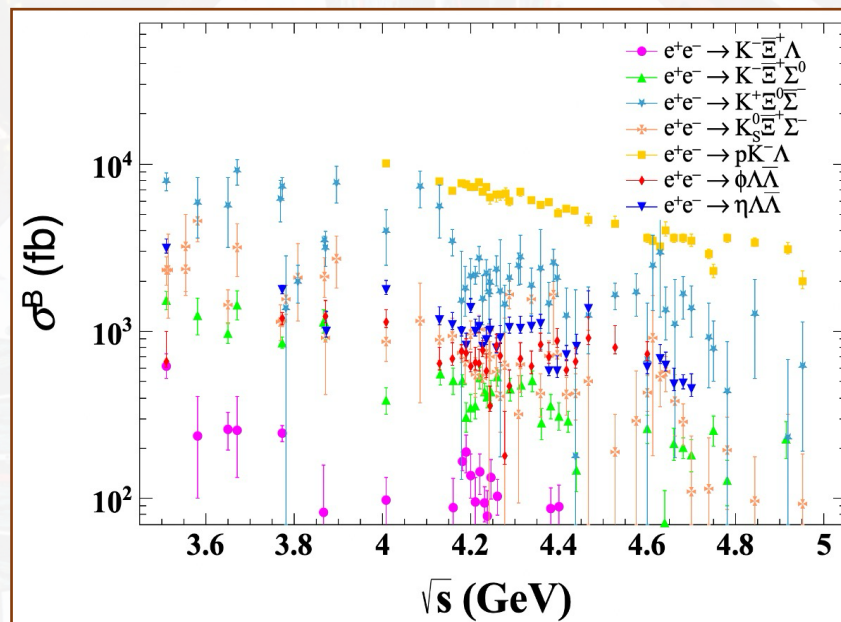
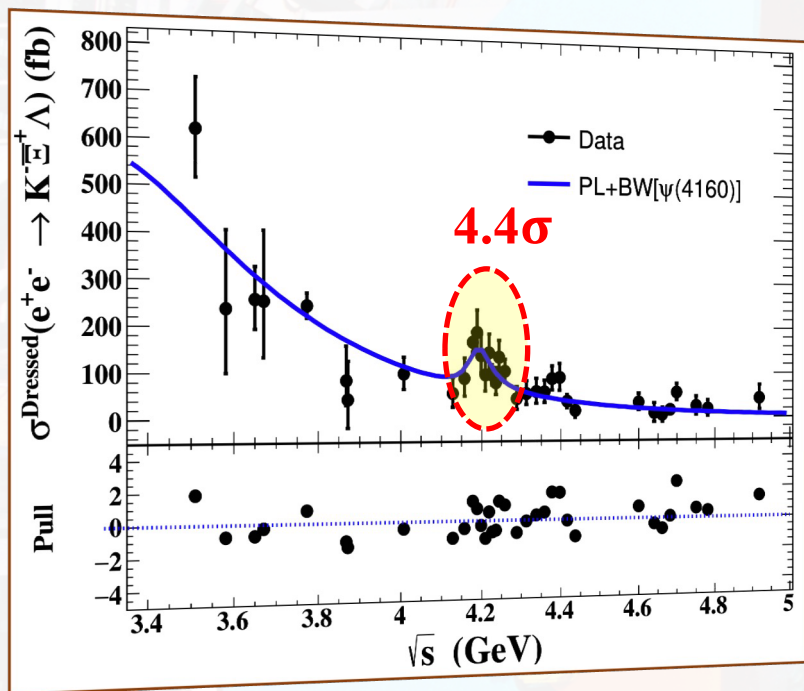
[JHEP07\(2024\)258](#)

[PRD104\(2021\)052006](#)

[PRD107\(2023\)112001](#)

[PRL131\(2023\)151901](#)

[arXiv:2605.19780](#)

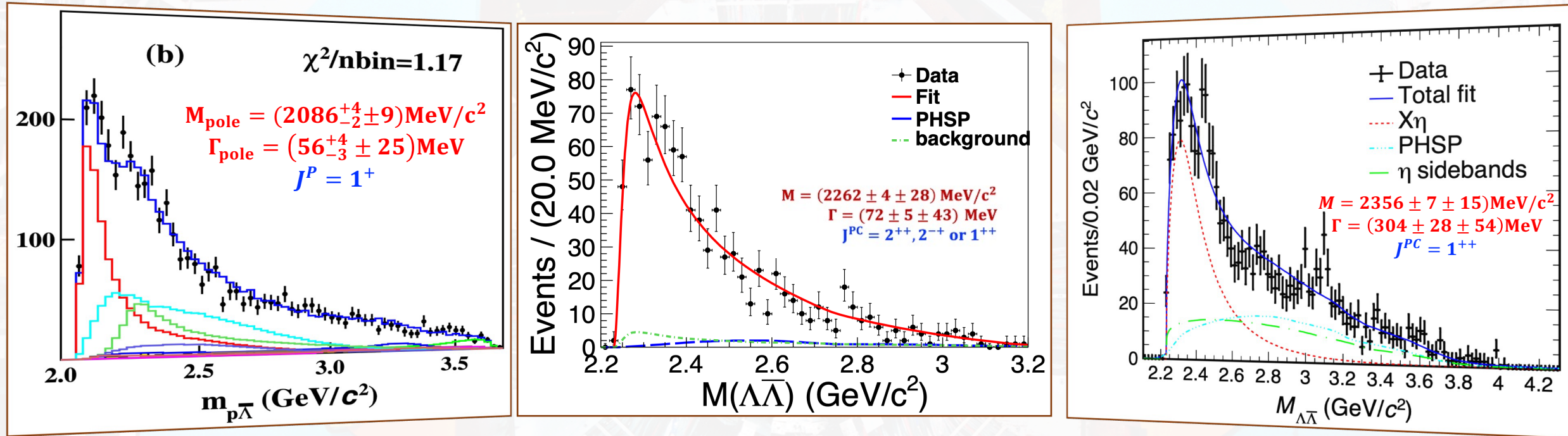


- Evidence of $\psi(4160) \rightarrow K^-\bar{\Xi}^+\Lambda$ and **observation of $\psi(3770) \rightarrow K^-\bar{\Xi}^0\Lambda$**
- No significance for other Charmonium(-like) observed
- More information for charmless decay of Charmonium(-like)

$$e^+e^- \rightarrow pK^-\bar{\Lambda}/\phi(\eta)\Lambda\bar{\Lambda} @ \sqrt{s} = 3.5 - 4.9 \text{ GeV}$$

PRD104(2021)052006
PRD107(2023)112001
PRL131(2023)151901

- Study for **three-body** baryonic final states production, search for excited baryon/meson states

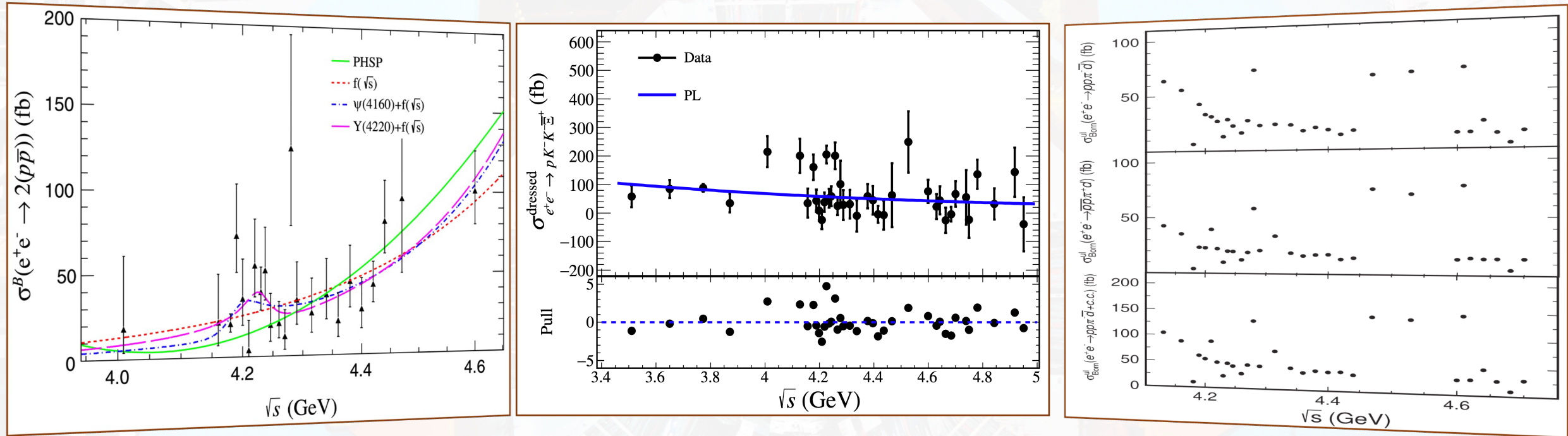


- Observations of near $\Lambda\bar{\Lambda}$ and $p\bar{\Lambda}$ enhancements
- More excited states and more constraint for pQCD

$e^+e^- \rightarrow$ multi-body final states @ $\sqrt{s} = 3.5 - 4.9$ GeV

□ More study for **multi-body** baryonic final states production, search for **Charmonium(-like) states**

[PRD103\(2021\)052003](#)
[PRD109\(2024\)092013](#)
[JHEP11\(2025\)111](#)

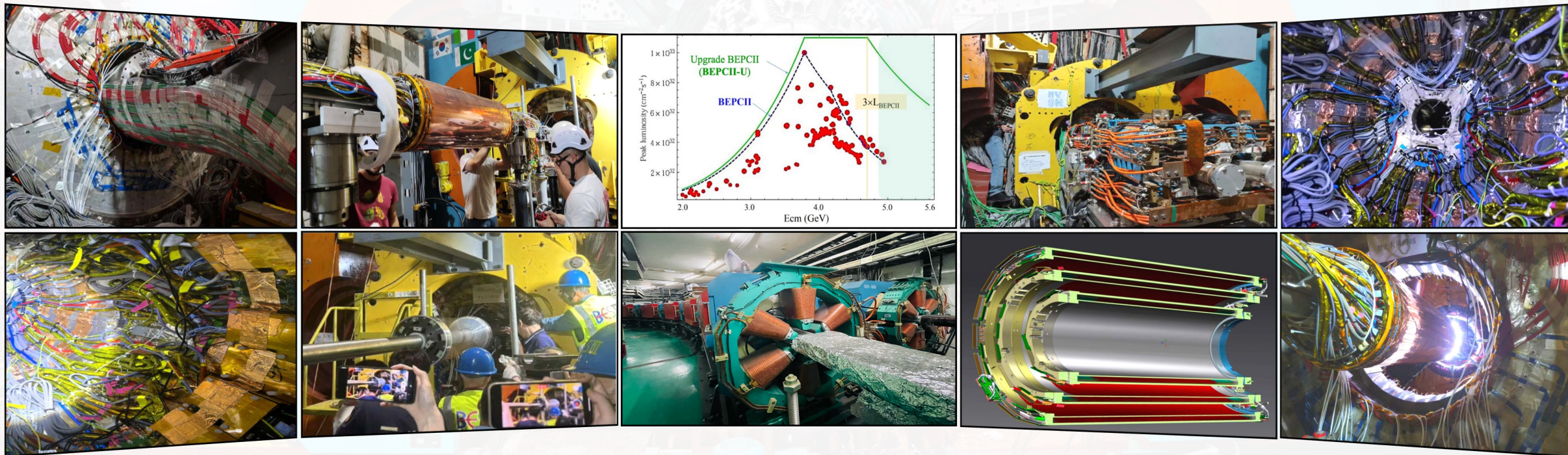


➤ **No any Charmonium(-like) states observed, No deuteron signal observed**

➤ **More excited states and more constraint for pQCD**

Summary

- ❑ **BESIII has been running successfully (>16 years)**
- ❑ **2024-2025, BESIII detector and BEPCII upgrade**
 - Upgrade in beam energy up to 2.8 GeV and luminosity (BEPCII-UP, 3X)
 - A new inner tracker (CGEM) for BESIII detector was installed
 - Opportunities to study the baryons physics in the BEPCII-UP

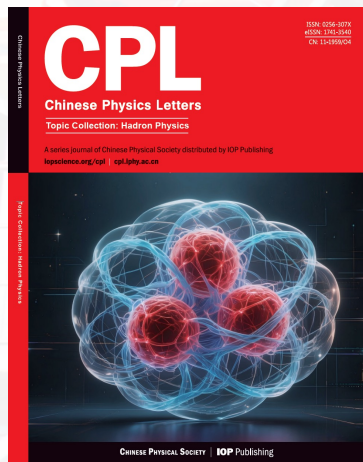


Summary

□ Many studies for hyperon/baryon physics achieved

- Hyperon polarization observed
- CPV in hyperon: $O(\sim 10^{-3})$ [SM $\sim 10^{-4}$]
- A more strict upper bound for Λ –EDM and CEDM
- Observation: $\psi(3770) \rightarrow p\bar{p}, \Sigma^- \bar{\Sigma}^+$ and $K^+ \Xi^0 \bar{\Sigma}^-$
- Evidence: $Y(4230) \rightarrow p\bar{p}$
- Evidence: $\psi(3770) \rightarrow \Lambda \bar{\Lambda}, \Xi^- \bar{\Xi}^+$ and $\psi(4160) \rightarrow K^- \bar{E}^+ \Lambda$
- Production for two/three/four-body hyperon final states
- ...

□ More new results are on the way



Guest Editors:

Lisheng Geng
Jinhui Chen
Shuangshi Fang
Jujun Xie
Xiaorong Zhou
Xiongfei Wang



Searches for New Physics Beyond the Standard Model in Hyperon Sector

Jianyu Zhang, Jinlin Fu, Hai-Bo Li

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