

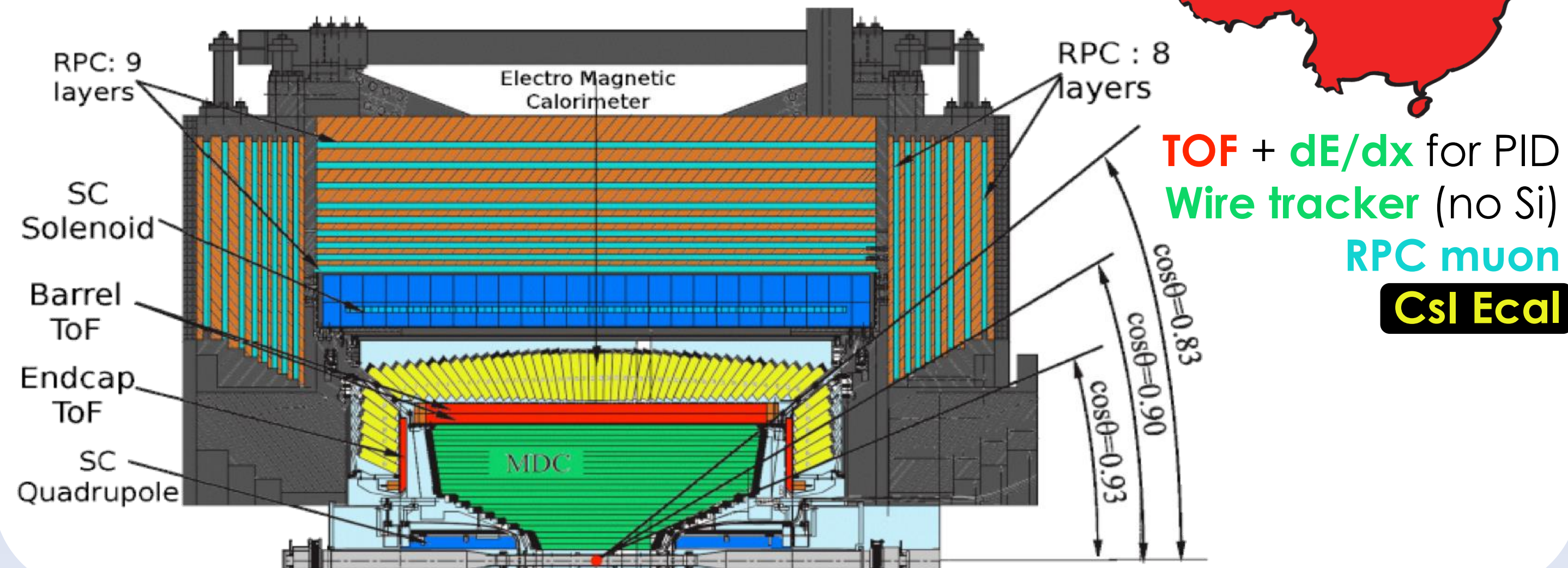
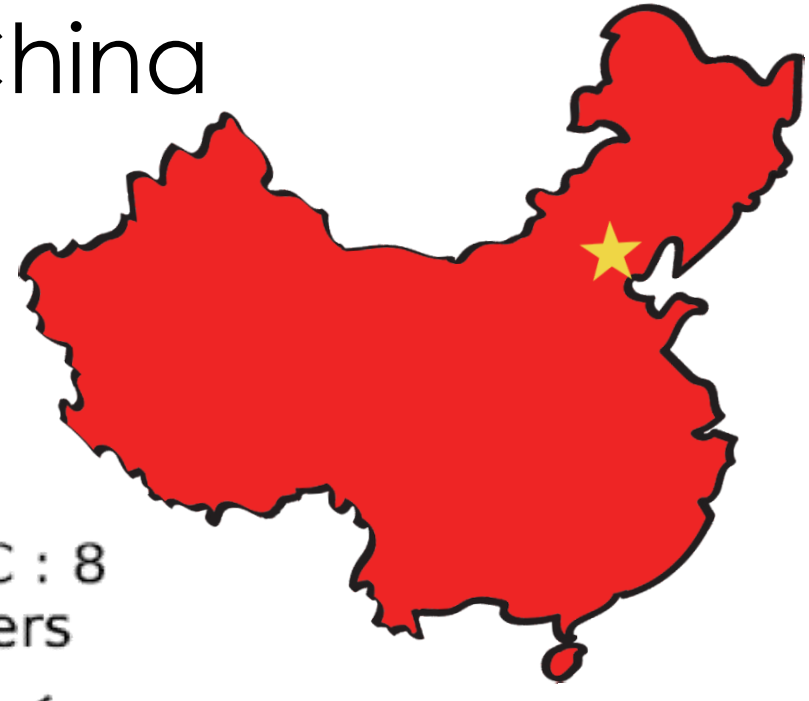
Inclusive Analysis of $e^+e^- \rightarrow Y(4260) \rightarrow J/\psi + \text{recoils}$ for $\sqrt{s} \in (4230, 4260, 4360, 4420, 4600)$ MeV



Mathilde Himmelreich for the GSI Hadron Spectroscopy Group on behalf of the BESIII Collaboration

BESIII at BEPCII

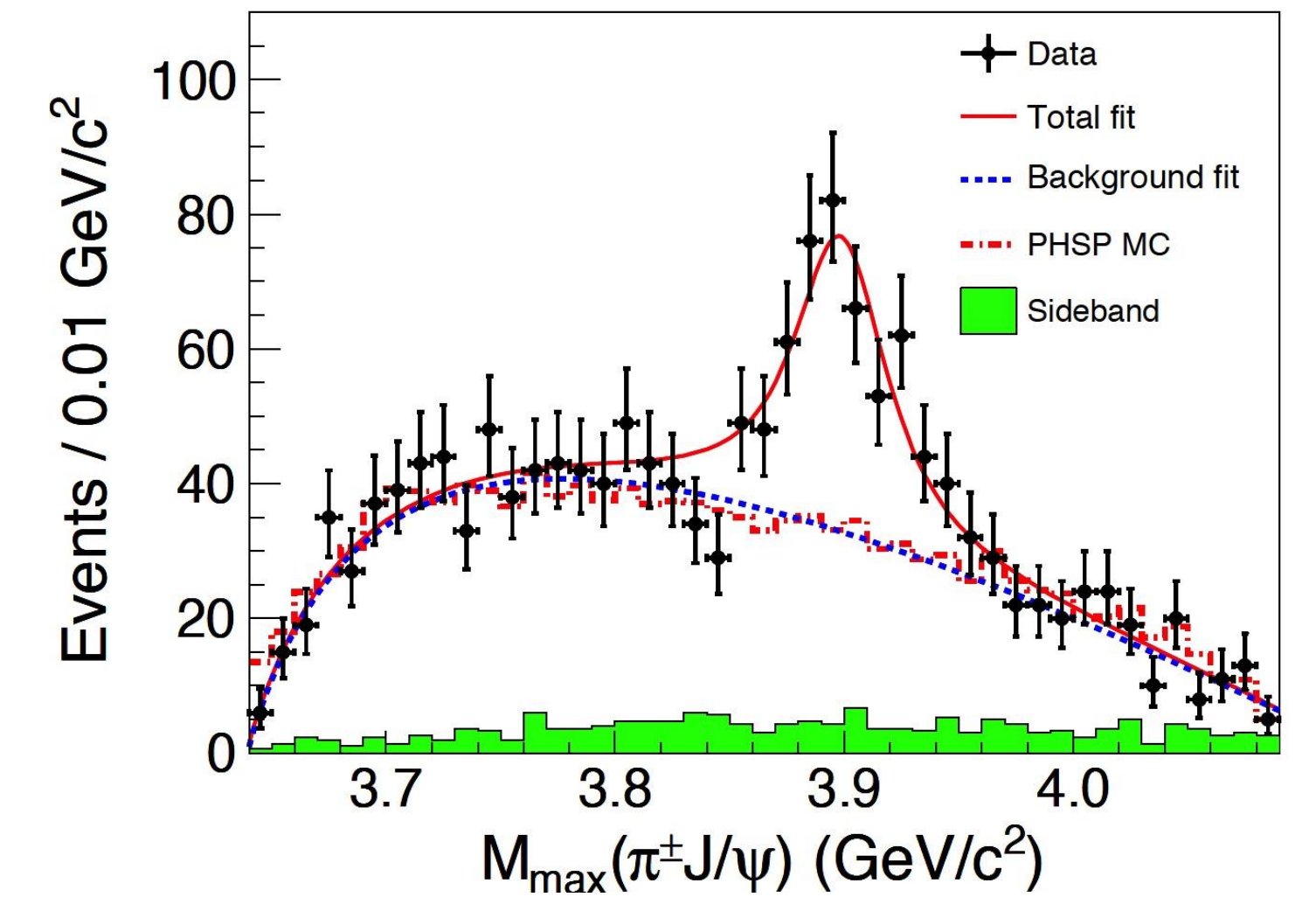
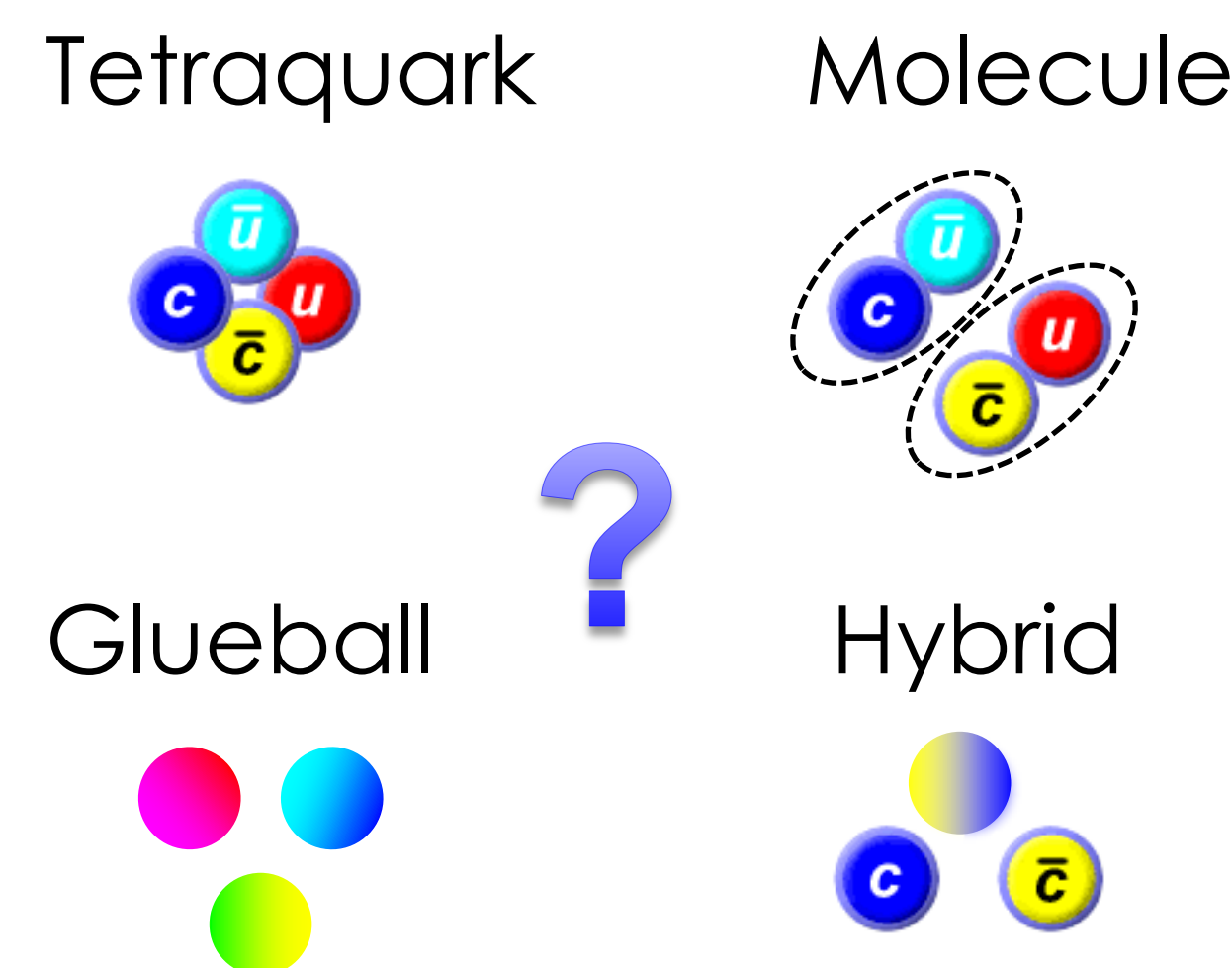
- BEPCII (Beijing Electron-Positron Collider II) located at IHEP (Institute of High Energy Physics), China
- In operation since 2008
- Luminosity: $10^{33} \text{ cm}^{-2} \text{ s}^{-1}$



TOF + dE/dx for PID
Wire tracker (no Si)
RPC muon
CsI Ecal

Search and Validation of QCD Exotics

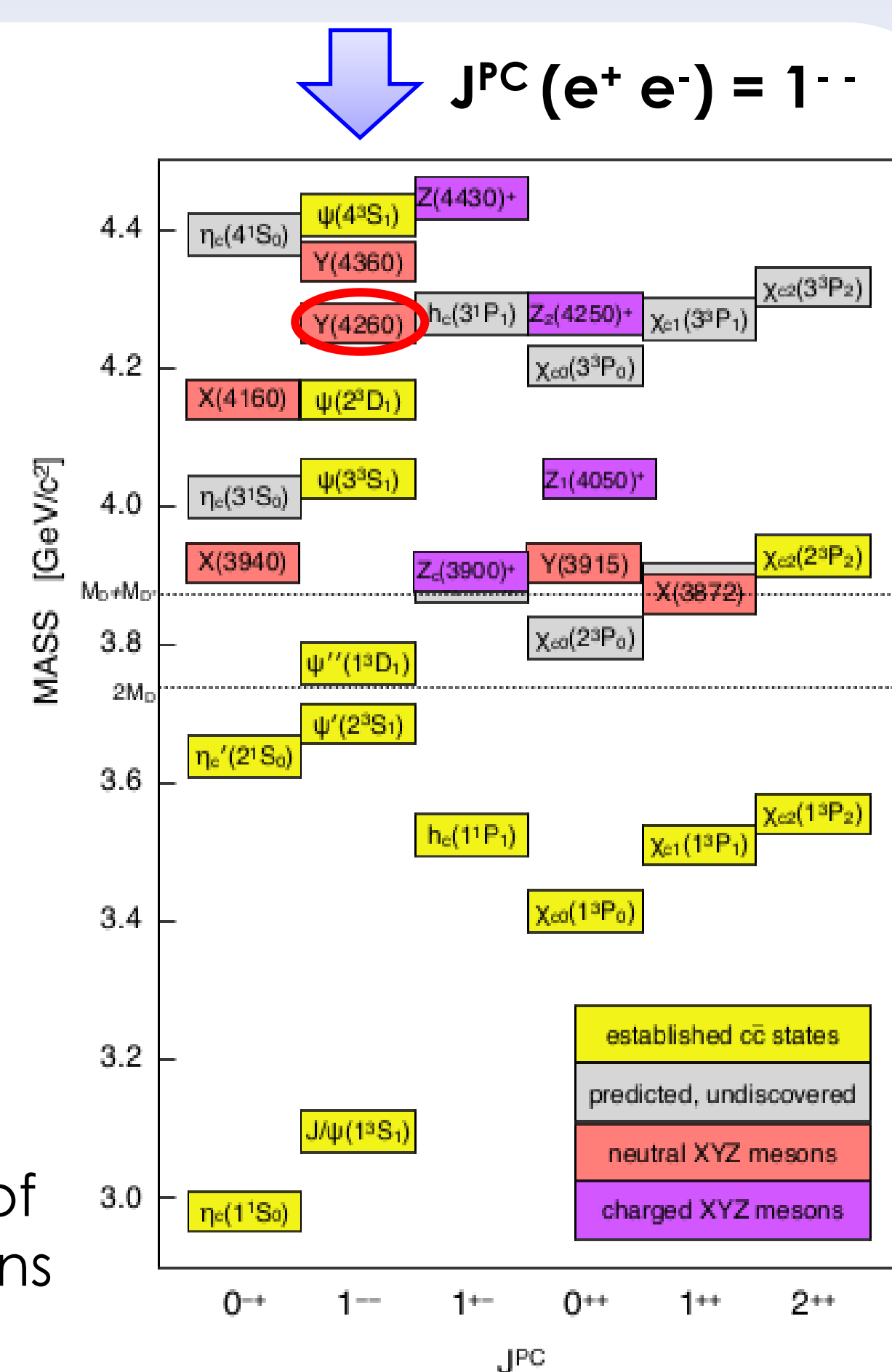
- Quantum Chromo Dynamic predicts exotic bound states
- Previous observations at BABAR, Belle, CLEO-c



Discovery of the $Z_c^{+/-}$ (3900) in the $J/\psi \pi^+ \pi^-$ invariant mass spectrum in the decay $Y(4260) \rightarrow J/\psi \pi^+ \pi^-$

Motivation

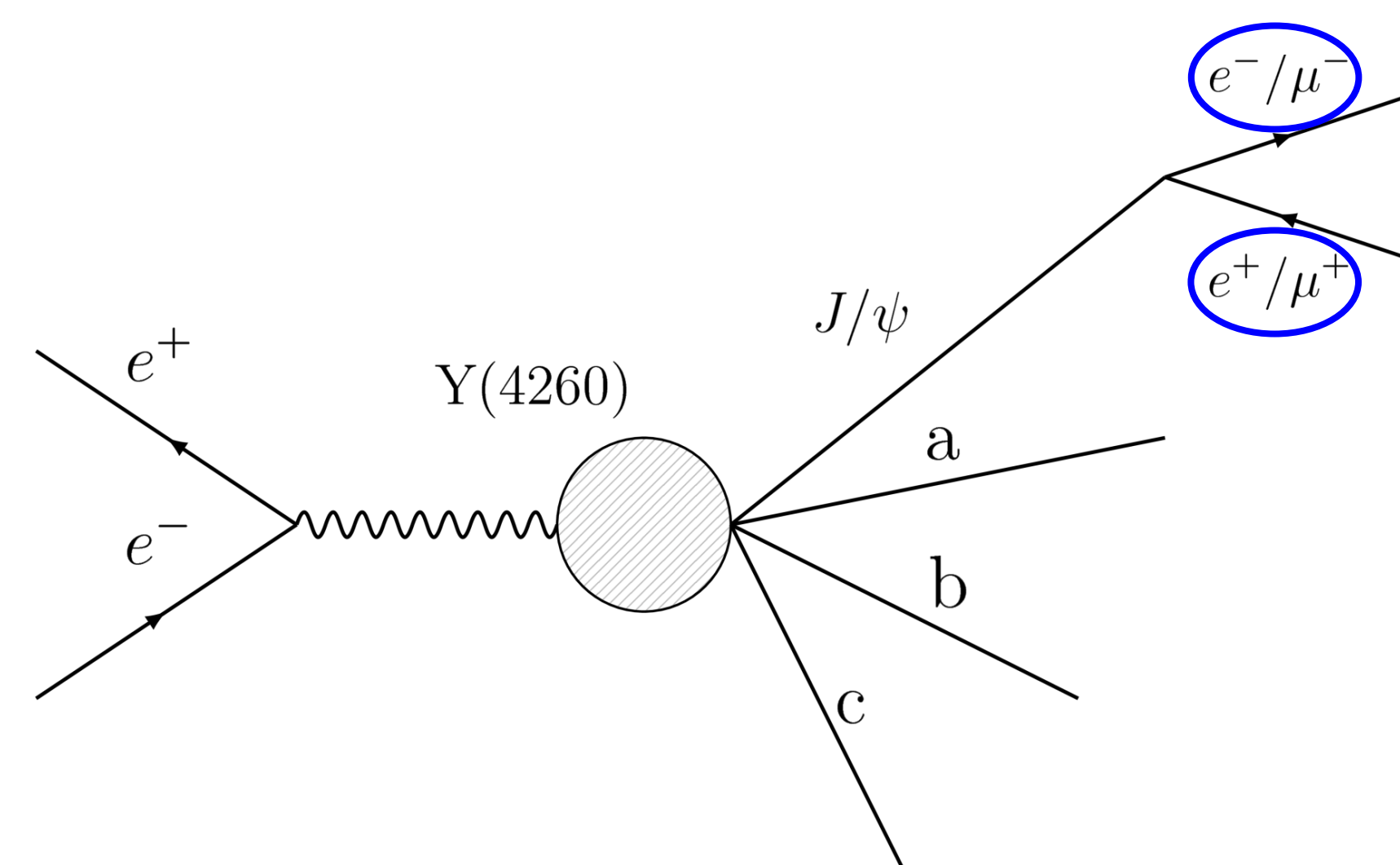
- Search and validation of QCD exotics
- Search for additional final states
- Search for isoscalar partners ($I = 0$)
- Explanation of measured states



Spectrum of charmonium-like mesons

Strategy

- Inclusive analysis independent of recoiling particles
- **Reconstruction of J/ψ via leptons** (small background)
- Using Monte-Carlo simulations of various decay channels to understand/interpret measurements

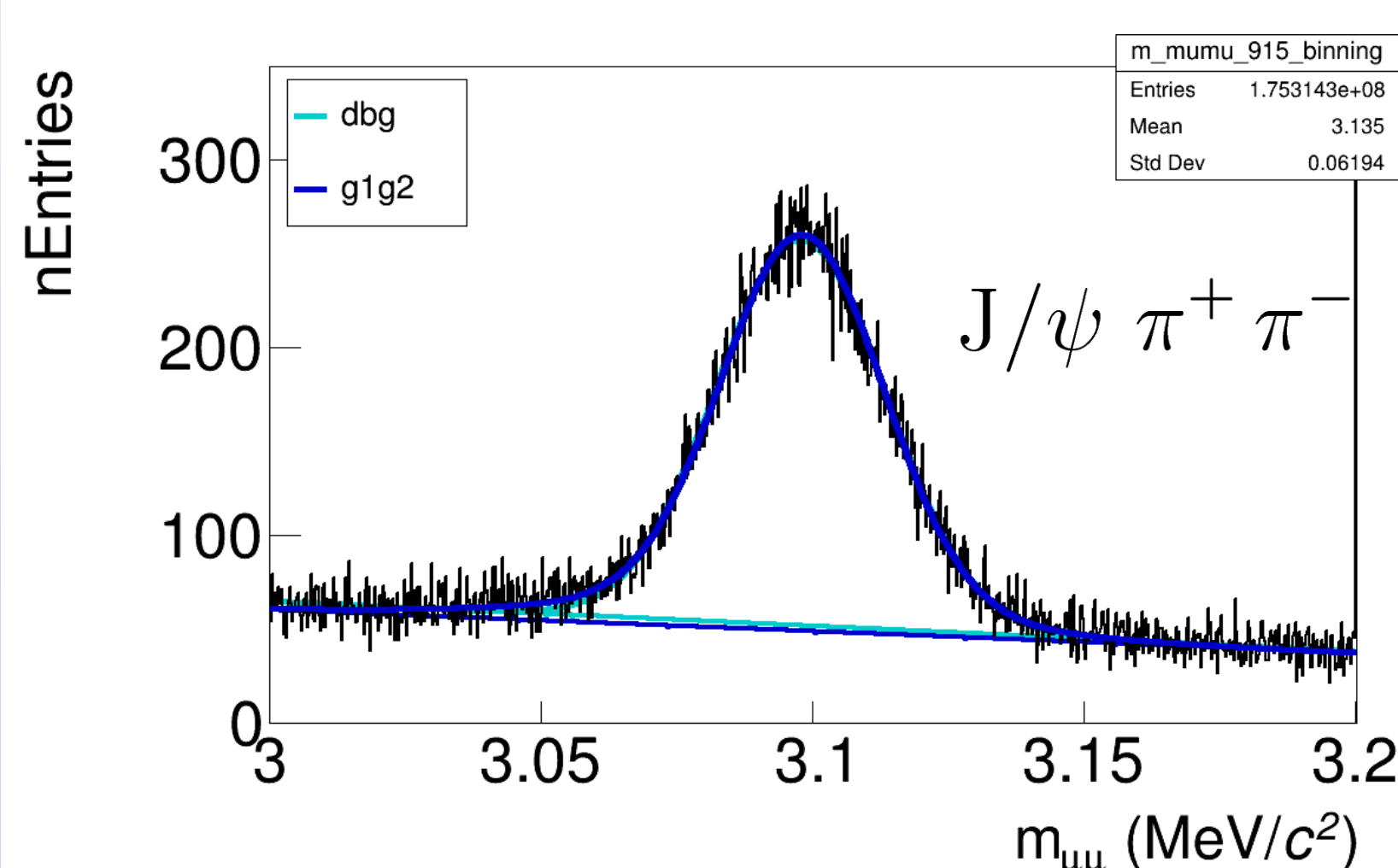


Investigated recoils:

a	b	c	a	b	c
π^+	π^-	π^0	π^0	π^0	η
π^+	π^-	π^0	π^0	π^0	ω
π^+	π^-	η	π^0	π^0	ρ
π^+	π^-	ω	π^0	π^0	ρ
π^+	π^-	ρ	K_S^+	K_S^-	
			K_S^0	K_S^0	

MC Simulation $Y(4260) \rightarrow J/\psi \pi^+ \pi^-$ and $J/\psi \pi^+ \pi^- \pi^0$ ($J/\psi \rightarrow \mu^+ \mu^-$)

Invariant mass spectrum ($\mu^- \mu^+$)



Applied fit functions

double gaussians (dbg):

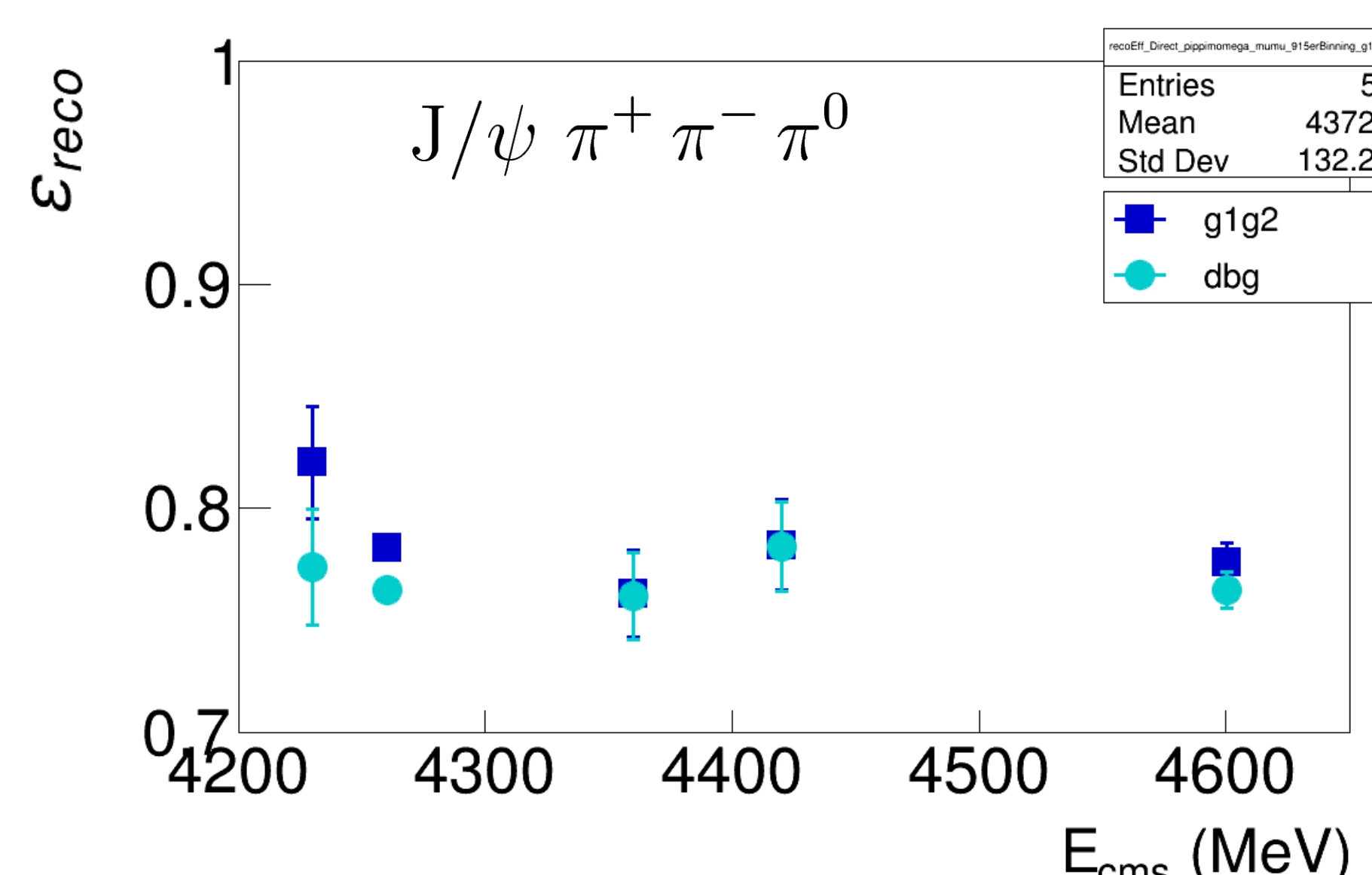
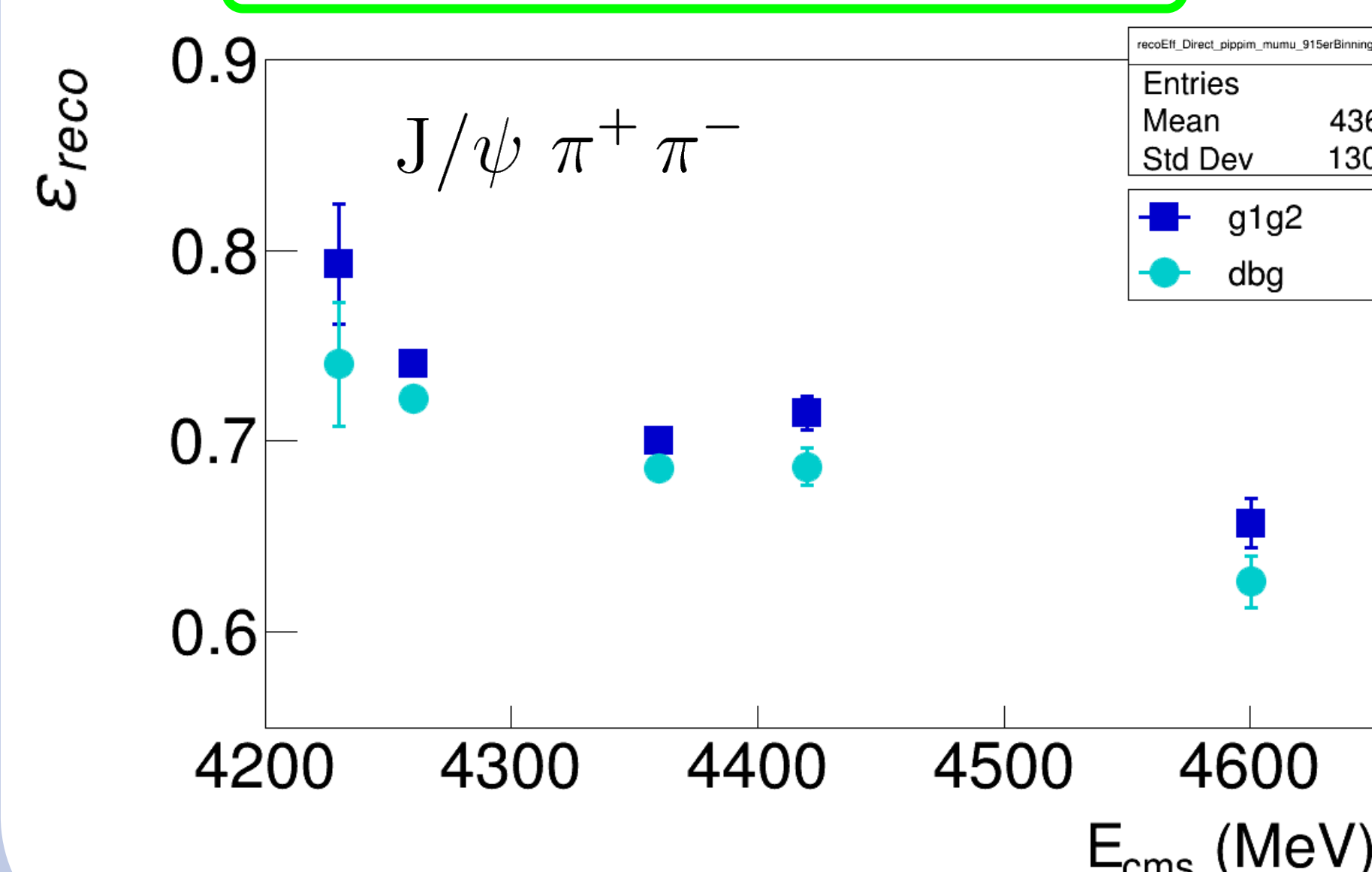
Two gaussian functions with the same mean values

gauss1+ gauss2 (g1g2):

Two gaussian functions with different mean values

$$\epsilon_{\text{reco}} = \frac{dE \int f(\text{signal})}{N_{\text{generated}}}$$

Reconstruction Efficiency



$Y(4260) \rightarrow J/\psi \pi^+ \pi^-$ and $J/\psi \pi^+ \pi^- \pi^0$

- 50k signal events
- Inclusive background sample
- Good track selection
- No mass cuts

Outlook (MC Simulations)

- Study of the effect of lepton misidentification (cross feed)
- Study of the effect of the used decay model (PHSP/VLL) on the J/ψ reconstruction
- Search for recoiling resonances
- Selection criteria optimisation

Application to Data

- Measurement of the energy dependent cross section

Development of analysis routines within the PANDA Phase-0

