BESIII - Preventivi 2023

Consiglio di Sezione - Sezione di Ferrara, 1 Luglio 2022

I. Garzia

Anagrafica del gruppo

	Cognome	Nome	Qualifica	Responsabilità	BESIII
Phys	Balossino	Ilaria	fellow IHEP	responsabile operation CGEM	0.7
Phys	Bettoni	Diego	ricercatore		1
Phys	Cibinetto	Gianluigi	ricercatore	tech. board, system manage CGEM	0.5
Phys	Farinelli	Riccardo	AdR		0.3
Phys	Garzia	Isabella	ricercatore Unife	convener LH, CIF	0.6
Phys	Gramigna	Stefano	dottorando		0.9
Phys	Mezzadri	Giulio	AdR		0.7
Phys	Scodeggio	Marco	dottorando		0.8

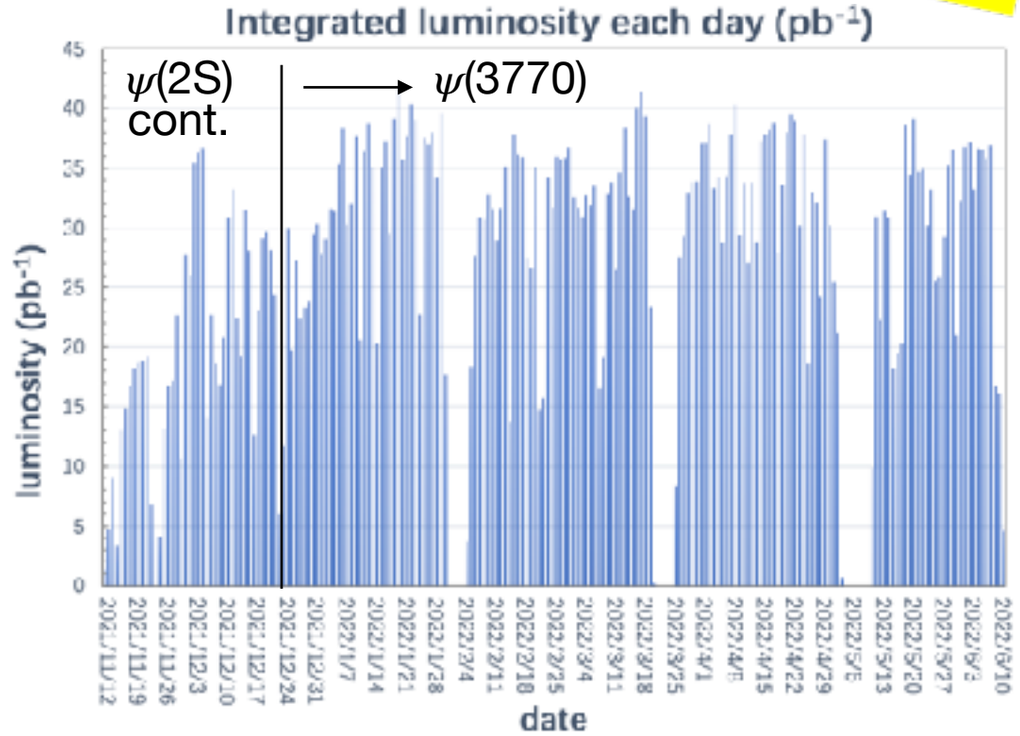
Totale 2023 (Phys)	**5.5**
Totale 2022/2021 (solo fisici)	**5.35/5.45**
Totale 2022/2021 (Phys+Tech)	6.45/6.65

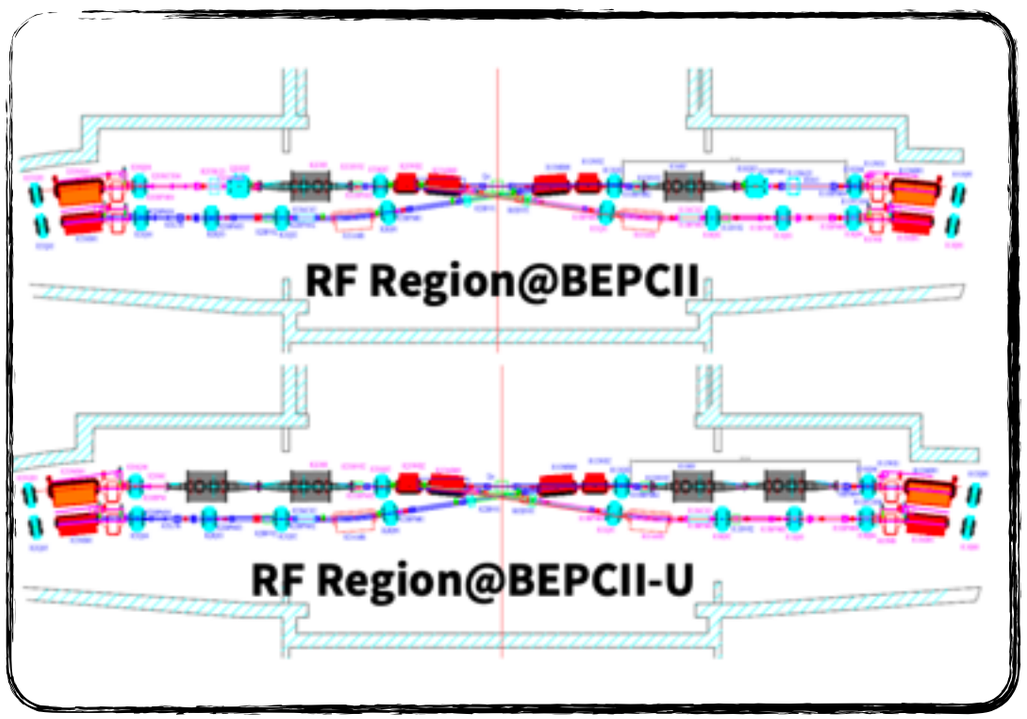
Fondamentale il supporto dei servizi di meccanica ed elettronica

Stato dell'esperimento

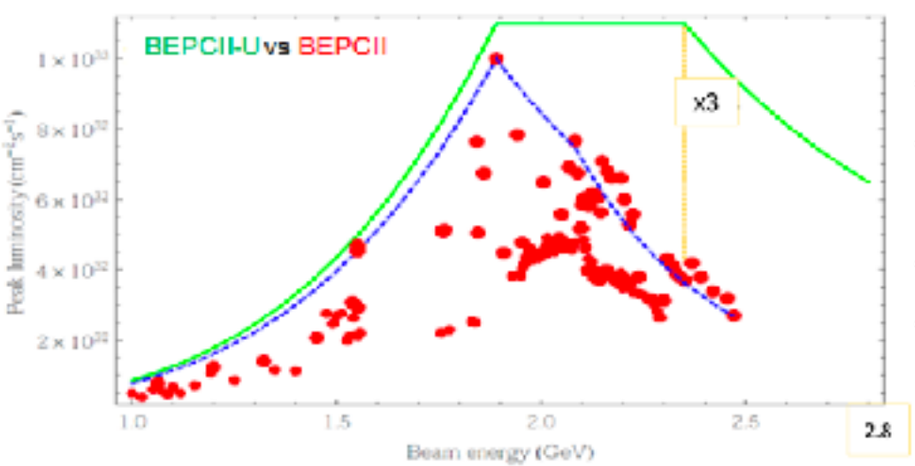
World largest J/ψ, ψ(2S) and ψ(3770) samples

- Presa dati anno in corso: 400 pb^{-1} @ 3.65 GeV e 3.682 GeV (continuum data) + 4.8 fb^{-1} @ $\psi(3770)$
  - Turni online + presenza (cinesi) 2021/2022
  - La situazione pandemica non ha influenzato il piano di presa dati
  - Presa dati per i prossimi anni già programmata
- Luglio-Dicembre 2024: shutdown per l'upgrade di BEPCII





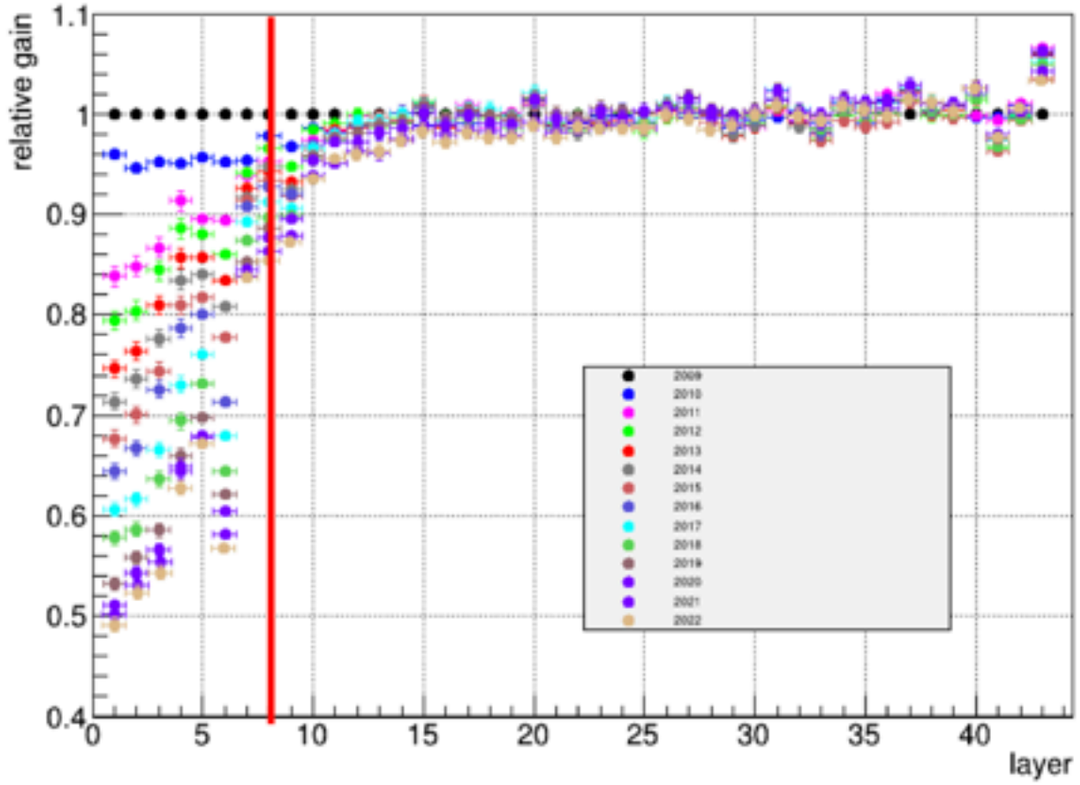
- Aggiunta cavità risonante
- Migliorare l'ottica per incrementare il numero di pacchetti
- Sfida: aumento intensità del fascio e background del rivelatore

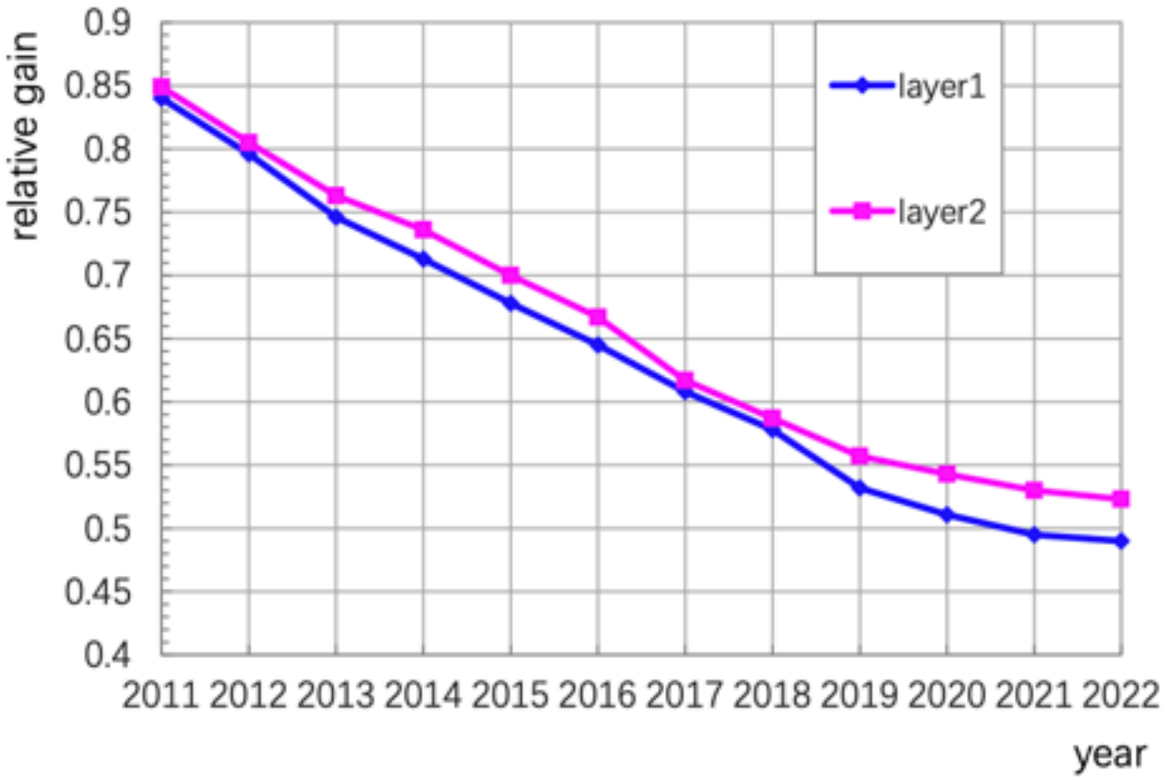


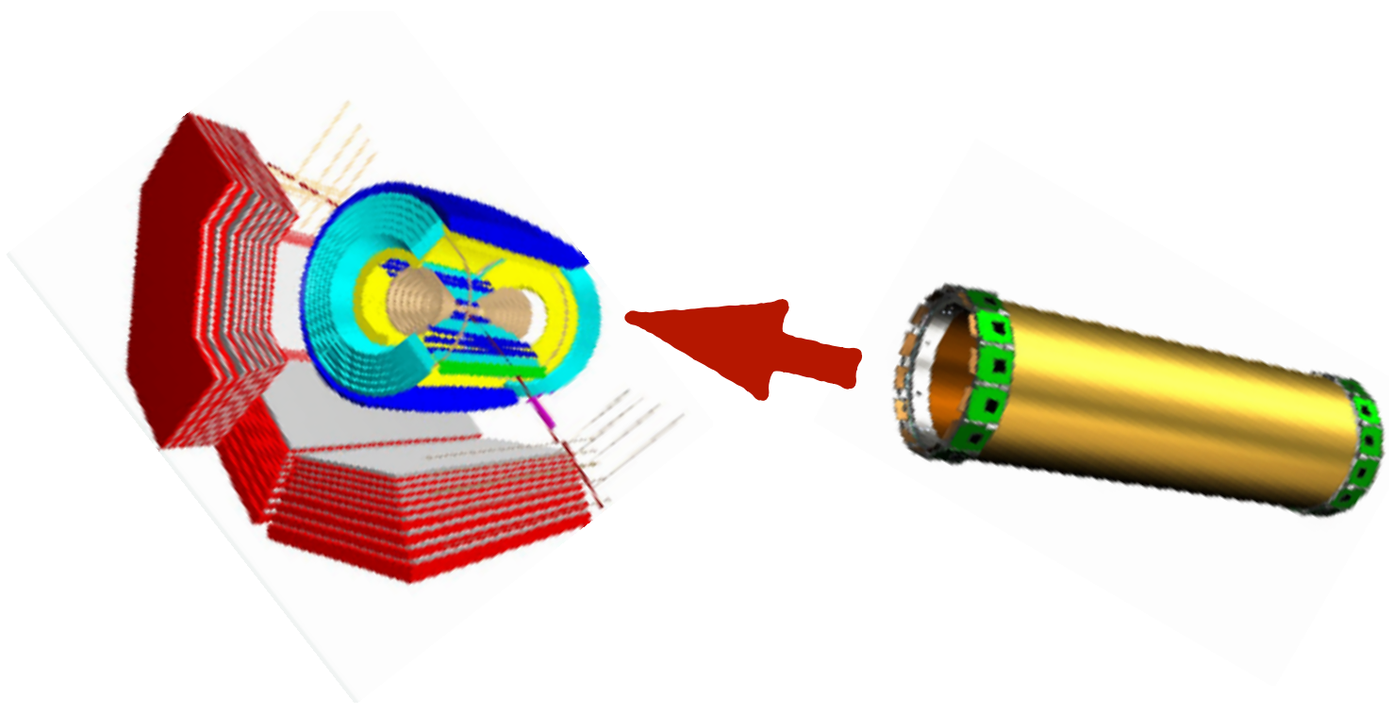
- XYZ states
- charmed baryon/meson pairs
- Hadronic FF
- CP violation in charmed baryon decays

Stato dell'esperimento

Inner MDC:





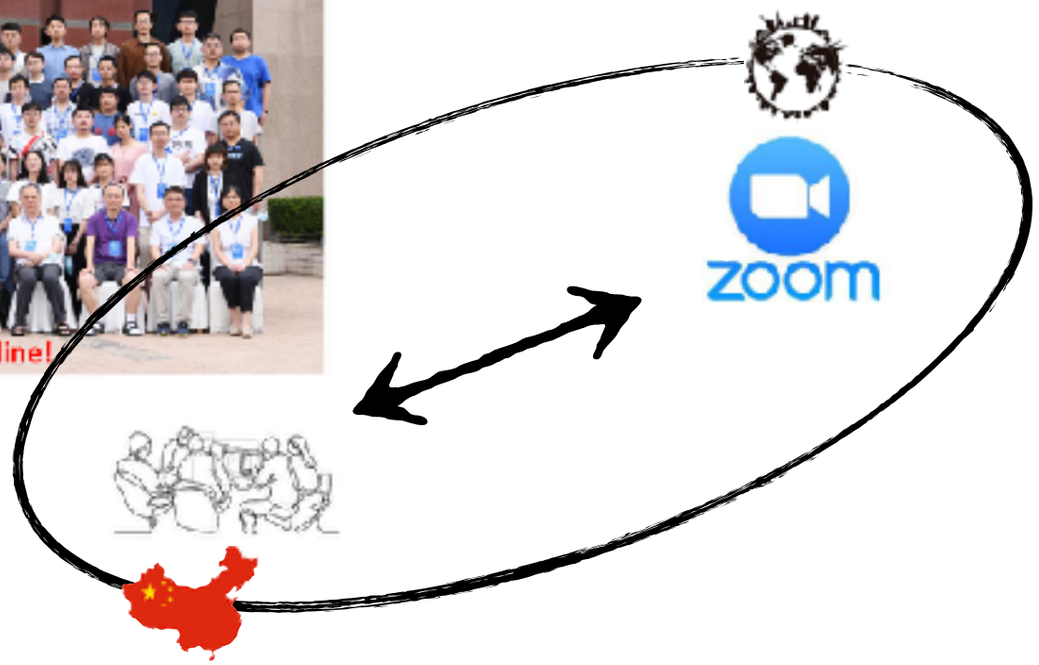


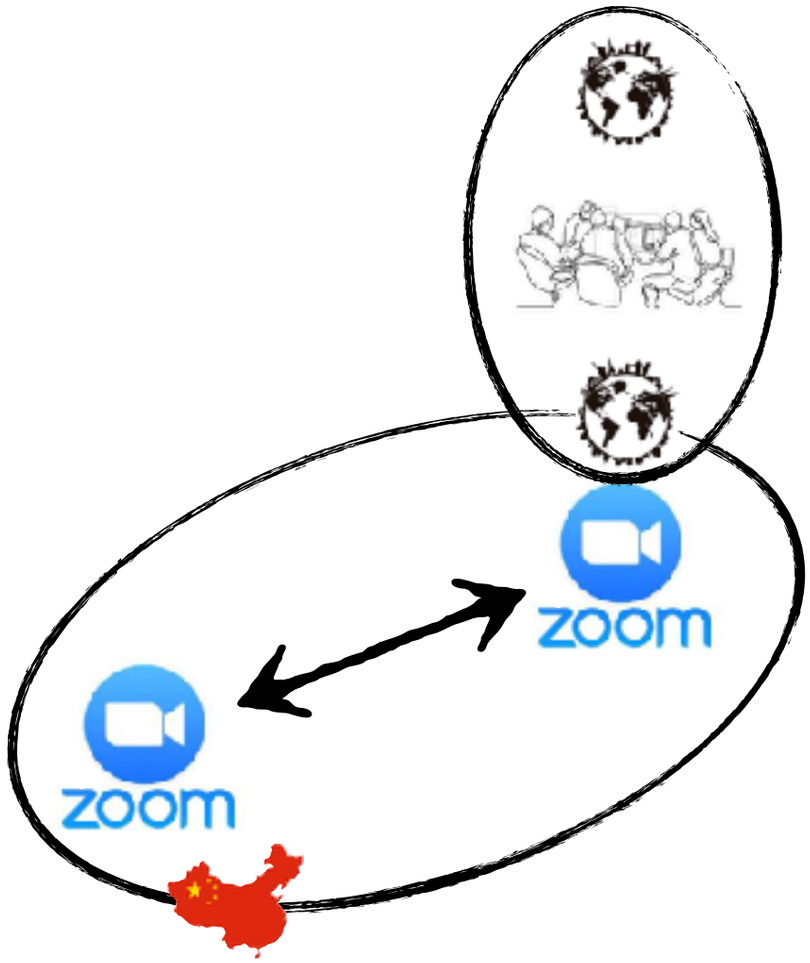
CGEM project

Luglio-Dicembre 2024

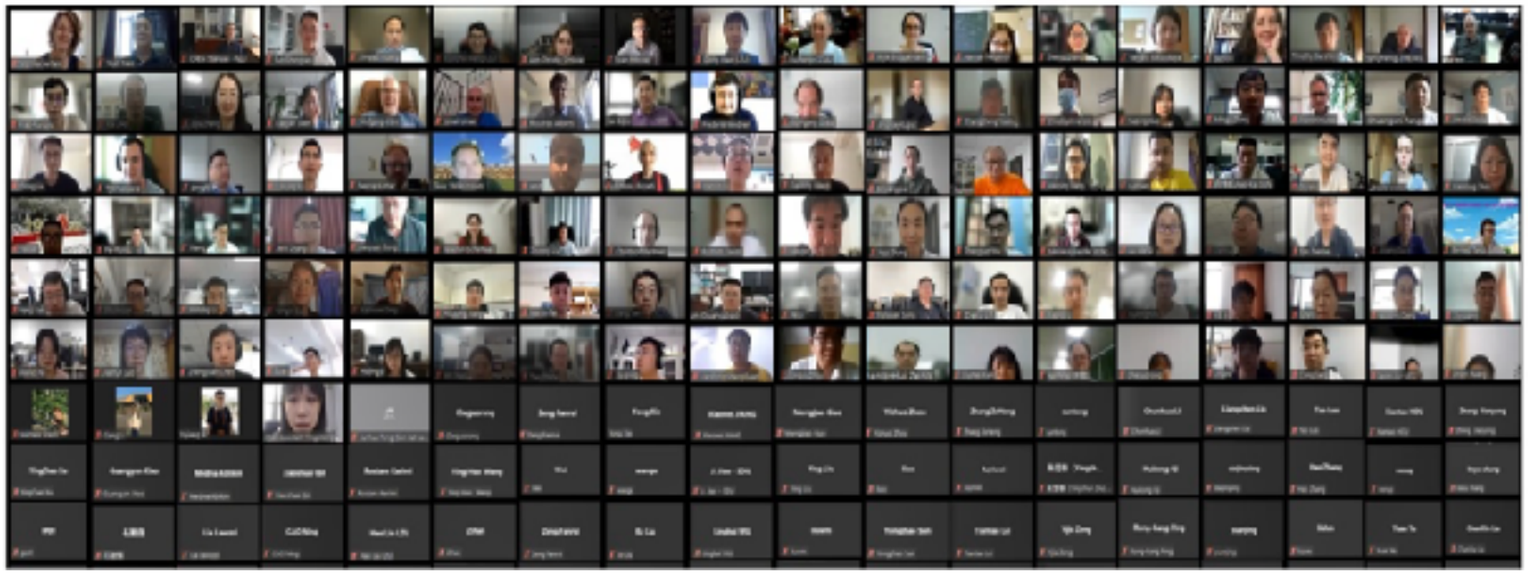
(presa dati fino al 2030)

Impatto COVID - 19 su BESIII





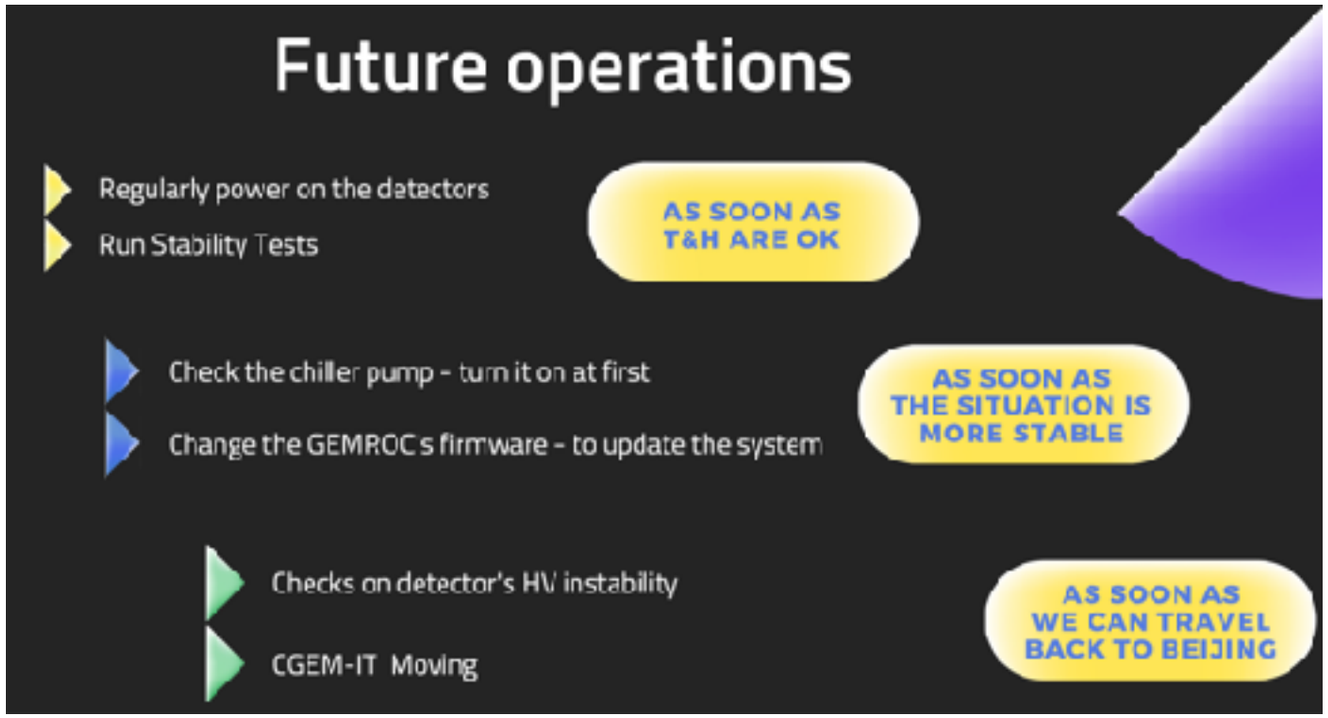
BESIII Collaboration Meeting in Summer 2022
June 13-17, 2022, ONLINE



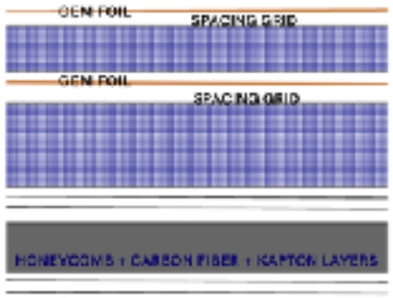
Attività 2023: hardware (I)

- Layer1&2 @ Beijing (ultima accensione 13 Aprile 2022)

Appena ci sarà la possibilità di rientrare a Beijing: operazioni per il mantenimento, integrazione e commissioning



- Disegno e costruzione Layer3: situazione attuale



Drop test

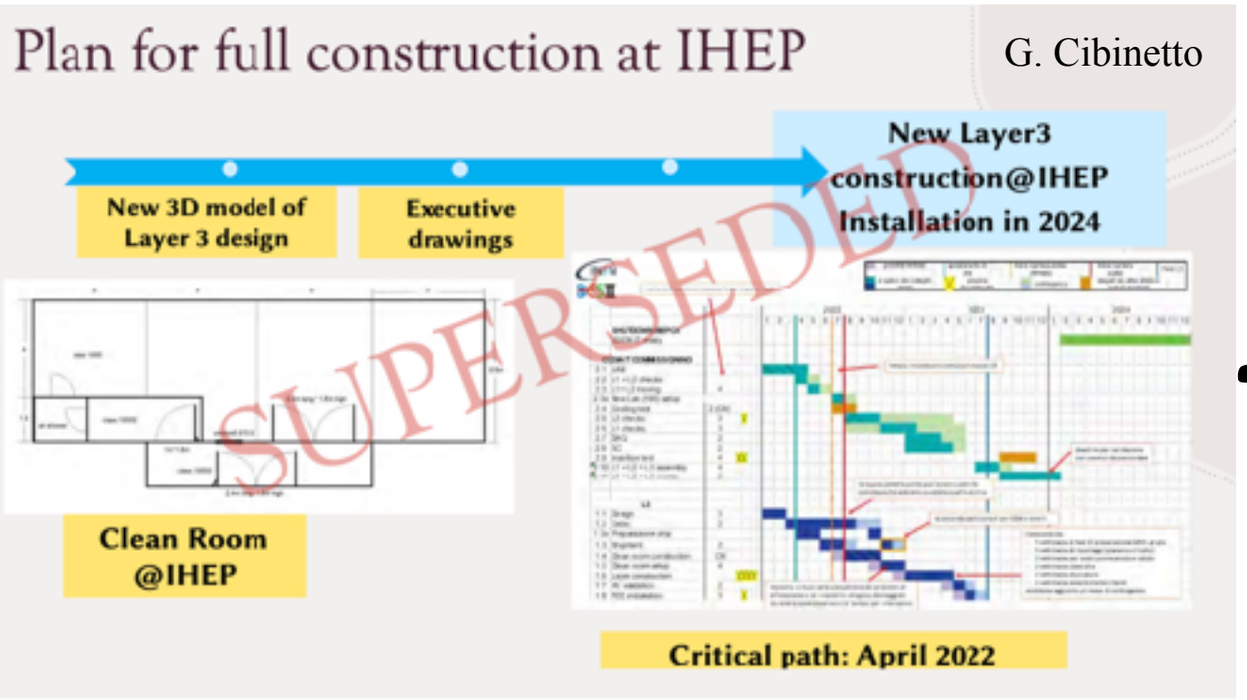
CT Scan

Attività 2023: hardware (1)

- Costruzione Layer3: piani per il 2023

Plan for full construction at IHEP

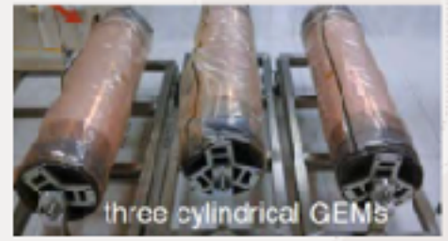
G. Cibinetto

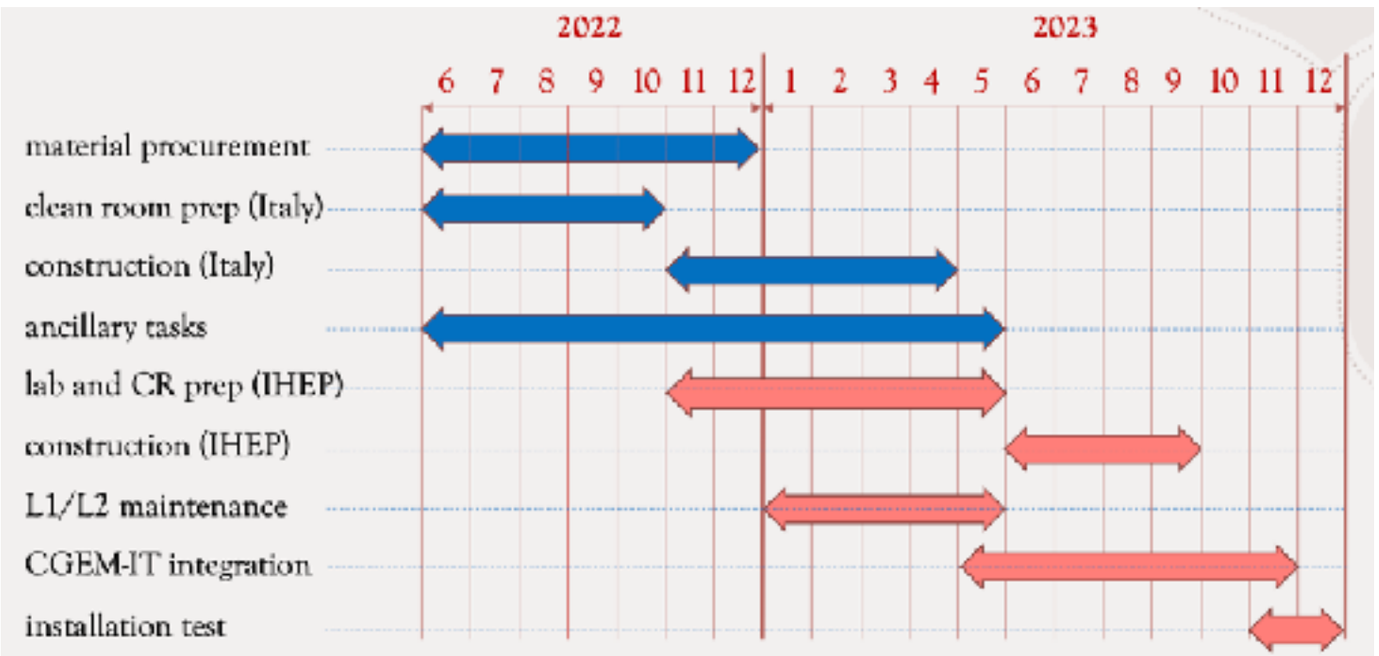


Hybrid construction

- Single cylindrical elements built in Italy
  - Early 2023
  - Clean Room options under discussion (about 25 m²)
- Vertical assembly at IHEP
  - Mid 2023
  - Upgrade of curren: Clean Room (NO enlargement needed)
  - Upgrade of the vertical tool alignment system needed

International Travels must be restored by end of 2022

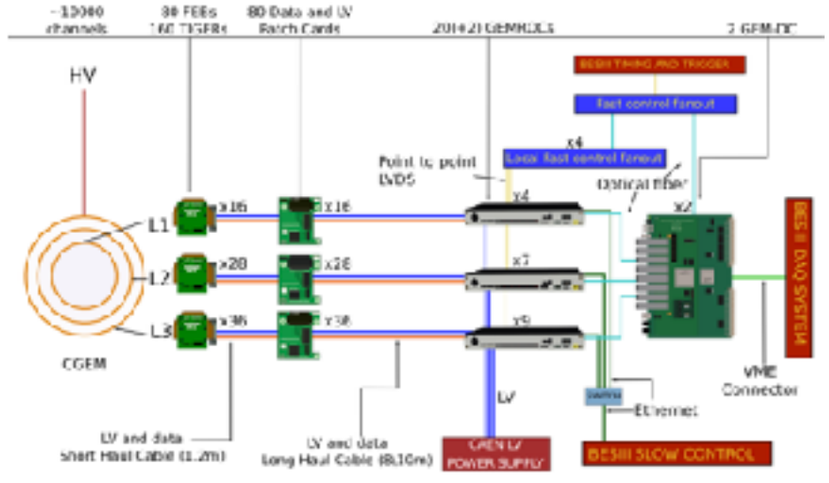




Attività 2023: elettronica e software (II)

ELETTRONICA

- Preparare le GEMROC necessarie per completare la catena di lettura
  - sostituzione ArrivaV GX development kit
- Finalizzazione dei disegni dei racks per l'installazione dei moduli GEMROC e cavi nella hall di BESIII
- Sistema FCS FANOUT modulare basato sulle GEMROC: verrà testato prima in Italia e successivamente a Beijing

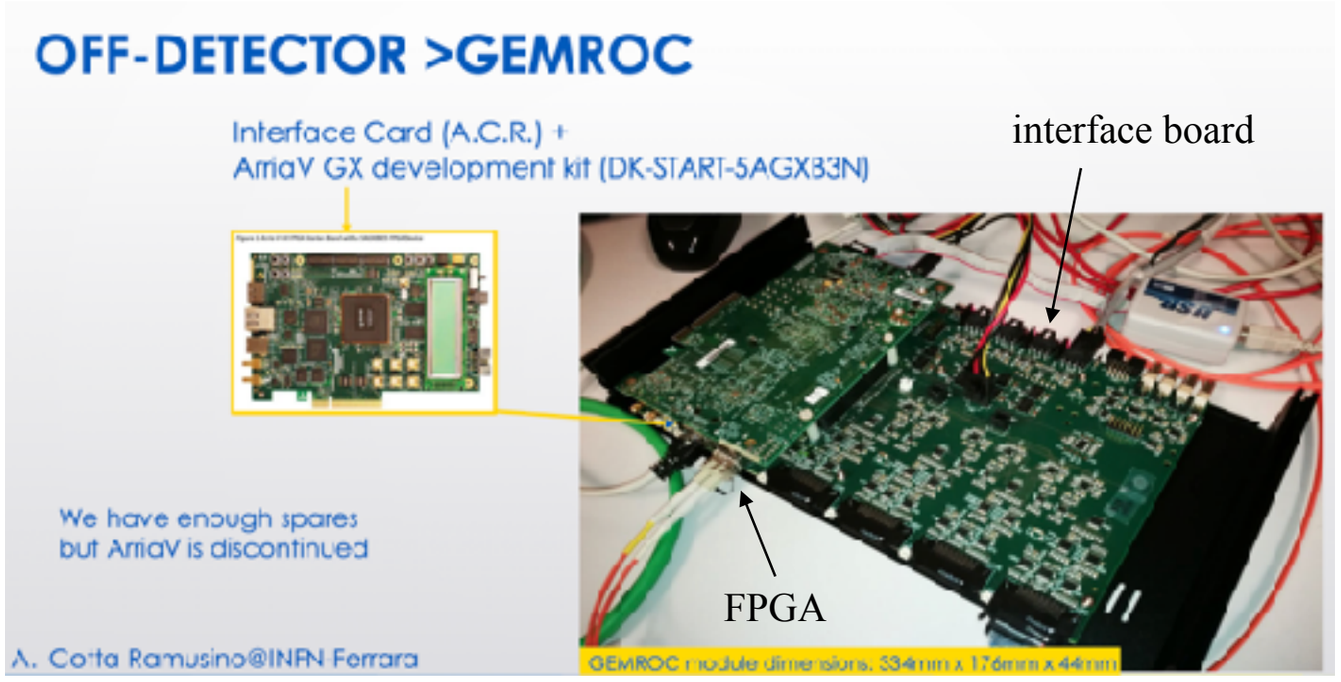


DATA TAKING

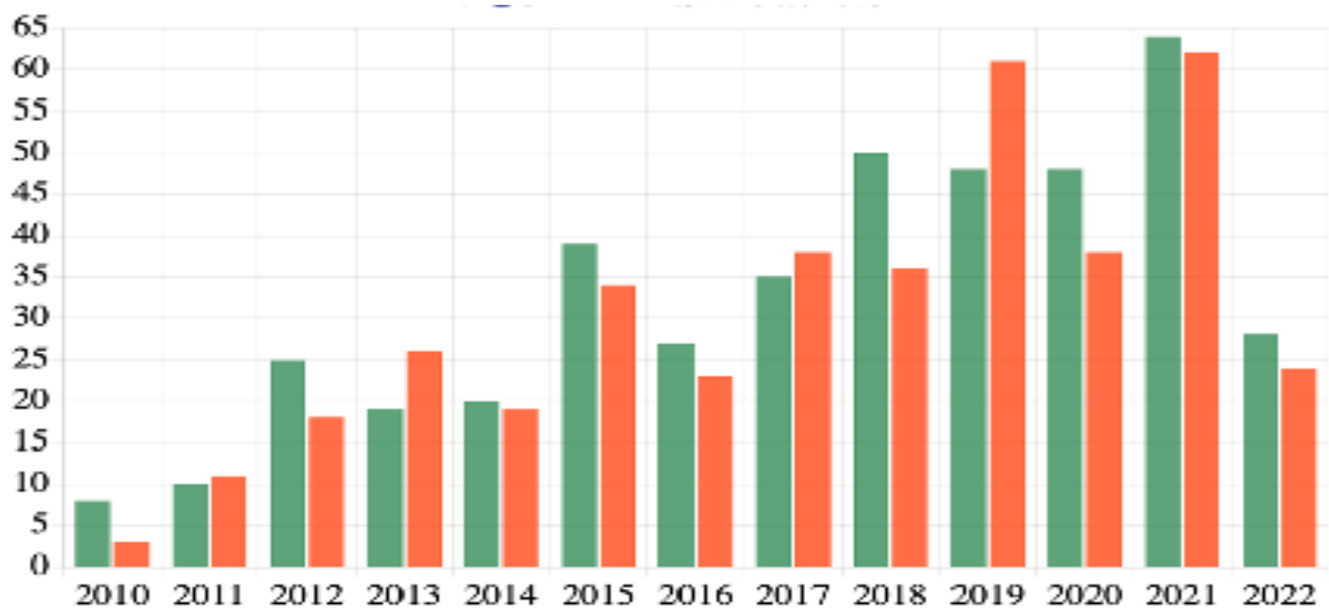
- Presa dati: **online** o in presenza?

SOFTWARE

- Aggiornamento geometria L3
- Test e debug del software di tracciamento
- Calibrazioni temporali
- Ottimizzazione μTPC



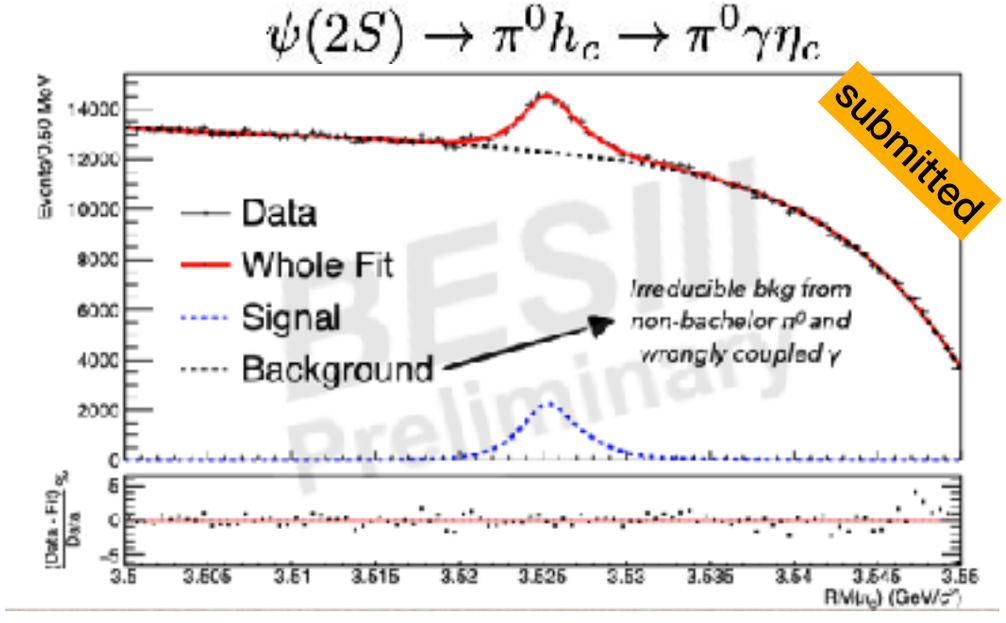
Attività 2022: analisi (III)



*ai primi di Giugno 2022
Sottomesse (2022): 23
Pubblicate (2022): 21

Physics Analysis ongoing from Ferrara group:

- **Relative phase for ψ(2S)**: finish the analysis for $e^+e^- \to J/\psi\pi\pi$ (advanced state) and then proceed to other analysis sharing the task with the Collaboration
- **Charmonium**:
  - Measurement of h_c mass and width: **submitted on PRD**
  - Search for the Zc(4430) in Y(4460) decay: PhD thesis of M. Scodeggio
- **LFVU** with $\psi(2S) \to \tau\tau$
- **Search for hidden strangeness pentaquark**: use the recent collected data to improve the statistics



Richieste Finanziarie

Richieste per missioni

- **~ 100 k€**
  - riunioni di coordinamento CGEM, software, fisica; Collaboration Meeting; periodi lavoro fuori sede, …

Finanziamenti esterni

- **~ 100 k€** FEST-project MSCA-RISE 2019 (anni 2020-2023)

Costruzione ed apparati

- **~ 30 k€** - (soggetti a definizione progetto e preventivi)
  - costruzione e test

Grazie per l’attenzione

Tecnologi: Anagrafica 2022

	Cognome	Nome	Qualifica	Responsabilità	BESIII	
Tec. Elec.	Cotta Ramusino	Angelo	tecnologo		0.1	
Tec. Elec.	Chiozzi	Stefano	tecnico		0.1	
Tec. Elec.	Malaguti	Roberto	tecnico		0.1	
Tec. Elec.	Magnani	Andrea	tecnico		0.2	
Tec. Elec.	Neri	Ilaria	tecnico		0.1	**tot=0.6**
Tec. Mech.	Carassiti	Vito	tecnologo		0.2	
Tec. Mech.	Cavallina	Michele	tecnico		0.1	
Tec. Mech.	Melchiorri	Michele	tecnico	responsabile meccanica	0.2	**tot=0.5**

Totale (Phys+tec.)	**6.45** (6.65 per 2021)
Totale solo Phys.	**5.35** (5.45 per 2021)

Attività 2022 (III)

M. Scodeggio
PhD thesis

What and Why

Study of two exotic states through the chain

$e^+e^- \rightarrow (\Upsilon(4660) \rightarrow) Z_c(4430)\,\pi \rightarrow \psi(2S)\,\pi\,\pi \rightarrow J/\psi\,\pi\,\pi\,\pi\,\pi \rightarrow 2\ell\,4\pi$

$Z^+_c(4430)$ was **observed** and studied in the B meson decays in the $\pi\psi(2S)$ invariant mass **by BELLE** [PRD **88**, 074026] (and by LHCb [PRL **112**, 222002])

$\Upsilon(4660)$, already **observed by BaBar** [PRD **89**, 111103(R)] and **BELLE** [PRD **91**, 112007], was **hypothesised** to be a **baryonium**

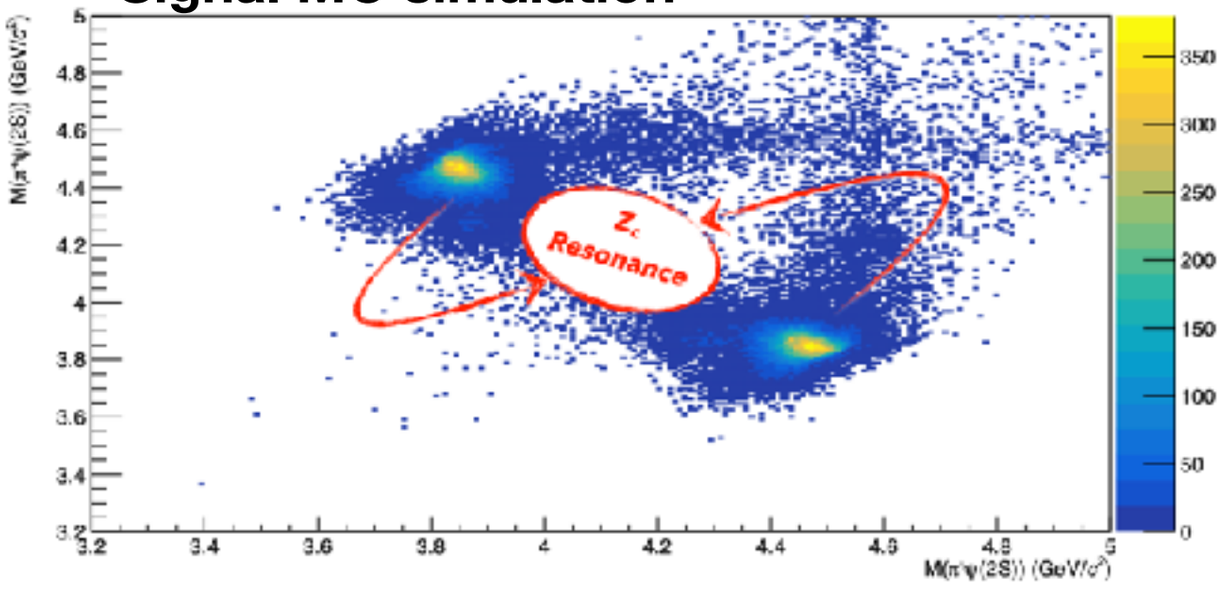
HOW

The study will make use of the **~5 fb^{-1}** data @$\sqrt{s}$ > 4.6 GeV

No $Z^+_c(4430)$ signal was observed in the mono-energetic datasets, so the main idea is to merge all the data @$\sqrt{s}$ > 4.6 GeV to use the whole statistics

- Optimization of event and track selection (almost done)
- Off-peak data sets and background studies
- Systematic uncertainties

Signal MC simulation



ARRIAV GX >CANDIDATES FOR REPLACEMENT

1) **Cyclone V GT dev. kit Intel DK-DEV-5CGTD9N:**
   - onboard FPGA: 5CGTFD9E5F35C7N; year launched: 2011; TSMC's 28nm technology
   - Status: active; cost: 1.162,73€ (current, Digikey)
   - *porting of GEMROC FPGA firmware (A.C.R.): fits with timing closure warnings*

2) **Cyclone V SX SoC dev. kit Critical Link MitySOM-5CSX:**
   - onboard FPGA: 5CSXFC6C6U23C7N (SoC); year launched: 2012
   - Status: active; cost: 804.69€ (current, Digikey)
   - *porting of GEMROC FPGA firmware (A.C.R.): unsuccessful due to insufficient I/O*

3) **Cyclone V SX SoC dev. kit Intel DK-DEV-5CSXC6N:**
   - onboard FPGA: 5CSXFC6D6F31C6N (SoC) ; year launched: 2011
   - Status: active; cost: 1.606,71€ (current, Digikey)
   - *porting of GEMROC FPGA firmware (A.C.R.): fits with timing closure warnings for more pessimistic timing corners*

4) **Cyclone 10 GX dev. kit Trenz TEI0006-03-220-5I:**
   - onboard FPGA: 10CX220YF780I5G; year launched: 2017; TSMC's 20nm technology
   - Status: active; cost: 498.00€ (current, Trenz)
   - accessory carrier board Trenz TEIB0006-02 cost: 179,00€ (current, Trenz)
   - *porting of GEMROC FPGA firmware (A.C.R.): in progress – needs Quartus Pro Edition*

5) **Cyclone 10 GX dev. kit Intel DK-DEV-10CX220-A:**
   - onboard FPGA: 10CX220YF780E5G; year launched: 2017; TSMC's 20nm technology
   - Status: active; cost: 1.074,12€ (current, Digikey)
   - *porting of GEMROC FPGA firmware (A.C.R.): in progress – needs Quartus Pro Edition*

Neither with the same footprint

Analysis of pros/cons

Detailed evaluation of fw porting

A solution with some compromises can be found