BESIII: DISCUSSIONE ALLA CSN1 DEL 13/09/20202

M.Bertani, riunione GR1 24/10/2022

BESIII

Michela Greco

CNS1, Arenzano, 13-9-2022

UNIVERSITÀ DI TORINO

INFN Istituto Nazionale di Fisica Nucleare SEZIONE DI TORINO

中國科學院高能物理研究所

Institute of High Energy Physics Chinese Academy of Sciences

INFN FERRARA Istituto Nazionale di Fisica Nucleare Sezione di Ferrara

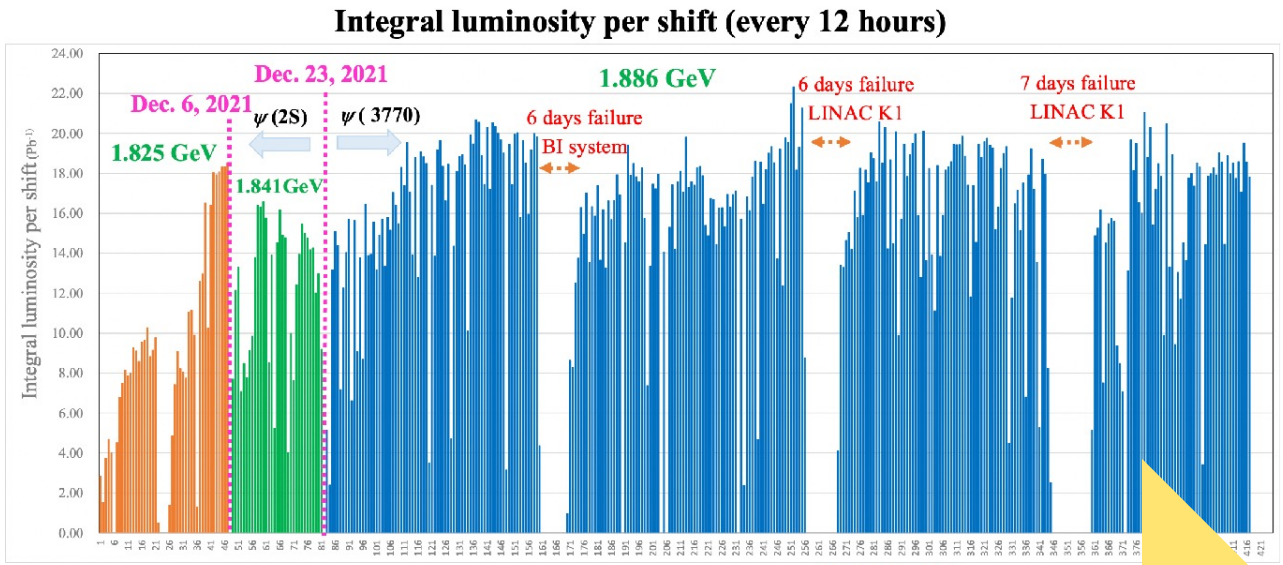
INFN Istituto Nazionale di Fisica Nucleare Laboratori Nazionali di Frascati

INFN PERUGIA

INFN TORINO Istituto Nazionale di Fisica Nucleare Sezione di Torino

DATA TAKING 2021-2022

@Chenghui YU



psi(2S) physics

✓@3.65 GeV : 400 pb^{-1}

✓ @3.682 GeV: 400 pb^{-1}

✓ psi(3770) data-taking > 5.2 fb^{-1}

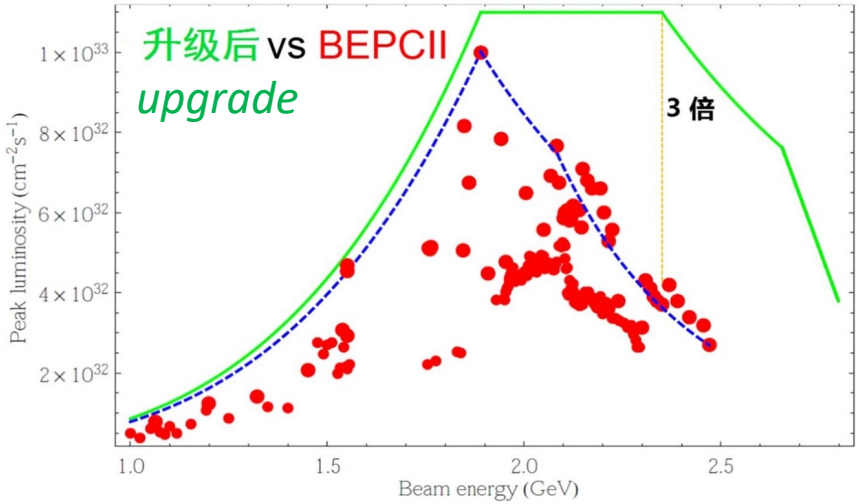
All goals for data taking in 2022 were achieved

Summer shutdown:

maintenance to improve reliability of LINAC and feedback system

2023-2024

psi(3770) data-taking >12 fb^{-1} before BEPCII Upgrade in July 2024

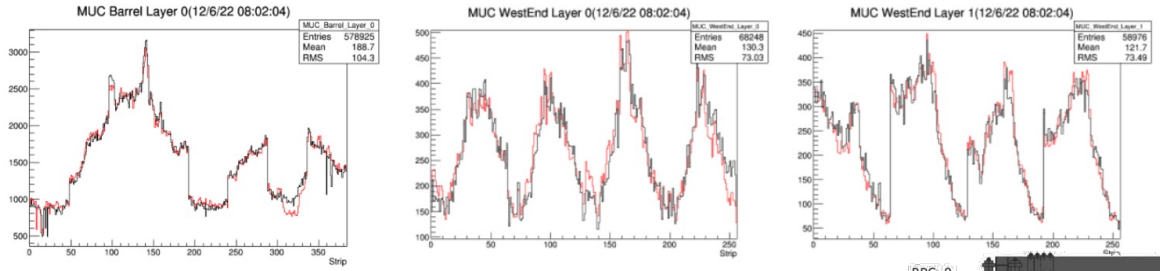


DETECTOR STATUS

Efficiencies/resolutions of all sub-detectors are good

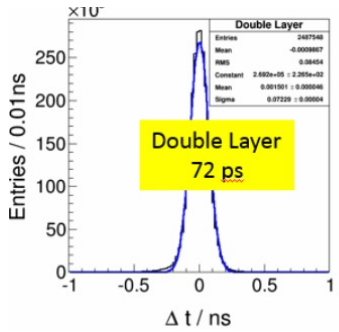
MUC

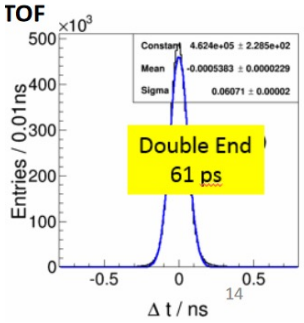
run smoothly during data taking, after a small fix in HV
Efficiency of all modules is fine. Two new LV crates will be used.

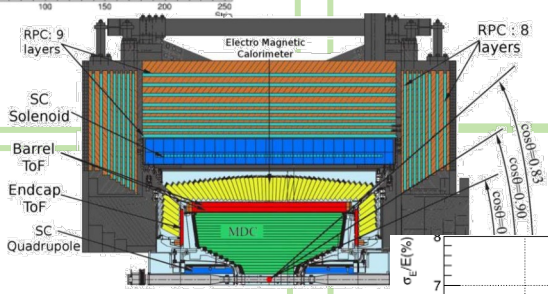


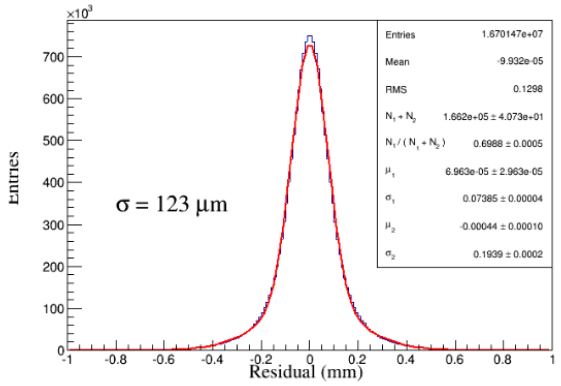
TOF

BTOF run smoothly. The current of one ETOF channel was unstable.
The performance is comparable to last year







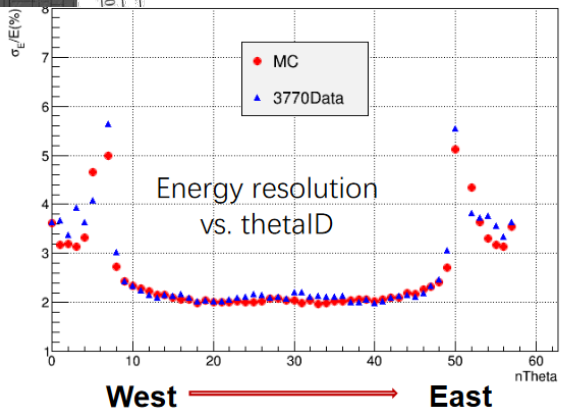


MDC

worked stably during data taking, even at high beam current of 900 mA

Noise fluctuations

Aging of inner layers



EMC

The temperature and humidity were well controlled
EMC crystal modules worked well
Good performance
New electronics modules will be tested

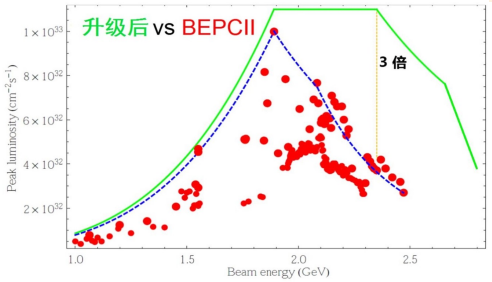
M. DONG

>2024 BEPCII UPGRADE

BEPC 1989-2005
Lpeak=1.0x10^{31}cm^{-2}s^{-1}
Ecm=2.0-4.2 GeV

BEPCII 2008-now
Lpeak=1.0x10^{33}cm^{-2}s^{-1}
Ecm=2.0-4.95 GeV

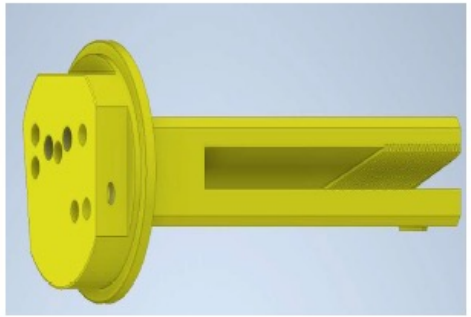
BEPCII-U > 2024
Lx3 @ 2.35 GeV
Ecm=2.0-5.6 GeV



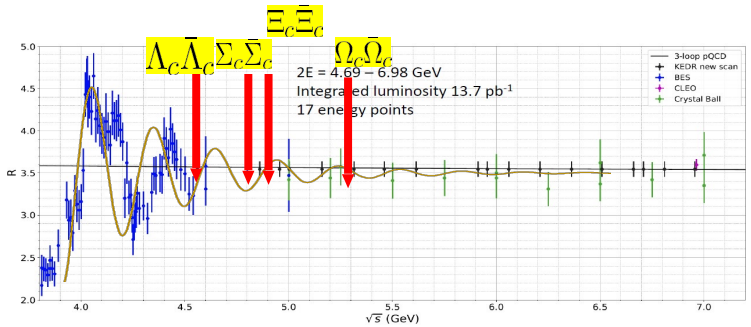
- 500 MHz RF Cavity is in fabrication
- Coupler & Cryostat are in fabrication

- Helium Refrigerator will start procurement next month

- Photon absorber CuCrZr type is in fabrication

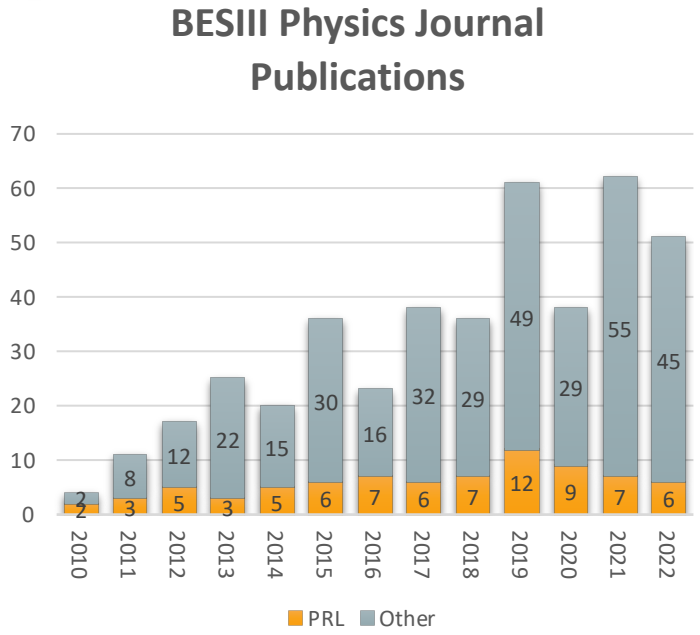


@Yfang WANG



Unique data @ thresholds
➢ XYZ states
➢ Entangled productions for charmed baryon/meson pairs
➢ CP violation in charmed baryon decays
➢ Hadronic form factors

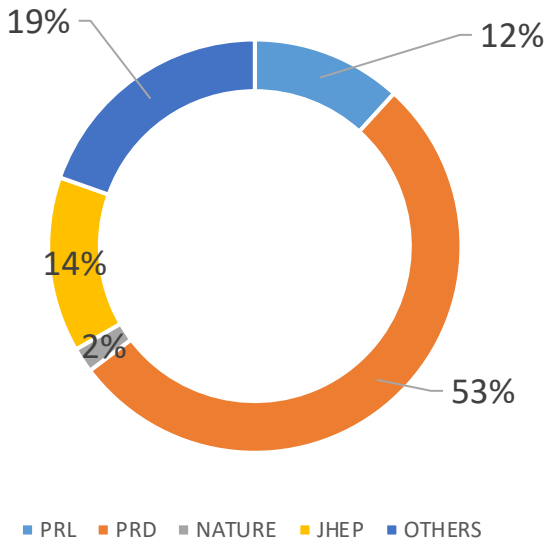
PUBLICATIONS



	A100	A75	A50	A25	R1	R2-PC	R2-CWR
PRL (6)						1	1
NATURE (1)						1	
PRD (27)					1	4	5
JHEP (7)						4	2
Others (10)						3	2

51

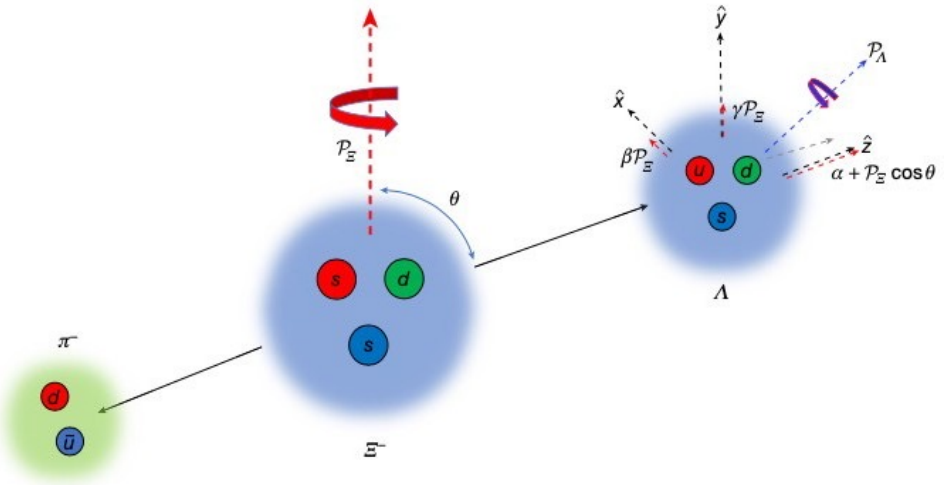
20



YEAR	CWR	EDITING	DONE	TOTAL
2022 (6/12 Mo.)	12	12	18	42
2021	1	2	75	78
2020	1	0	51	52
2019	0	0	45	45

Probing CP symmetry and weak phases with entangled double-strange baryons

Nature https://doi.org/10.1038/s41586-022-04624-1
June 1, 2022

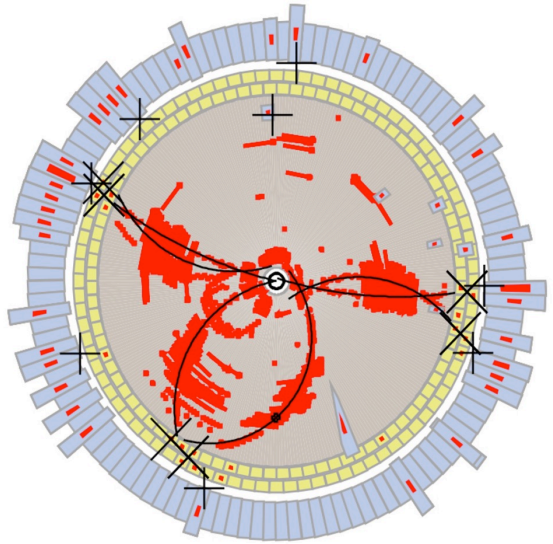


- ✓ First measurement of polarization
- ✓ First direct determination of all Ξ decay parameters
- ✓ First extraction of weak phase difference from baryon weak decays

The recent observations of hyperon polarisations at BESIII opens a new window for testing CP violation, as it allows for simultaneous production and detection of hyperon and anti-hyperon pair two body weak decays.
The CP-symmetry tests can be performed in processes like e.g.

$J/\psi \to \Lambda\bar{\Lambda}$, $J/\psi \to \Sigma\bar{\Sigma}$, $J/\psi \to \Xi\bar{\Xi}$. For the $\Xi \to \Lambda\pi$ decay it is possible to perform two independent CP tests and determine the strong phase and weak phase separetly.

R2



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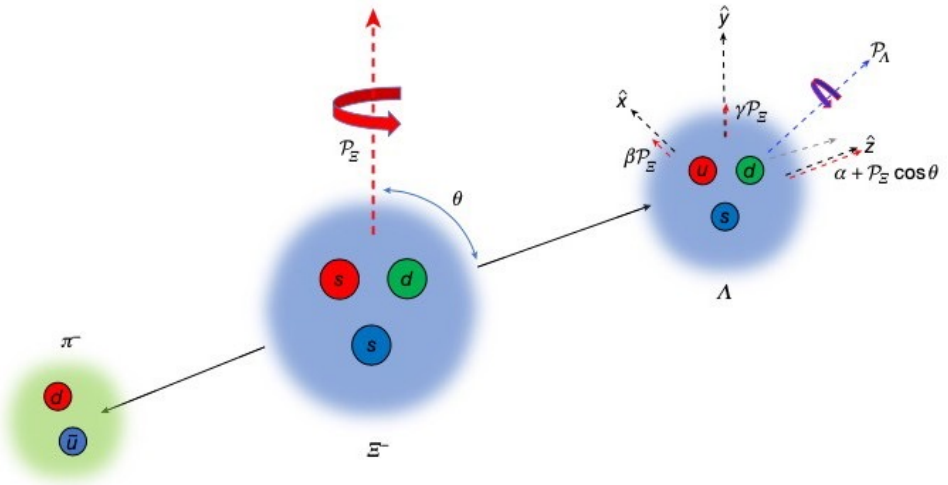
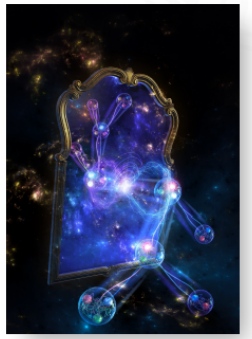


$$e^+e^- \to \Xi^-\bar{\Xi}^+, \Xi^- \to \Lambda\pi^-, \Lambda \to p\pi^-, \bar{\Xi}^+ \to \bar{\Lambda}\pi^+, \bar{\Lambda} \to \bar{p}\pi^+$$

$$A_{CP}^{\Xi} = \frac{\alpha_\Xi + \bar{\alpha}_\Xi}{\alpha_\Xi - \bar{\alpha}_\Xi} \approx -\sin\langle\phi_\Xi\rangle \frac{\sqrt{1-\alpha_\Xi^2}}{\alpha_\Xi} \tan(\xi_P - \xi_S)_\Xi \; *$$

$$\Delta\phi_{CP} = \frac{\phi_\Xi + \bar{\phi}_\Xi}{2} \approx \cos\langle\phi_\Xi\rangle \frac{\alpha_\Xi}{\sqrt{1-\alpha_\Xi^2}} \tan(\xi_P - \xi_S)_\Xi \; *$$



strong contribution $\phi_\Xi \approx 0$ weak phase diff - potentially CPV

$\Delta\phi_{CP}$ more sensitive to CP-violating effects cf A_{CP}^{Ξ}* * Phys. Rev Lett 55 162 (1985)

- ✓ First measurement of polarization
- ✓ First direct determination of all Ξ decay parameters
- ✓ First extraction of weak phase difference from baryon weak decays

- The formalism exploits polarisation, entanglement and sequential decays * **

$$\mathcal{W}(\boldsymbol{\xi};\boldsymbol{\omega}) = \sum_{\mu,\nu=0}^{3} C_{\mu\nu} \sum_{\mu'\nu'=0}^{3} a_{\mu\mu'}^{\Xi} a_{\nu\nu'}^{\bar{\Xi}} a_{\mu'0}^{\Lambda} a_{\nu'0}^{\bar{\Lambda}}$$

UPPSALA UNIVERSITET

- Nine-dimensional phase space given by nine helicity angles
- Eight free parameters determined by maximum log likelihood method:

$\alpha_\psi, \Delta\Phi, \alpha_\Xi, \bar{\alpha}_\Xi, \phi_\Xi, \bar{\phi}_\Xi, \alpha_\Lambda, \bar{\alpha}_\Lambda$

not measured before

Probing CP symmetry and weak phases with entangled double-strange baryons

- ✓ *First measurement of polarization*
- ✓ *First direct determination of all Ξ decay parameters*
- ✓ *First extraction of weak phase difference from baryon weak decays*

$\xi_P - \xi_S = (1.2 \pm 3.4 \pm 0.8) \times 10^{-2}$ rad
SM expectation: $(1.8 \pm 1.5) \times 10^{-4}$ rad

- ✓ *Three (two independent) CP tests*

$$\phi_{\Xi,HyperCP} = -0.042 \pm 0.011 \pm 0.011$$
$$\langle \phi_{\Xi,BESIII} \rangle = 0.016 \pm 0.014 \pm 0.007$$

same precision for ϕ as HyperCP
with *three orders of magnitude* smaller data sample!

Parameter	This work	Previous result	
α_ψ	0.586±0.012±0.010	0.58±0.04±0.08	PRD 93, 072003 (2018)
$\Delta\Phi$	1.213±0.046±0.016 rad	–	
α_Ξ	−0.376±0.007±0.003	−0.401±0.010	PDG 2020
ϕ_Ξ	0.011±0.019±0.009 rad	−0.037±0.014 rad	PDG 2020
$\bar{\alpha}_\Xi$	0.371±0.007±0.002	–	
$\bar{\phi}_\Xi$	−0.021±0.019±0.007 rad	–	
α_Λ	0.757±0.011±0.008	0.750±0.009±0.004	BESIII, Nat. Ph. 15, 631 (2019)
$\bar{\alpha}_\Lambda$	−0.763±0.011±0.007	−0.758±0.010±0.007	
$\xi_P - \xi_S$	$(1.2 \pm 3.4 \pm 0.8) \times 10^{-2}$ rad	–	
$\delta_P - \delta_S$	$(-4.0 \pm 3.3 \pm 1.7) \times 10^{-2}$ rad	$(10.2 \pm 3.9) \times 10^{-2}$ rad	PRL 93, 011802 (2004)
A_{CP}^{Ξ}	$(6 \pm 13 \pm 6) \times 10^{-3}$	–	
$\Delta\phi_{CP}^{\Xi}$	$(-5 \pm 14 \pm 3) \times 10^{-3}$ rad	–	
A_{CP}^{Λ}	$(-4 \pm 12 \pm 9) \times 10^{-3}$	$(-6 \pm 12 \pm 7) \times 10^{-3}$	BESIII, Nat. Ph. 15, 631 (2019)
$\langle \phi_\Xi \rangle$	0.016±0.014±0.007 rad		

ITALIAN ANALYSES

Relative Phase of Charmonia:

- Measurement of the phase between Strong and Electromagnetic J/ψ → $p\bar{p}$ decay amplitudes (internal review committee)
- Measurement of the Branching Ratio of J/psi -> K+K- via psi(2S) -> pi+pi- J/psi (internal review committee)
- Measurement of the relative phase between strong and electromagnetic decay amplitude of psi(2S) by means of e+e- → pi pi J/psi final state
- Measurement of the BR(J/psi → $\omega\pi^0$)

Started collaboration with IHEP and USTC groups (China) to expand analyses to other final states ($\Sigma^0\Sigma^0$, $\Sigma^+\Sigma^-$, $\Lambda\Lambda$)

Chamonium spectroscopy and decay

- Inclusive Measurements of the hc(1 1P1) in the psi(2S) Decay (accepted by PRD)
- Lepton Flavour Universality Violation test with psi(2S) → tau tau
- ψ(2S) → ππJ/ψ, J/ψ → KK
- J/ψ → $\omega\pi^0$: measurement of possible G-parity contribution (phase measurement under study)

Exotics:

- Search for $Z_c(4430)$ tetraquark in e^+e^- → ππψ(2S) invariant mass
- Search for hidden-strangeness pentaquark

Convener light hadron physics> I.Garzia
Italian coordination of a working group on phase, inside BESIII R/τ/QCD working group >F. De Mori

Open Access Article

Theoretical and Experimental Essentials on Baryon Form Factors

by Monica Bertani [1], Alessio Mangoni [2] and Simone Pacetti [2,3,*]

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[2] INFN Sezione di Perugia, 06100 Perugia, Italy
[3] Dipartimento di Fisica e Geologia, Università di Perugia, 06100 Perugia, Italy
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Open Access Review

The CGEM-IT: An Upgrade for the BESIII Experiment

by Ilaria Balossino [1,2], Fabio Cossio [3,*], Riccardo Farinelli [2] and Lia Lavezzi [3,4]

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[3] INFN-Sezione di Torino, 10125 Turin, Italy
[4] Dipartimento di Fisica, Università di Torino, 10125 Turin, Italy
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(This article belongs to the Special Issue Upgrades in High Energy Physics Experiments)

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High Energy Physics - Experiment ACCEPTED BY PRD

[Submitted on 20 Apr 2022]

Study of the $h_c(1^1P_1)$ meson via $\psi(2S) \to \pi^0 h_c$ decays at BESIII

BESIII Collaboration: M. Ablikim, M. N. Achasov, P. Adlarson, M. Albrecht, R. Aliberti, A. Amoroso, M. R. An, Q. An, X. H. Ba
M. Bertani, D. Bettoni, F. Bianchi, J. Bloms, A. Bortone, I. Boyko, R. A. Briere, A. Brueggemann, H. Cai, X. Cai, A. Calcaterra
Chen, S. J. Chen, T. Chen, X. R. Chen, X. T. Chen, Y. B. Chen, Z. J. Chen, W. S. Cheng, G. Cibinetto, F. Cossio, J. J. Cui, H
De Mori, Y. Ding, J. Dong, L. Y. Dong, M. Y. Dong, X. Dong, S. X. Du, P. Egorov, Y. L. Fan, J. Fang, S. S. Fang, Y. Fang, R. F
Gao, Yang Gao, S. Garbolino, I. Garzia, P. T. Ge, Z. W. Ge, C. Geng, E. M. Gersabeck, A Gilman, K. Goetzen, L. Gong, W. X
not shown)

Using 448 million $\psi(2S)$ events, the spin-singlet P-wave charmonium state $h_c(1^1P_1)$ is studied via the $\psi(2S) \to \pi^0 h_c$ decay followed t
$\mathcal{B}_{\rm Inc}(\psi(2S) \to \pi^0 h_c) \times \mathcal{B}_{\rm Tag}(h_c \to \gamma\eta_c) = (4.17^{+0.27}_{-0.25} \pm 0.19) \times 10^{-4}$, $\mathcal{B}_{\rm Inc}(\psi(2S) \to \pi^0 h_c) = (7.23 \pm 0.33 \pm 0.38) \times 10^{-4}$, ar
$h_c(1^1P_1)$ mass and width are determined to be $M = (3525.32 \pm 0.06 \pm 0.15)\ {\rm MeV/c^2}$ and $\Gamma = (0.78^{+0.27}_{-0.24} \pm 0.12)\ {\rm MeV}$. Using the
be $\Delta_{\rm hyp} = M(h_c) - M({\rm c.o.g.}) = (0.03 \pm 0.06 \pm 0.15)\ {\rm MeV/c^2}$, which is consistent with the expectation that the $1P$ hyperfine spl

Subjects: **High Energy Physics - Experiment (hep-ex)**
Cite as: arXiv:2204.09413 **[hep-ex]**
(or arXiv:2204.09413v1 **[hep-ex]** for this version)
https://doi.org/10.48550/arXiv.2204.09413

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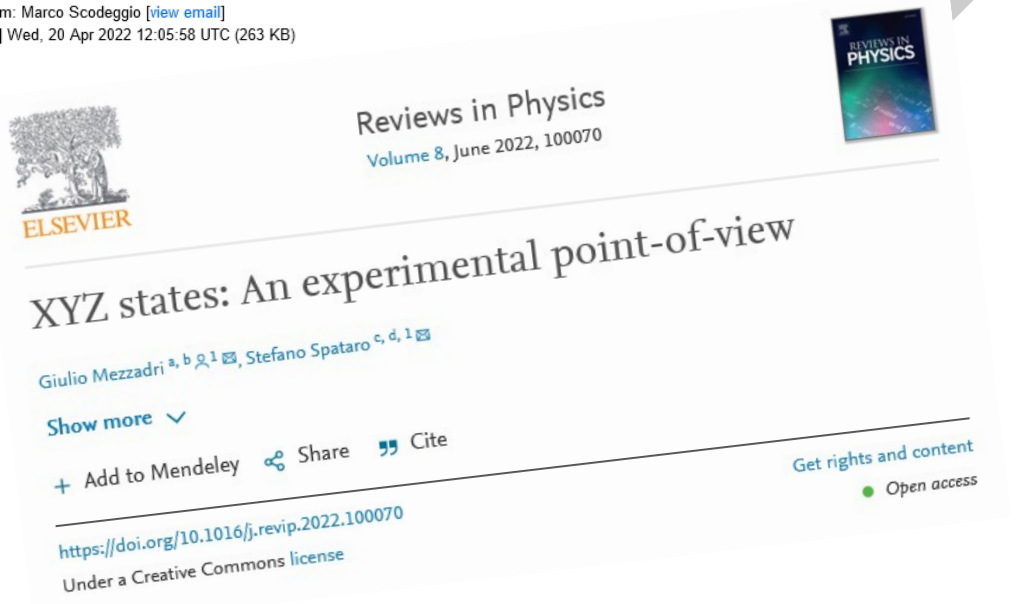
From: Marco Scodeggio [view email]
[v1] Wed, 20 Apr 2022 12:05:58 UTC (263 KB)



CGEM-IT

Build a cylindrical GEM Inner Tracker (CGEM-IT) to replace the BESIII Inner MDC as its performance is degraded by aging.

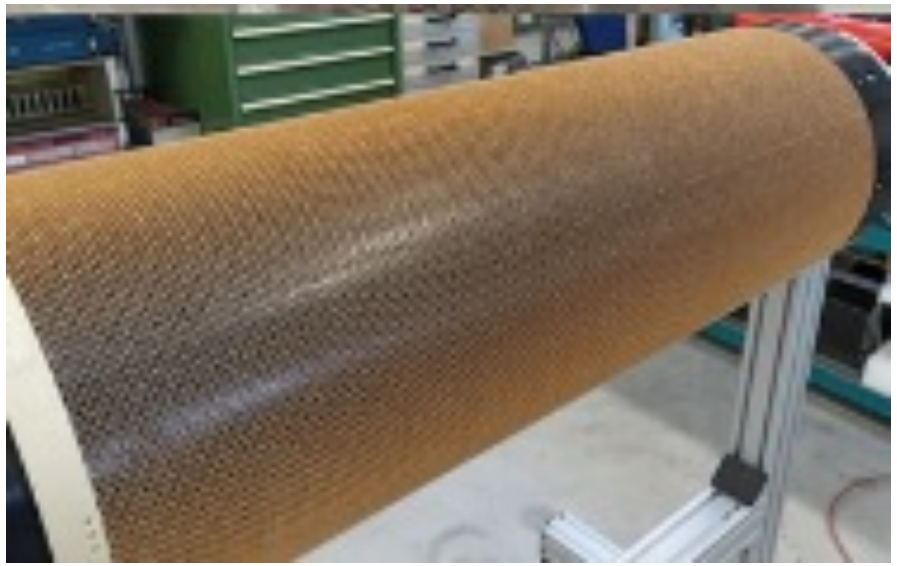
Match the Inner MDC tracking performance

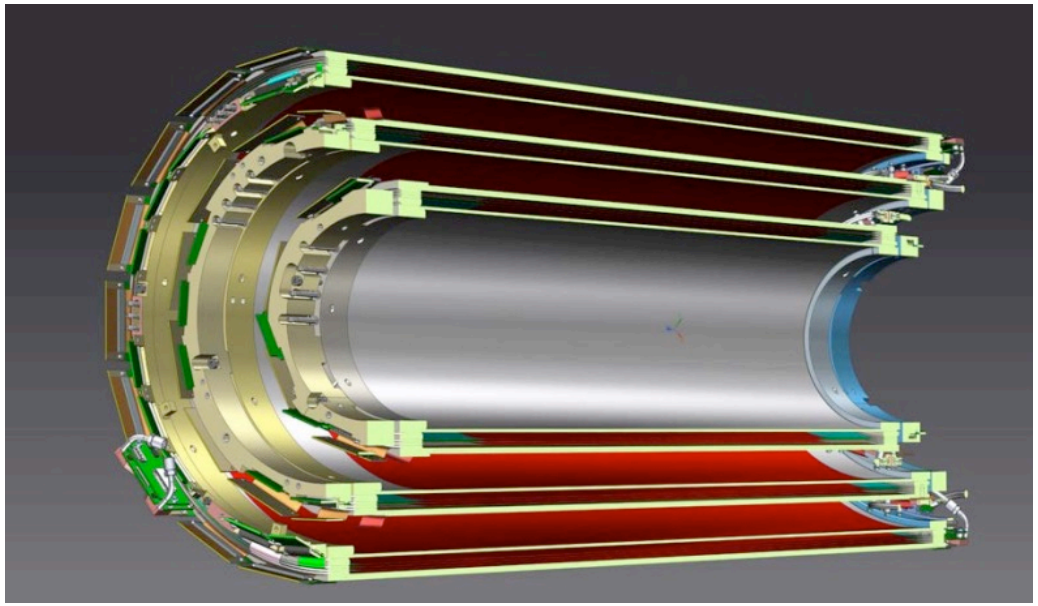
Improve the rate capability and radiation hardness

Improve z-resolution ~350 um

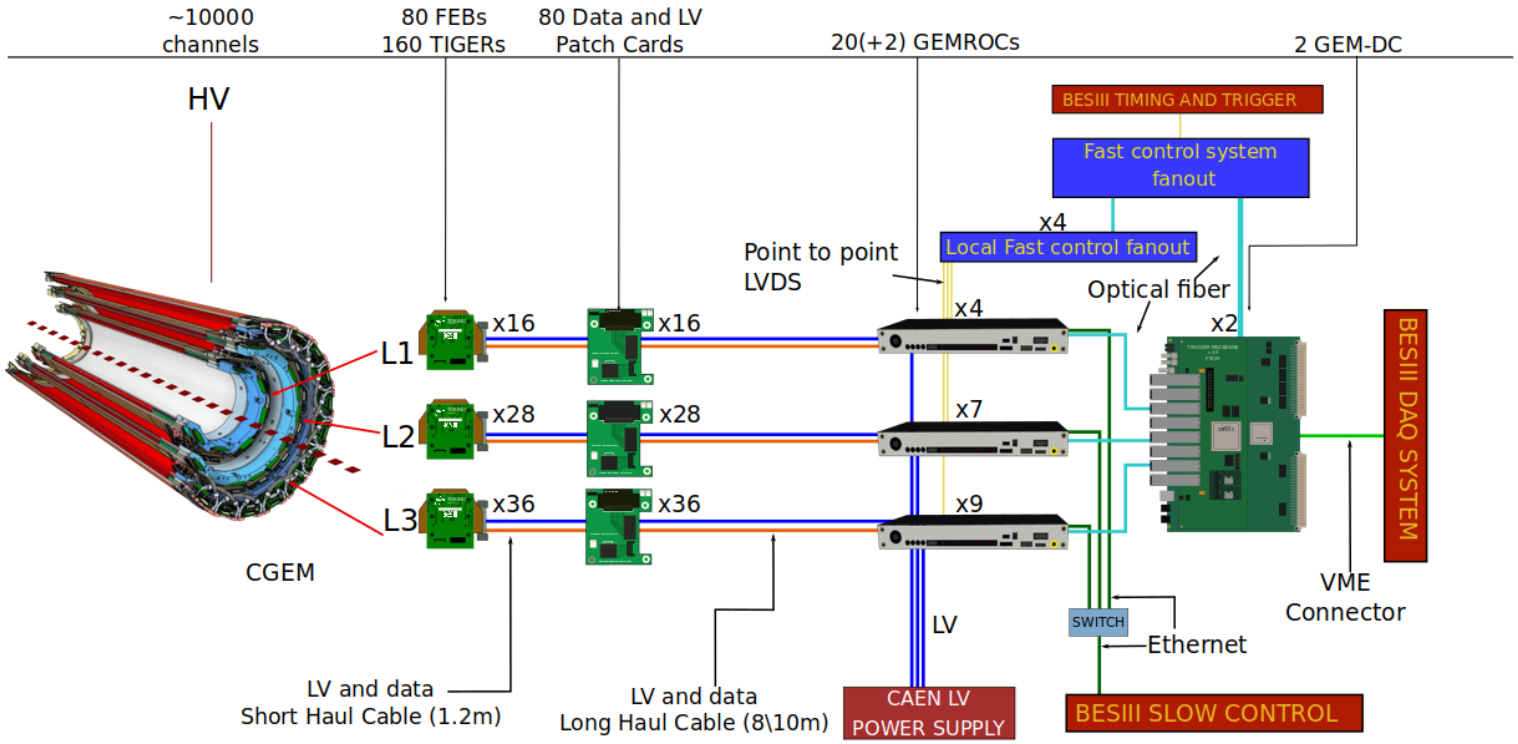
Possibility of further improvement of tracking performance with single-layer 3D tracking

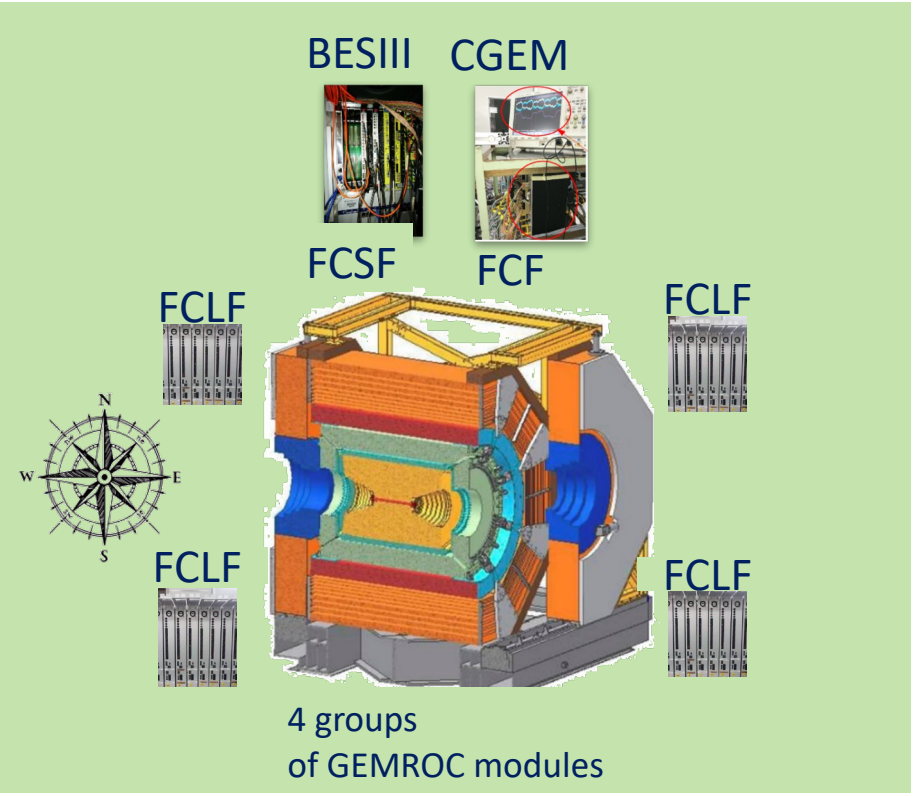
Material budget ≤ 1.5% X_0
σ_{xy} ~ 130 µm
σ_z < 1 mm (~ 350 µm)
σ_{p_t}/p_t ~ 0.5% @ 1 GeV/c
Operation in 1T magnetic field
High rate capability: 10^4 Hz/cm^2





CGEM-READOUT





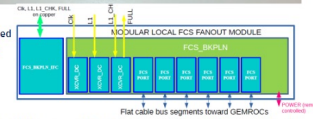
Fast Control system Fanout (FCF)

@A. Cotta Ramusino

a modified GEMROC module which connects to the CLK, L1, L1_CHK, FULL signals from the BESIII FCSF

4 fanout LVDS ports towards 4 groups of GEMROC
2 fanout NIM ports towards 2 GEM DC modules
4 fan in ports for FULL (LVDS) from 4 groups of GEMROC
2 fan in NIM ports for FULL (NIM) from 2 GEM DC modules

Status:
all pieces delivered
FCS_BKPLN_IFC,
FCS_BKPLN,
FCS_PORT,
XCVR_DC



1 "copper" port for LVDS signals carried by a 17- twisted pair, shielded cable ("green cable"), with auxiliary BNC ports for stand-alone operation
3 fiber optic duplex ports for FCS signals (DC to 50MHz)
6 output ports, each dedicated to a single GEMROC module

Fast Control system Local Fanout

a low cost, not programmable, fanout module which connects to the CLK, L1, L1_CHK, FULL signals from FCF

1 in operation
1 to be assembled as spare for TB operation

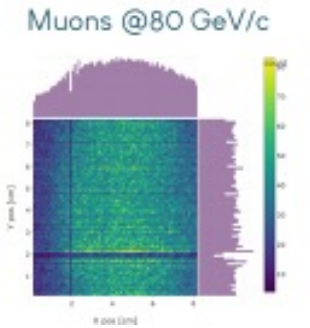
@A. Cotta Ramusino

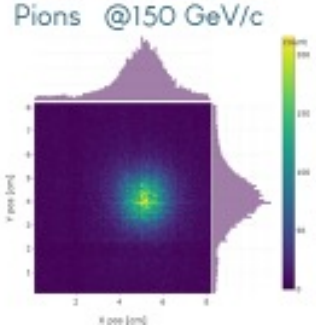
CGEM-INTEGRATION

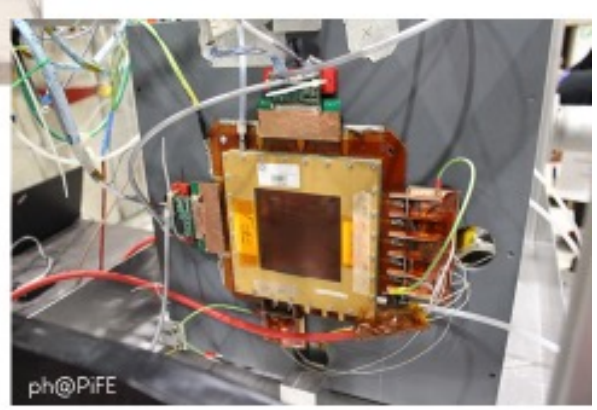
TEST BEAM @CERN

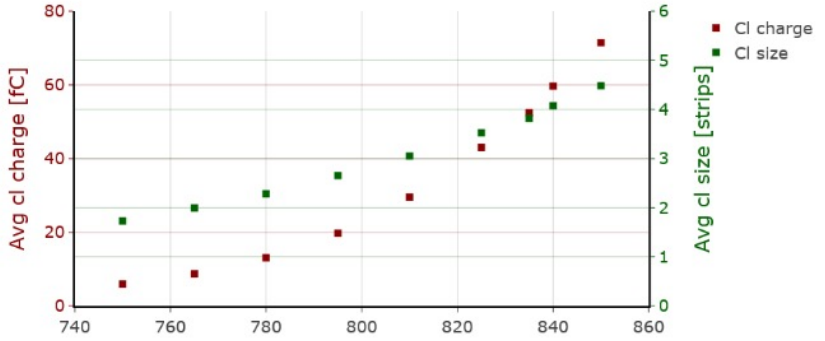
12/21 July 2021
RD51 test beam
@ H4 line CERN North Area, Prevessin

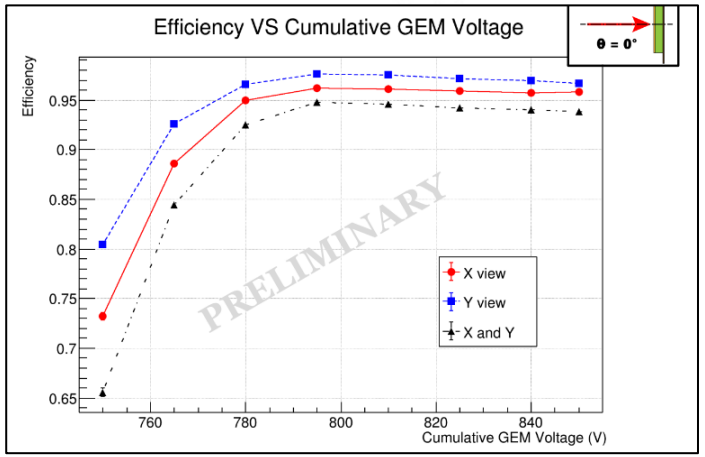
4.5 s spills
180 k muons
4M pions

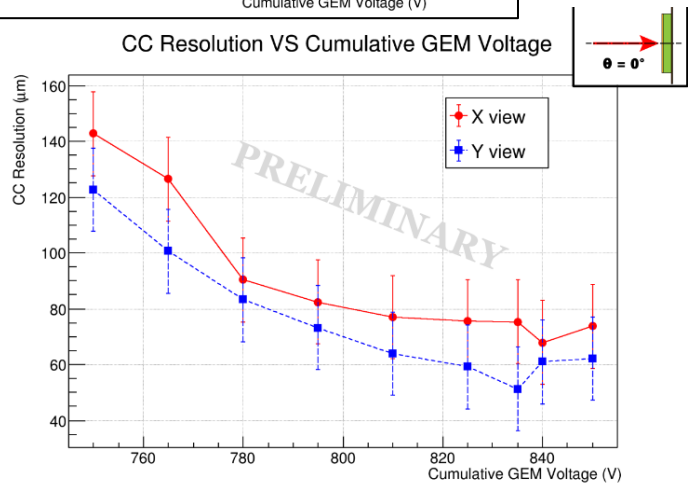












Due to the pandemic, we had to rethink integration activities

Planar detector performance benchmarked with commercial APV electronics

Detection performance consistent with expectations
Important test bench to understand more complex features of the CGEM-IT

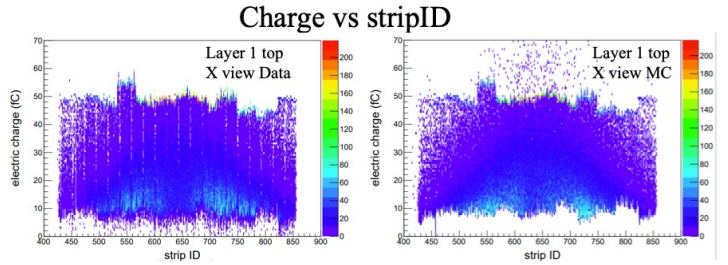
Cgem BESIII Offline Software System (CgemBoss665g)

Simulation

- ✓ L1 and L2 geometry fully implemented
- ✓ L3 geometry needs update

Digitization

- ✓ Electronics fully implemented
- ✓ Parameters tuning (ongoing)
- ✓ Micro-sectors simulation (started)

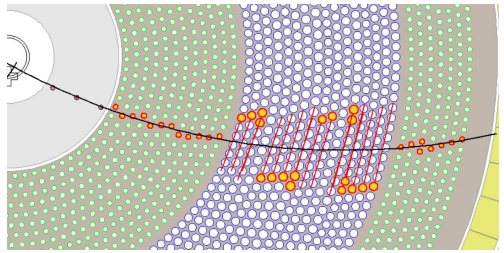


Clusterization

Track finding

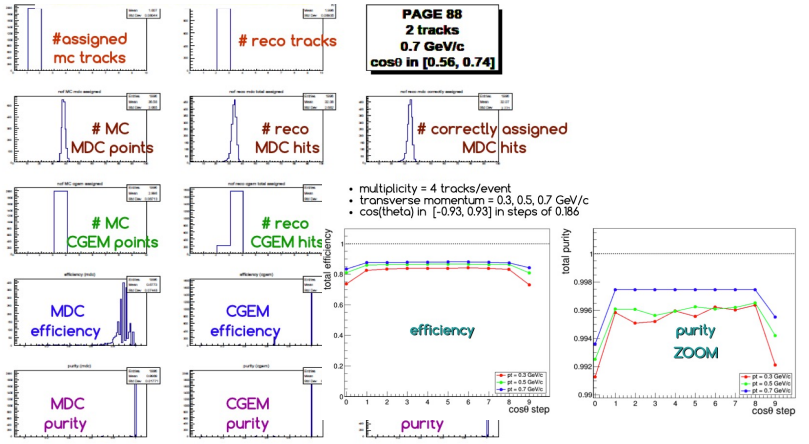
Track fitting

- ✓ Global tracking algorithm operational
- ✓ New tracking for secondaries under development (just started)



Calibration and alignment

- ✓ Automatic time calibration operational
- ✓ μ-TPC reconstruction under debugging

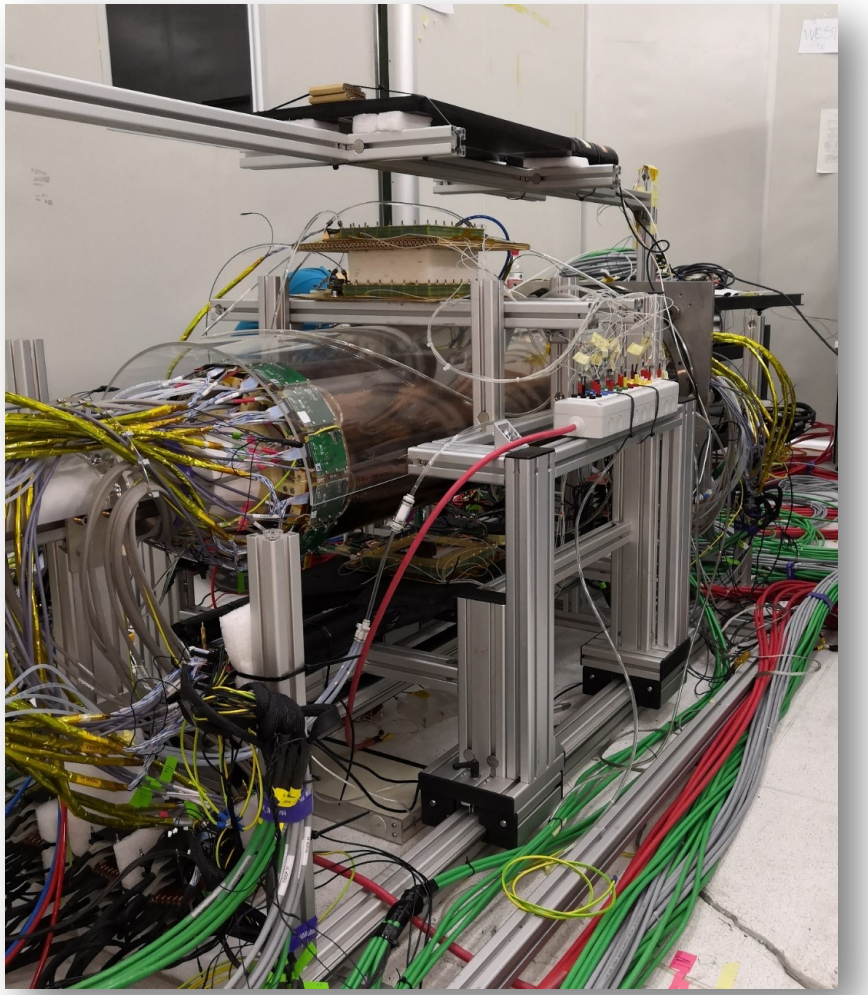


Analysis

- ✓ Automatic QA for tracking under development

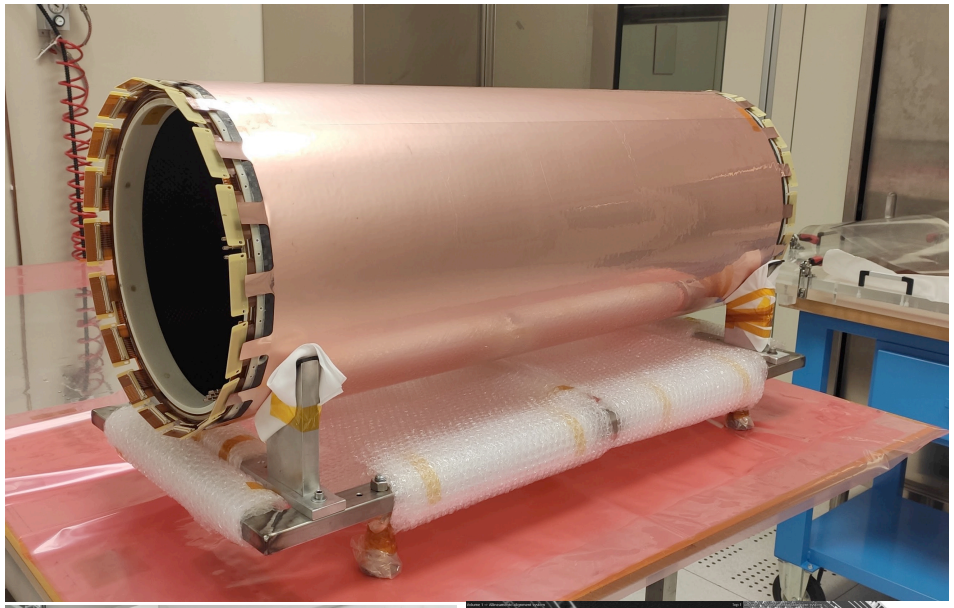
CGEM-LAYER 1&2

Maintenance operations to be carried out in 2022/2023



CGEM maintenance /test:	FEB L2: sostituzione dissipatori termici (montaggio e rimontaggio schede) FEB L3: sostituzione dissipatori termici Verifica del Sistema di cooling (lampade UV, patch panel) Verifica del funzionamento della catena elettronica e sostituzione con spare Verifica catena HV/LV
CGEM integration	Sostituzione e allestimento nuovo stand per cosmici Integrazione della catena elettronica con i moduli ancillary di fanout Test del cooling system finale (booster pump) e circuito Montaggio e test interlock hw Test di inserimento meccanico
CGEM L1 e L2	Integrazione BESIII Slow control Integrazione BESIII DAQ Commissioning

CGEM-LAYER 3



First HV validation
Nov 2020

Gas leakage -Gluing
Dec -Jan 2021

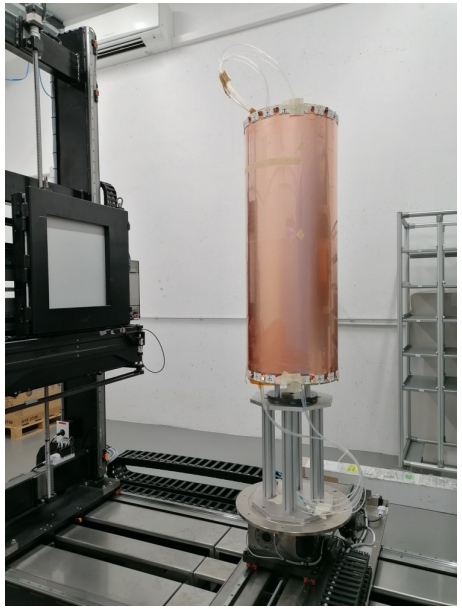
Second HV validation
Jan 2021

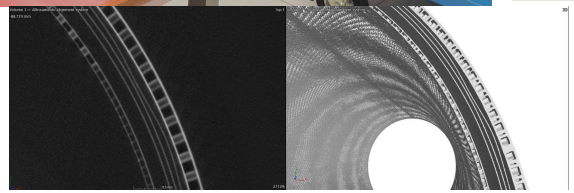
Investigation
Jan-May 2021

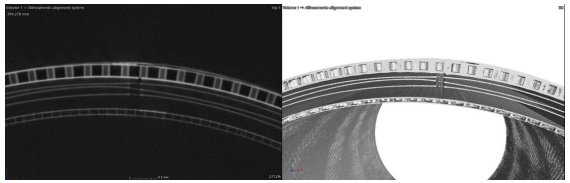
Completed in Nov 2020

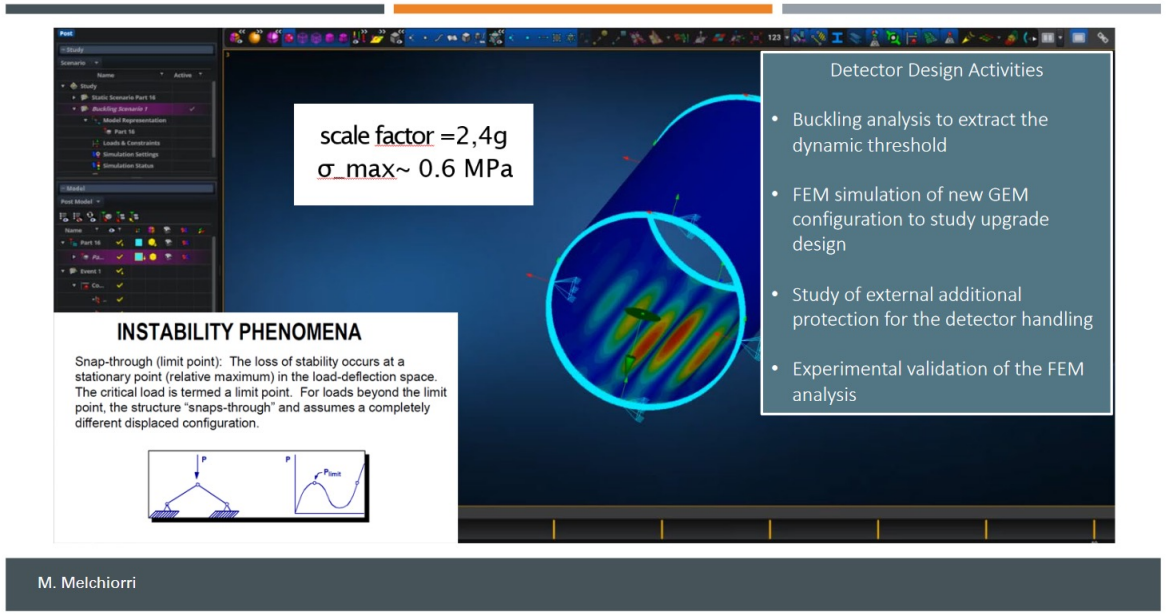
Construction has taken more time than usual due to the pandemic, with anode preparation driving the schedule as usual

Not functioning as expected instability due to buckling

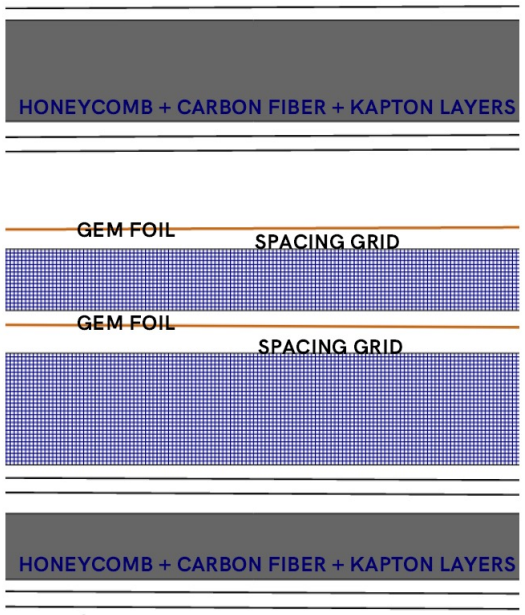


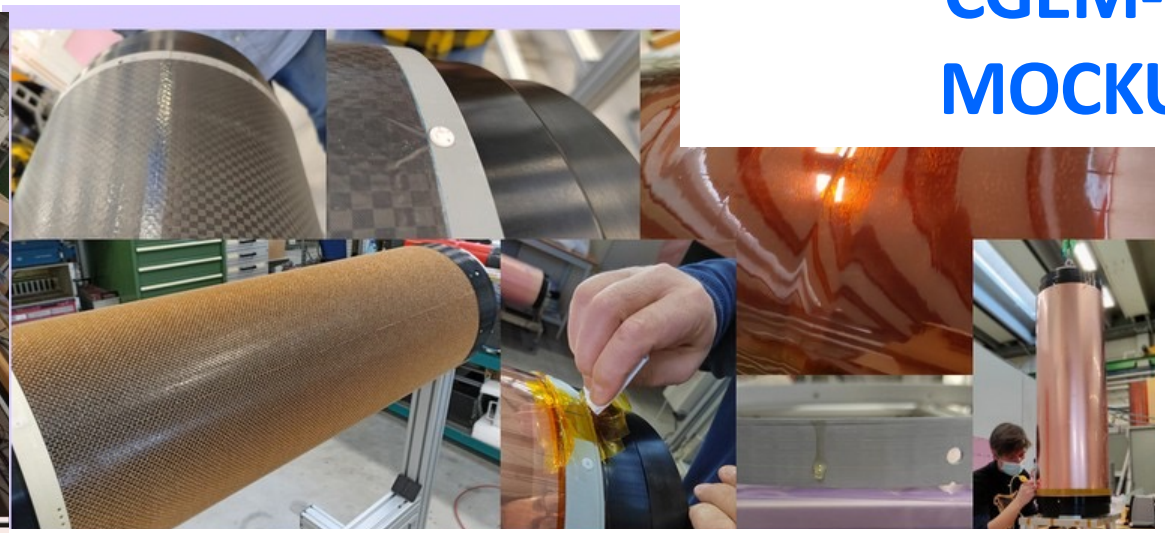




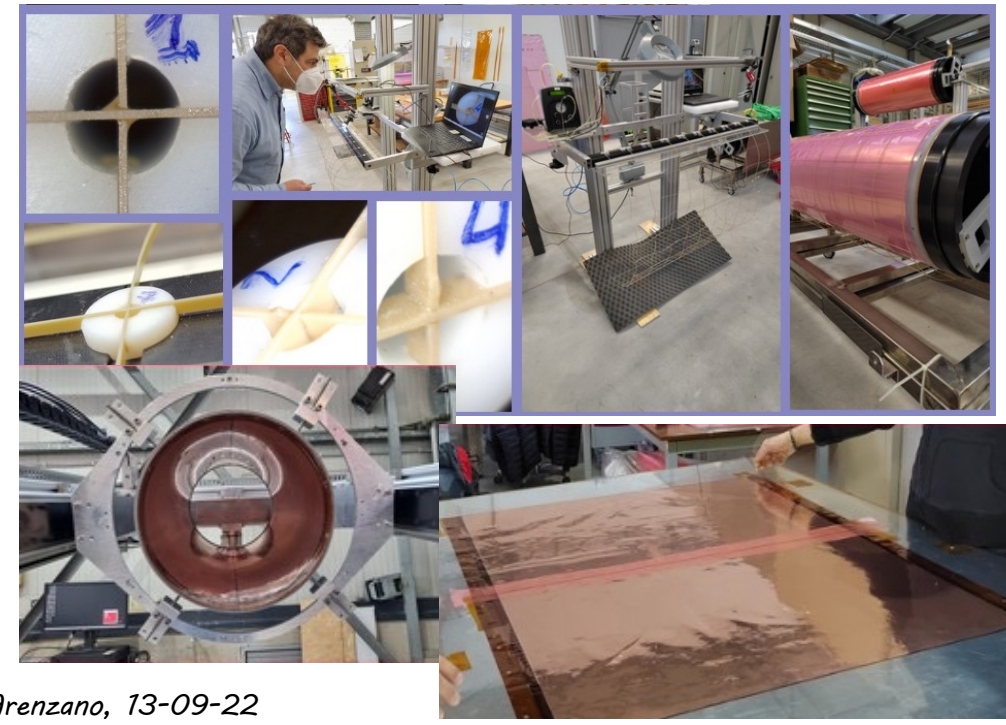


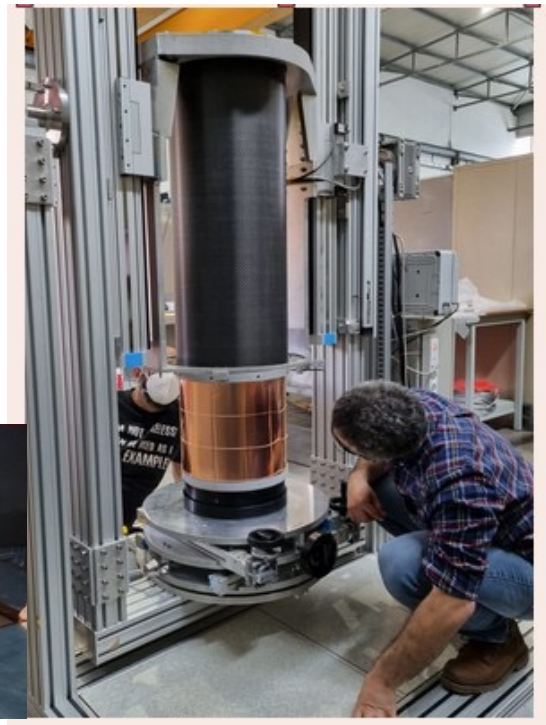
CGEM-L3 MOCKUP





I. Balossino



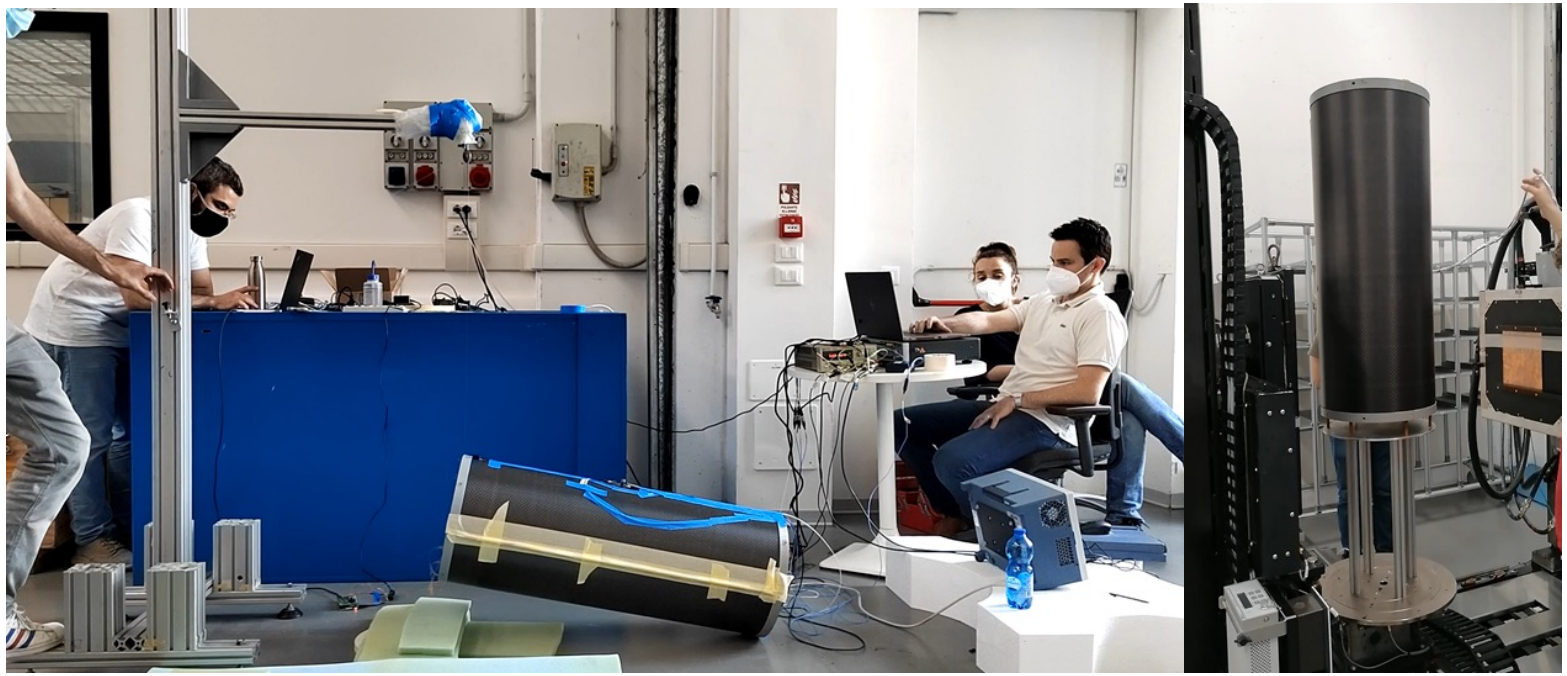


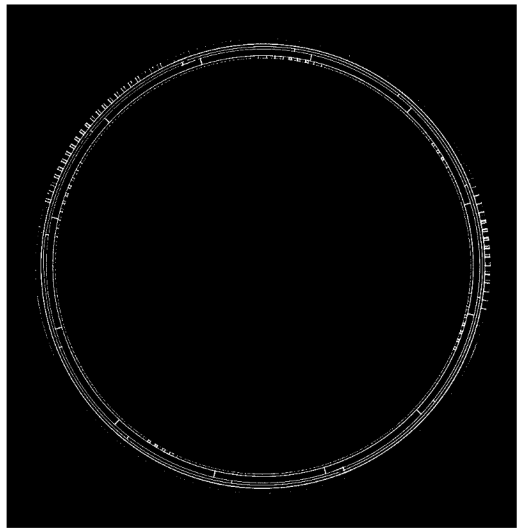
Preparation:
Electrodes
Mechanical structure
Grid insertion
Assembly

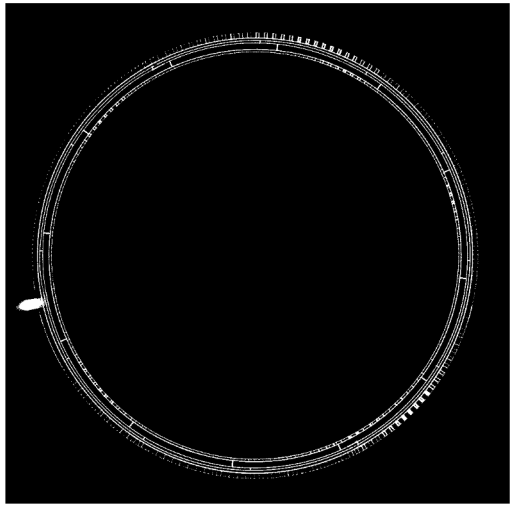
CGEM-L3 MOCKUP

CT-SCAN
Drop test (3·3 g)
CT-SCAN
Drop test (4·2 g)
CT-SCAN
Drop test (7·5 g)
CT-SCAN

- Test done to understand buckling damage due to normal handling of the detector
- Doesn't mean to test shipping stress (the whole detector will not be shipped)
- Doesn’t mean we can treat it badly







- No buckling deformation with spacing grids
- Small defects due to bad quality of some foils → improve quality assurance at the production sites

MOCKUP INSPECTION

Carefully opened layer by layer

Checked

- GEM deformations
- gluing quality
- grid structure

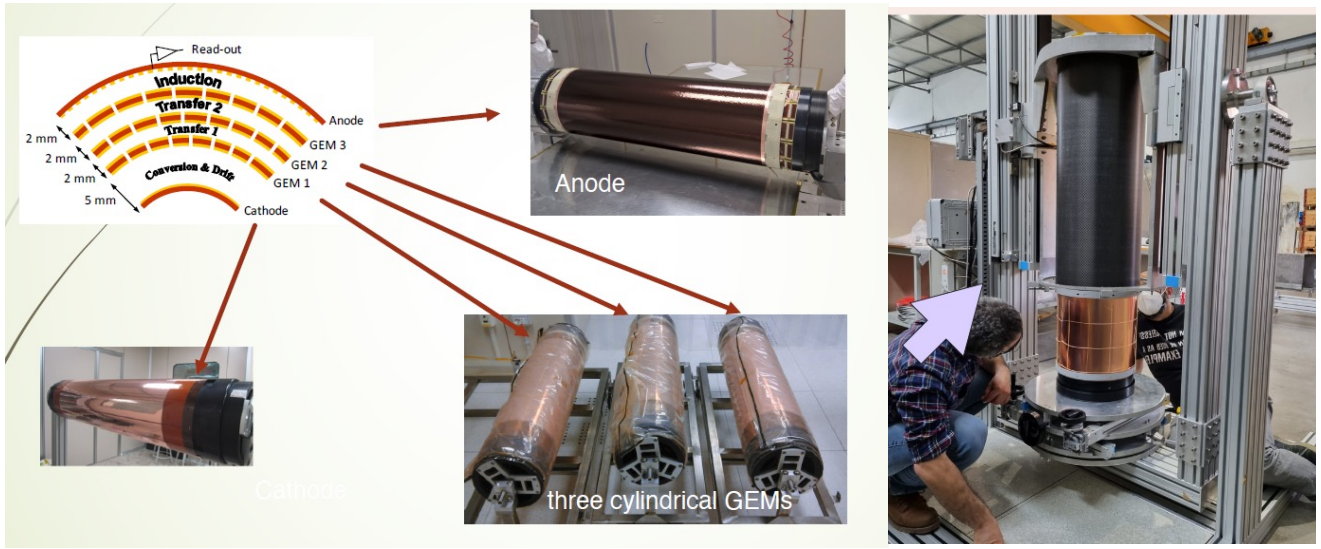
Compared defects with CT scan

→Final grid design

(Grid not qualified for flying, will be installed in Beijing)

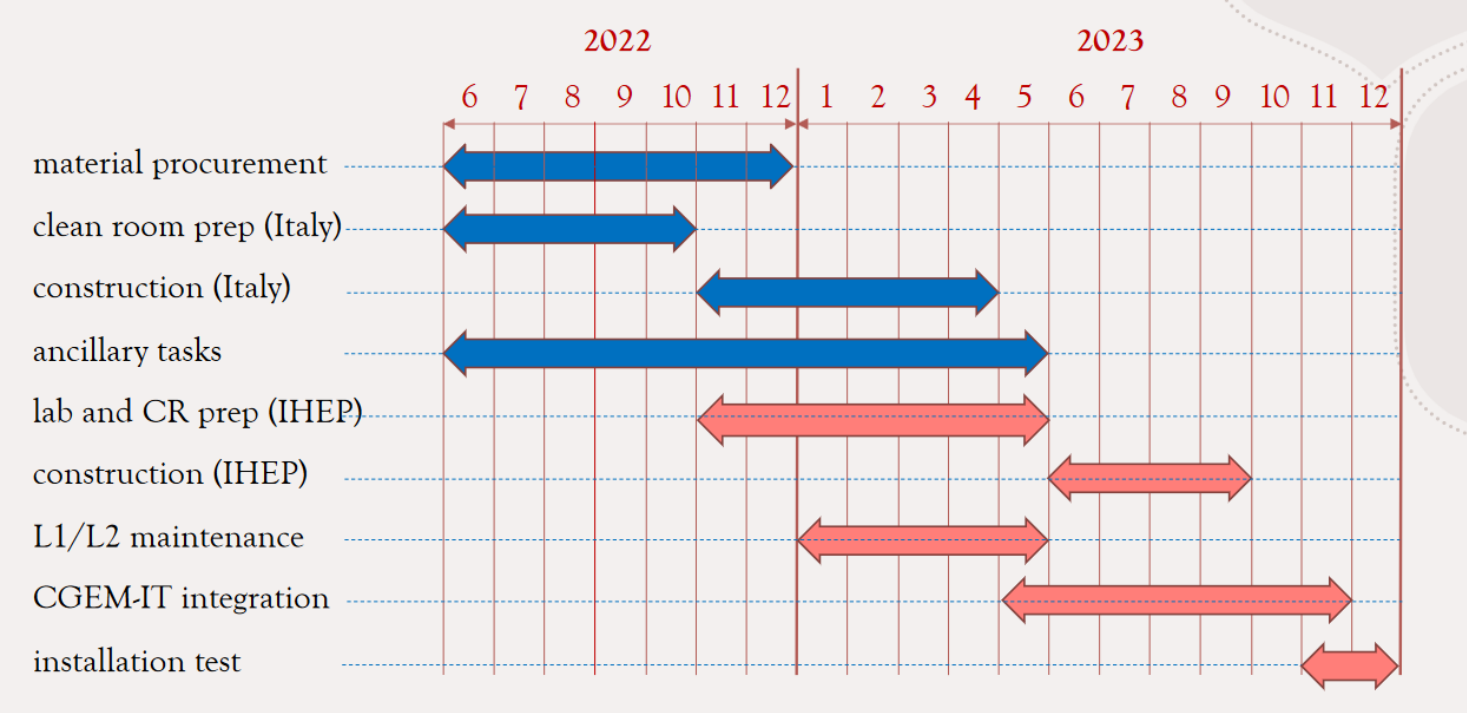
- *New document for construction procedure in preparation*
- *New construction team was trained*

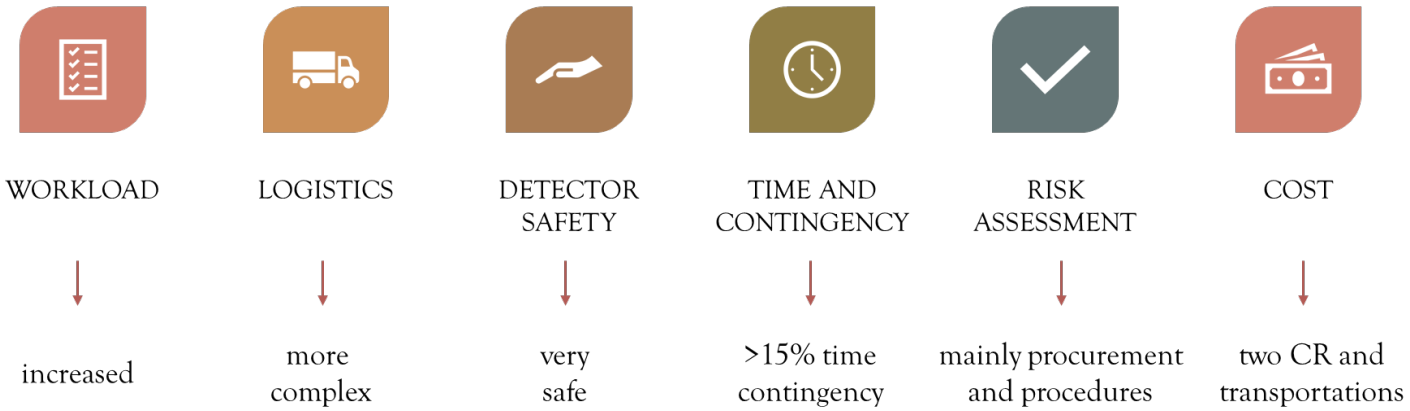
Hybrid solution for construction



SCHEDULE

G. Cibinetto





- all the material needed for construction in Italy ordered
- some delay in the preparation of Ferrara clean room→expected by December

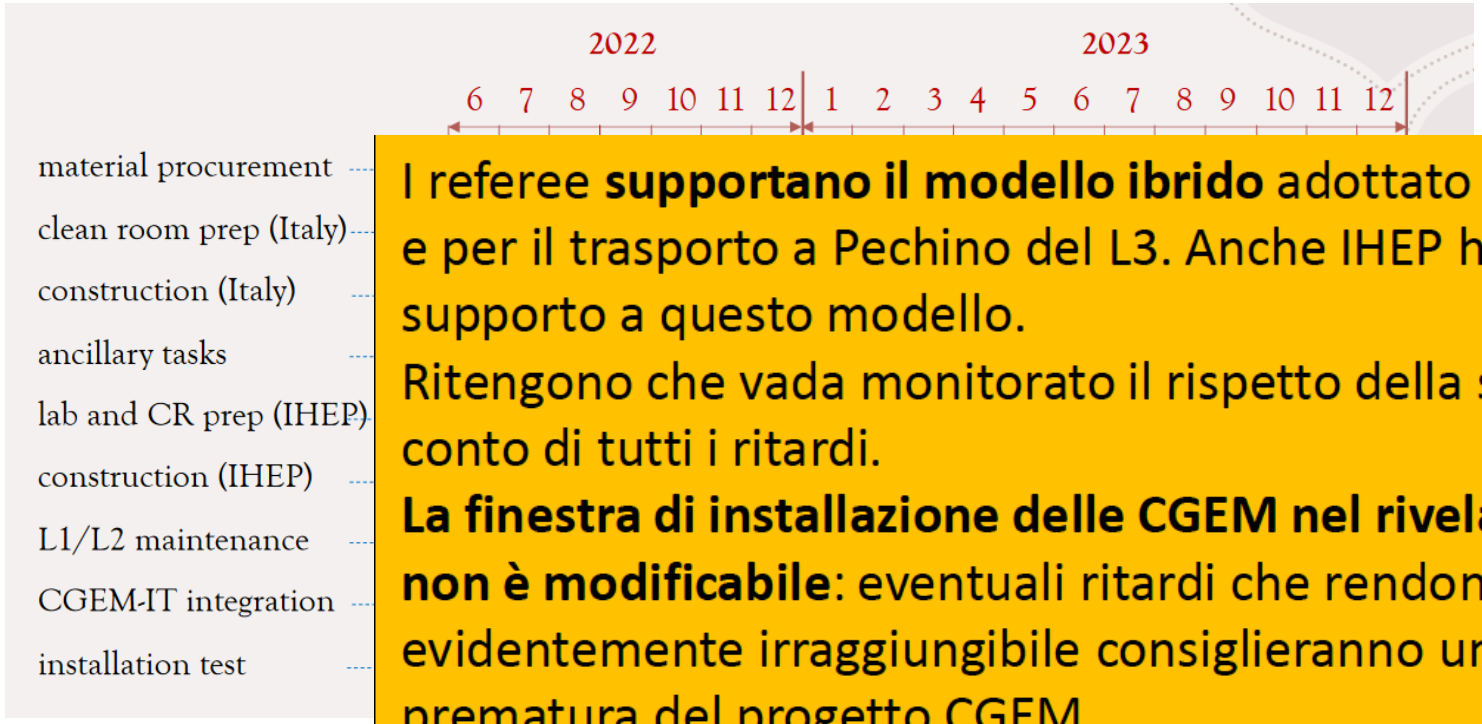
but
HV tests will start as planned in another clean room in Ferrara

Ancillary tasks are related to the new touchless alignment procedure:
-sensors arrived
-development ongoing

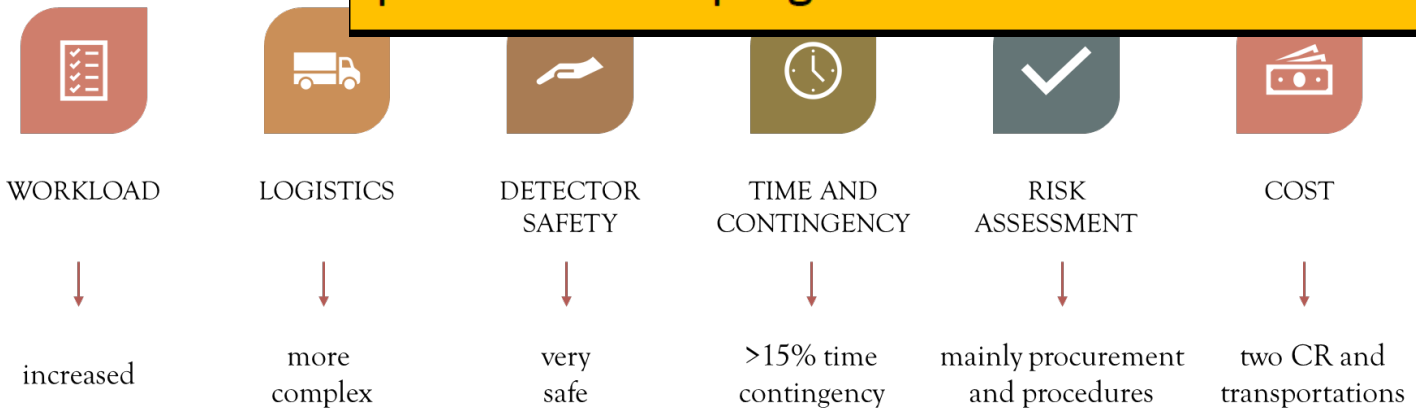
Schedule is ok!
but we need
international travels
to be restored by end of 2022

IN SUMMARY

G. Cibinetto



I referee **supportano il modello ibrido** adottato per la costruzione e per il trasporto a Pechino del L3. Anche IHEP ha dichiarato pieno supporto a questo modello.
Ritengono che vada monitorato il rispetto della schedula, e tenuto conto di tutti i ritardi.
La finestra di installazione delle CGEM nel rivelatore BES nel 2024 non è modificabile: eventuali ritardi che rendono tale obiettivo evidentemente irraggiungibile consiglieranno una interruzione prematura del progetto CGEM.



- all the material needed for construction in Italy

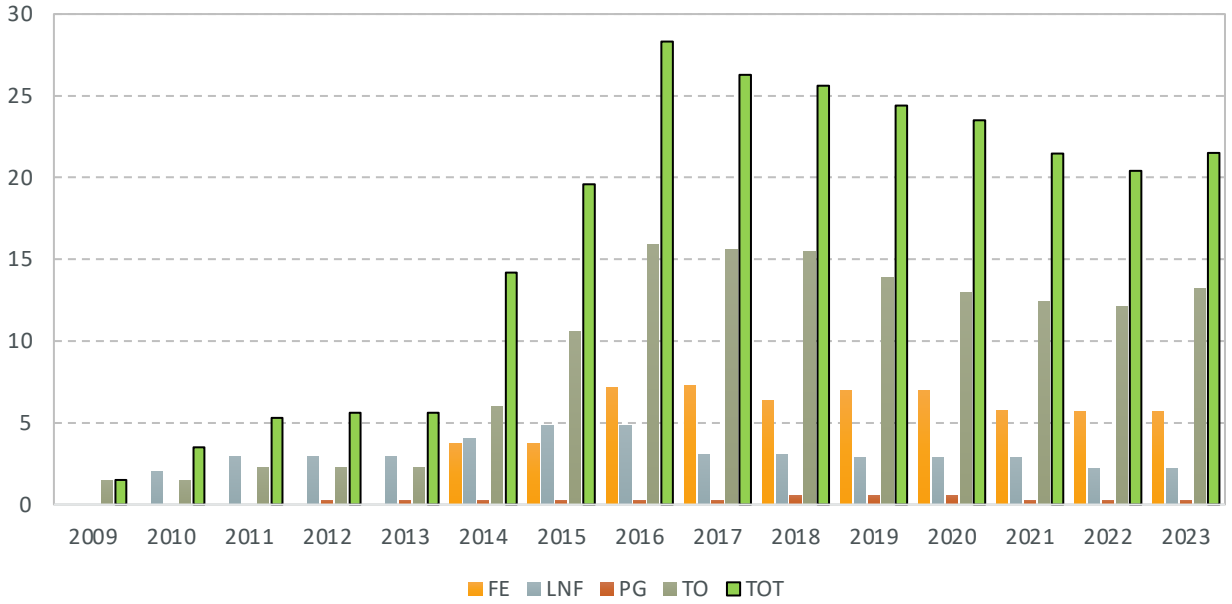
eparation of Ferrara clean
December

nned in another clean

d to the new touchless

Schedule is ok!
but we need
international travels
to be restored by end of 2022

ANAGRAFICA DI BESIII ITALIA



21.5 FTE
~40 authors (~6% of the total)
~0.6 authors/FTE
38 physicists + technologists
~ 50 members

	FTE/f	FTE/t
FE	5.50	0.20
LNF	1.95	0.30
PG	0.3	-
TO	9.45	3.8

FTE	2022	2023
FE	5.7	5.7
LNF	2.25	2.25
PG	0.3	0.3
TO	12.05	13.25

Responsibility roles

- **G. Cibinetto, PM BESIII CGEM-IT Project**, Member of Technical Board
- **M. Maggiora**: Director of IHEP-INFN Joint Laboratory, Member of BESIII Executive Board, RISE FEST Coordinator;
- **M. Bertani, C. Cibinetto, M. Maggiora**, Members of BESIII Institutional Board
- **M. Greco**: Italian BESIII Coordinator for INFN, Convener of BESIII CGEM and FEST electronics, Convener of BESIII CGEM Integration
- **F. Bianchi**: Deputy Chair of BESIII Speakers' Bureau
- **I. Garzia:** Convener Light Hadron WG
- **F. De Mori**: Coordinator working group on phase
- **L. Lavezzi**: Convener WG CGEM & Data Quality
- **M. Rolo**: Convener of BESIII CGEM microelectronics, Convener of FEST microelectronics and medical applications
- **S. Spataro**: Convener SW BESIII CGEM, Publication Committee Member

RICHIESTE 2023

E COMMENTI DEI REFEREES

Commenti dei referees

Gli ultimi anni sono stati difficili a causa della pandemia e del persistere delle restrizioni agli spostamenti in Cina. Nonostante ciò molte attività sono comunque state svolte con successo da remoto

La rottura di L3 ne ha richiesto il rifacimento. Per ovviare ai problemi logistici si sono pensate diverse soluzioni. Scartata la possibilità di costruirlo tutto in Italia (fragilità nel trasporto) o tutto in Cina (non ci si riesce coi tempi), si è optato su una soluzione ibrida, che ha il supporto dei referee.

La tempistica è molto stretta: ci rendiamo conto che il gruppo va supportato per portare a termine il compito.

In generale, i referee si congratulano con il gruppo italiano per l'impatto sulla collaborazione, i risultati di fisica, e la gestione della costruzione in questa difficile fase.

BESIII referees

Commenti dei Referees sulle richieste di missioni

Avendo già finanziato gran parte delle spese per la costruzione del L3, il grosso delle richieste consiste nelle trasferte, in particolare quelle per terminare la costruzione, il commissioning e l'installazione nell'esperimento.

Come sempre le richieste di questo gruppo sono ben dettagliate, documentate, e ben giustificate.

Data l'importanza del completamento di questa travagliatissima fase costruttiva del CGEM non proponiamo tagli alla parte relativa al movimento tecnici e fisici a Pechino per la costruzione del nuovo L3 e le altre attività di commissioning.

Hanno considerato di aggiungere sj a ogni viaggio l'extra costo che si avrebbe acquistando i biglietti aerei al costo attuale. Abbiamo deciso di lasciare tale sj per le trasferte necessarie per la costruzione, non per i turni di presa dati e per i meetings di collaborazione. Riteniamo che se i costi resteranno quelli attuali il gruppo dovrebbe concordare una motivata riduzione dei turni con l'esperimento e/o comprimere la partecipazione in presenza ai meetings.

La richiesta di trasferte per meetings in presenza ammonta a 286 kEuro, troppi per un gruppo con 21.5FTE, nonostante le molte responsabilità istituzionali. La pandemia ci ha insegnato che si può operare anche da remoto. Nelle proposte di assegnazione abbiamo considerato di ridurre i meetings in Italia, mentre per i meetings di collaborazione in Cina consideriamo 2 meetings a FTE, e uno in più per chi ha responsabilità, con rimborso base.

Abbiamo spostato sj le quote per l'IHEP-INFN fellowship, come fatto negli anni scorsi.

Riepilogo proposte di assegnazione

Strutt.	missioni		Consumo		altri_cons		Trasporti		licenze-SW		apparati		*TOTALI*	
FE	151.0	85.0	9.0	0	1,5	0	1.5	0	0,5	0	1.0	5.0	**164.5**	**90.0**
	101.5	75.5	8.5	0	1,5	0	1.5	0	0.5	0	0	0	**114.5**	**80.5**
LNF	64.5	41.5	5.0	0	0	0	0	0	0	0	0	0	**69,5**	**41.5**
	38.0	32.5	5.0	1.5	0	0	0	0	0	0	0	0	**43.0**	**32.5**
PG.DTZ	4.0	1.0	0,5	0	0	0	0	0	0	0	0	0	**4.5**	**1.0**
	4.0	0	0.5	0	0	0	0	0	0	0	0	0	**4.5**	**0**
TO	302.0	129.0	20.0	0	0	0	38.0	0	2.5	0	3.0	0	**365.5**	**129.0**
	204.5	95.0	20.0	8.0	0	0	38.0	0	1.0	0	3.0	0	**266.5**	**95.0**
Totali	**521.5**	**256.5**	**34.5**	**0**	**1.5**	**0**	**39,5**	**0**	**3.0**	**0**	**4.0**	**5.0**	**604,0**	**261.5**
	348.0	**203.0**	**34.0**	**12.5**	**1.5**	**0**	**39.5**	**0**	**1.5**	**0**	**4.0**	**5.0**	**428.5**	**208.0**

Totale Generale BESIII:	**Richieste**	**(di cui SJ)**	**Proposta referees**	**(di cui SJ)**
	865.5	**261.5**	**636.5**	**208.0**

- SPARES

RIASSUNTO RICHIESTE

Nel 2023 il carico del gruppo italiano di BES-III sarà molto impegnativo:

- Servirà ricostruire a Ferrara e IHEP il nuovo layer 3, oltre a finalizzare integrazione e commissioning delle CGEM
- Si ricomincerà a partecipare ai turni di presa dati
- Responsabilità rilevanti nella collaborazione
- FEST in aggiunta

Richieste BESIII 2023

Trasporti tool per assemblaggio ad IHEP (mandrini, clessidra, etc..) e materiale in prestito camera pulita a Frascati	39.5 k€	
Gas	1.5 k€	
Apparati	4+5 k€	3 cooling, 1 assemblaggio, 5sj supporti meccanici per GEMROC e mockup
Licenze sw	3 k€	
Totale	53 k€ (di cui 5 sj)	

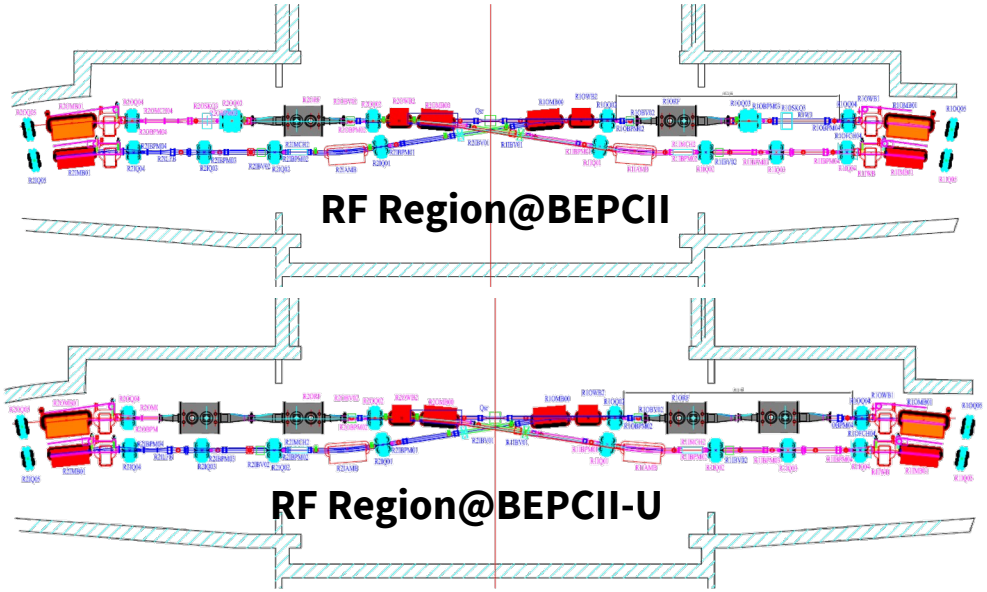
Missioni ITALIA	k€
Costruzione e test layer 3	23
Coordinamento CGEM	12.5
Coordinamento sw/fisica	11.5
Coordinamento Trasporti CGEM	4
Sviluppi sw/simulazioni	8
Meeting BESIII Italia	34.0
CNS1	3.5

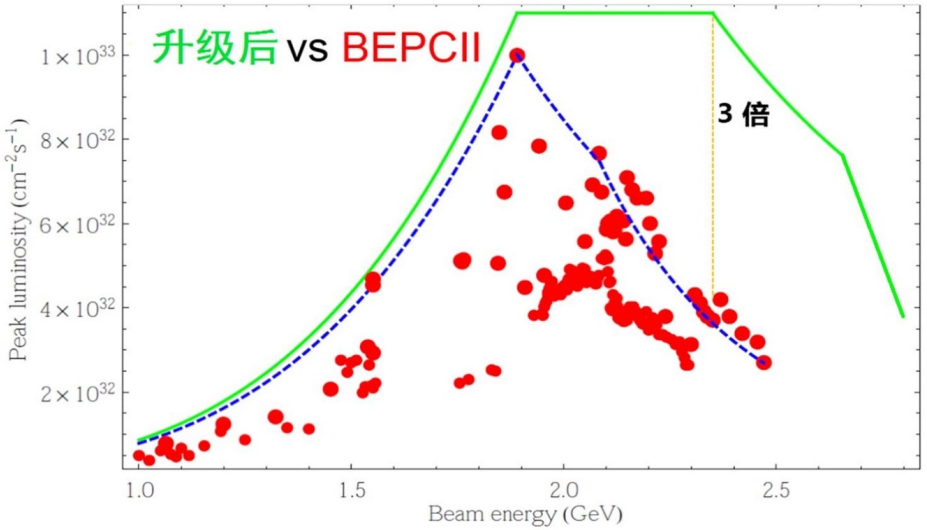
Missioni ESTERO	k€	Sj	Sj aerei
Maintenance Layer 1 e 2	48.5		16
Costruzione L3		38.5	10
Integrazione	64		23
Commissioning CGEM IT		40	15
Coordinamento FEST	6		
BESIII CM/P&Sw non all'IHEP	77.5		40
BESIII CM/P&Sw all'IHEP	101		52
Turni presa dati	33		15
Joint INFN IHEP fellow	60		0
Direzione JOINT Institute	35		7

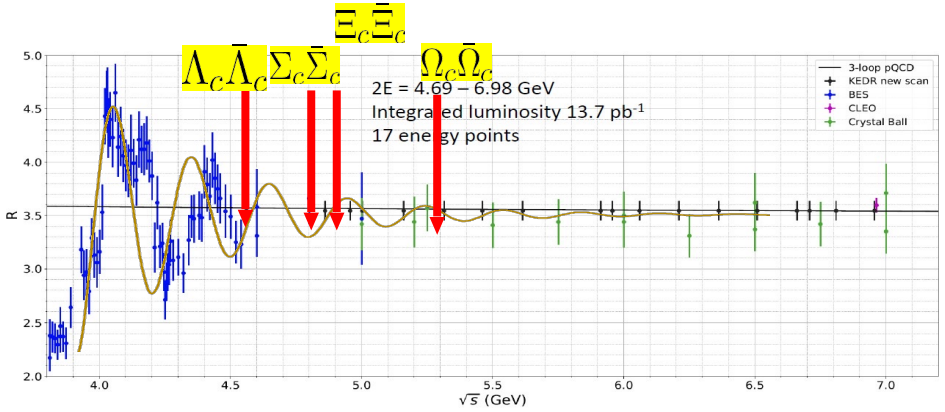
BESIII referees

>2024
MACHINE UPGRADE

- Add another cavity per beam to improve the RF power
- Change optics slightly, increase number of bunches
- Challenges: high beam intensities, backgrounds in the detector
- Small risk: can continue running
- Timescale: 2.5 years construction + 0.5 year installation
- Installation: July – December 2024, ready in Jan. 2025



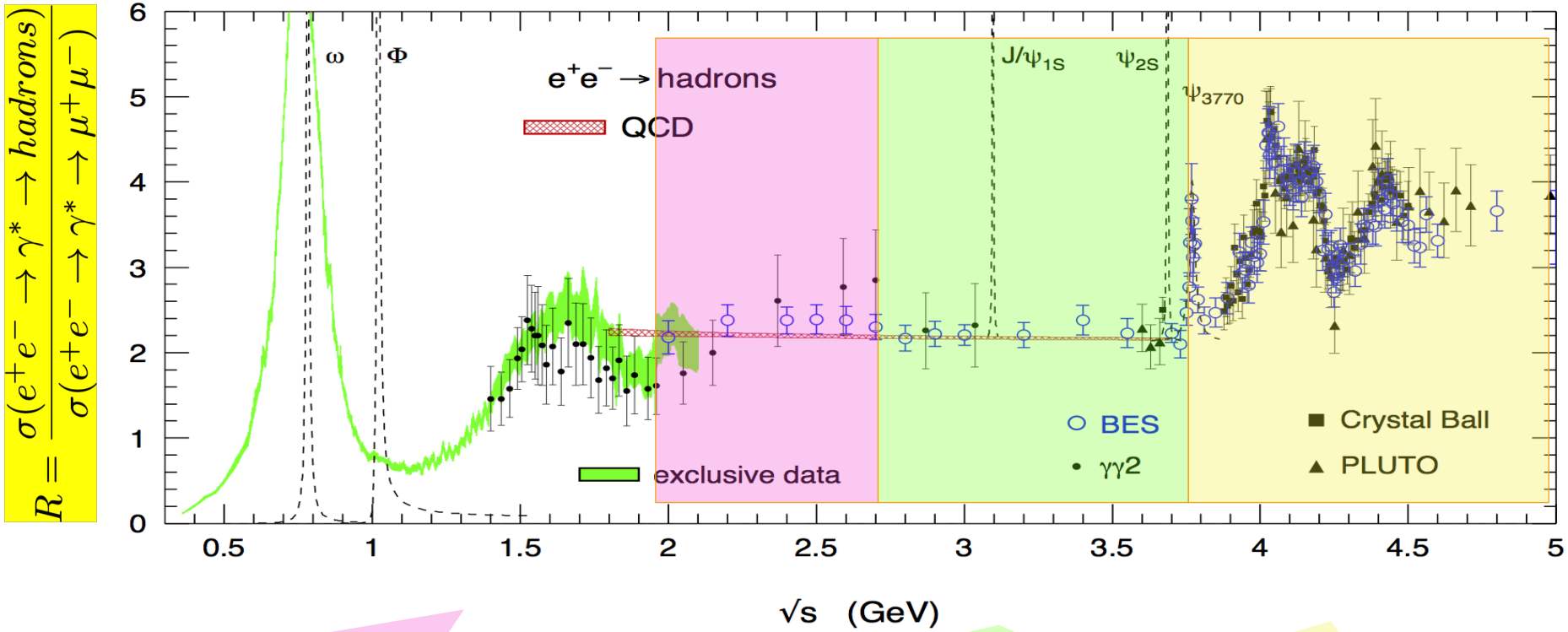




Unique data @ thresholds

➢ XYZ states
➢ Entangled productions for charmed baryon/meson pairs
➢ CP violation in charmed baryon decays
➢ Hadronic form factors

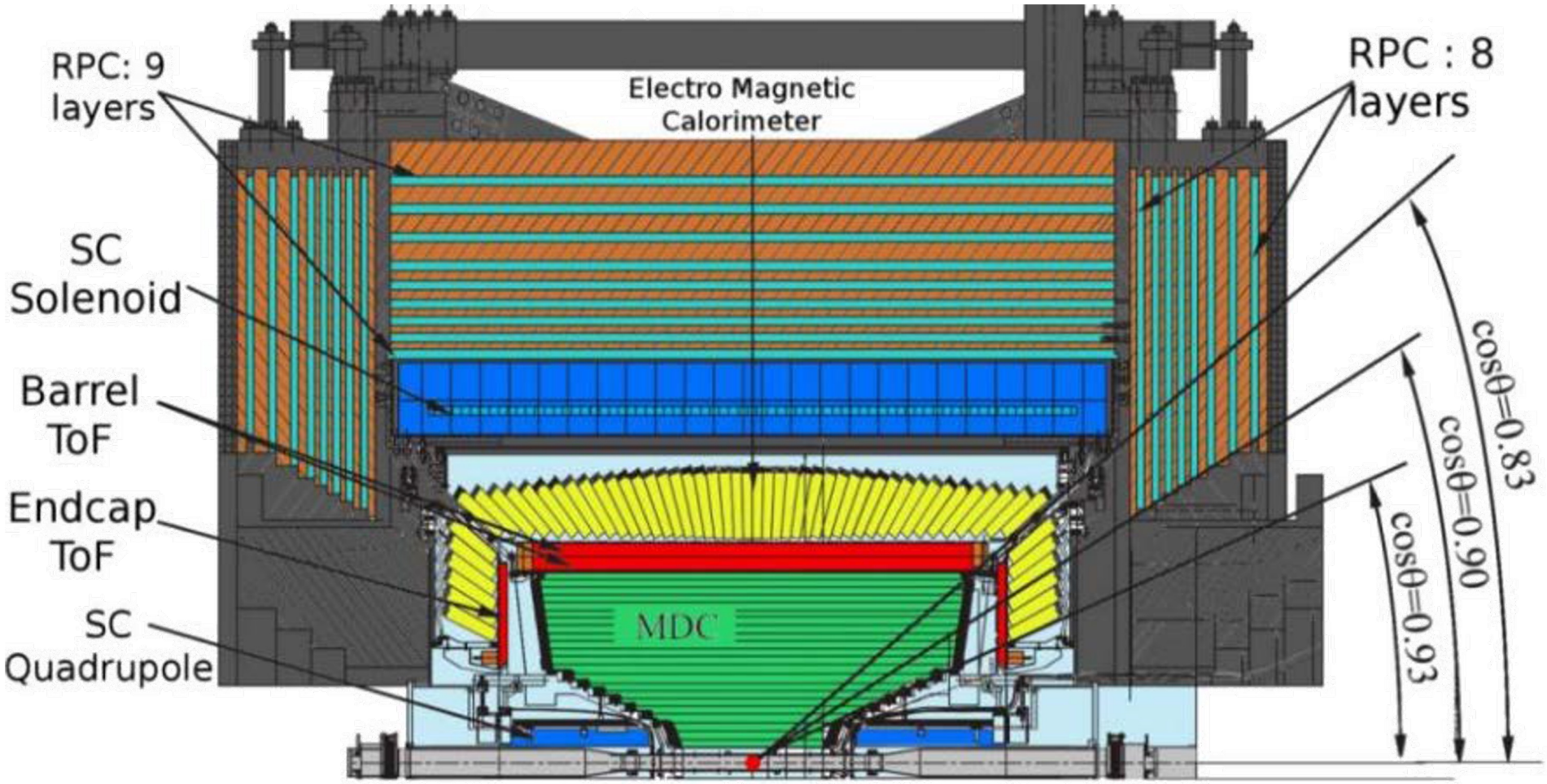
BESIII PHYSICS PROGRAM



- Hadron form factors
- R values and QCD

- Light hadron spectroscopy
- Gluonic and exotic states
- tau Physics

- XYZ particles
- Charm mesons
- Charm baryons


RPC: 9
layers
Electro Magnetic
Calorimeter
RPC : 8
layers
SC
Solenoid
Barrel
ToF
Endcap
ToF
SC
Quadrupole
MDC
cosθ=0.83
cosθ=0.90
cosθ=0.93