

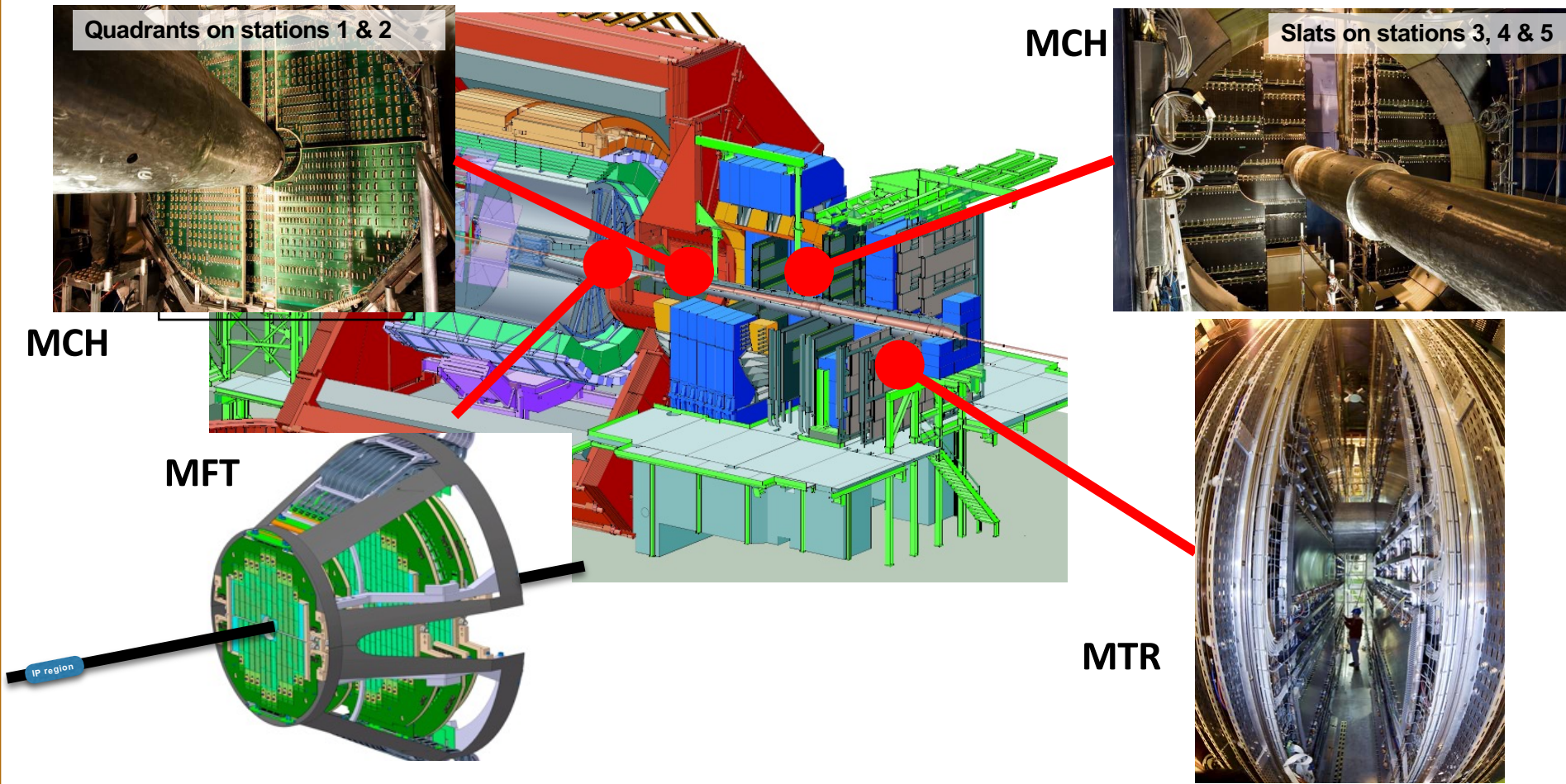


MCH status

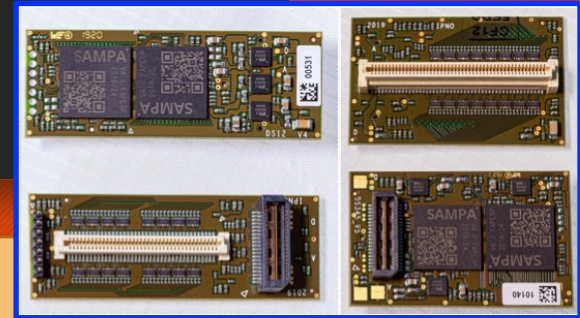
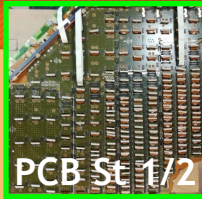
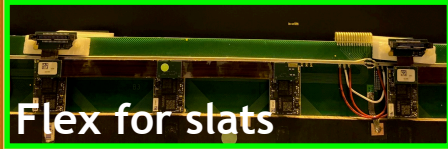
18-19 luglio 2024

Corrado Cicalò - Cagliari

Il muon tracking



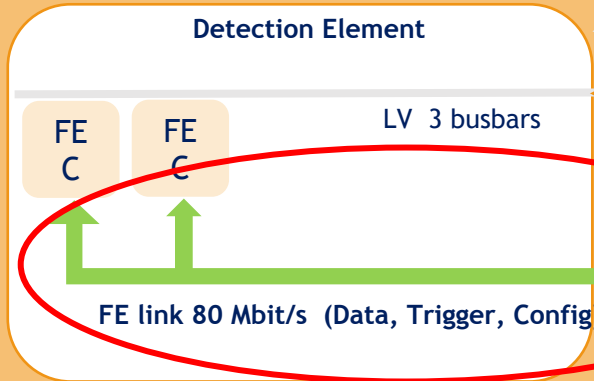
MCH upgrade project



DualSampa FEC

1 FEC = 2 SAMPA = DualSAMPA
16500 + 2500 (spares)

SAMPA: Brazil
CRU: Hungary, India



FEC: Orsay
FLEX: Cagliari
SOLAR : Saclay
CRU: India
(Kolkata, Aligarh)

FE link:
FLEX (slats) /PCB(quadrants)
+ flat cable
~ 3000

Cavern

LVPS
WIENER
PL512

HVPS
No change

Filter
box

DCS

1.2V analog
1.2V digital
GND

2.5V
GND

30

SOLAR

GBT link
3.2 Gbit/s

CRU

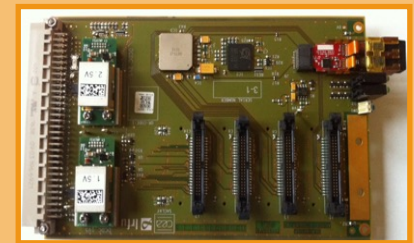
FLP
(O2)

700

LTU

CTP

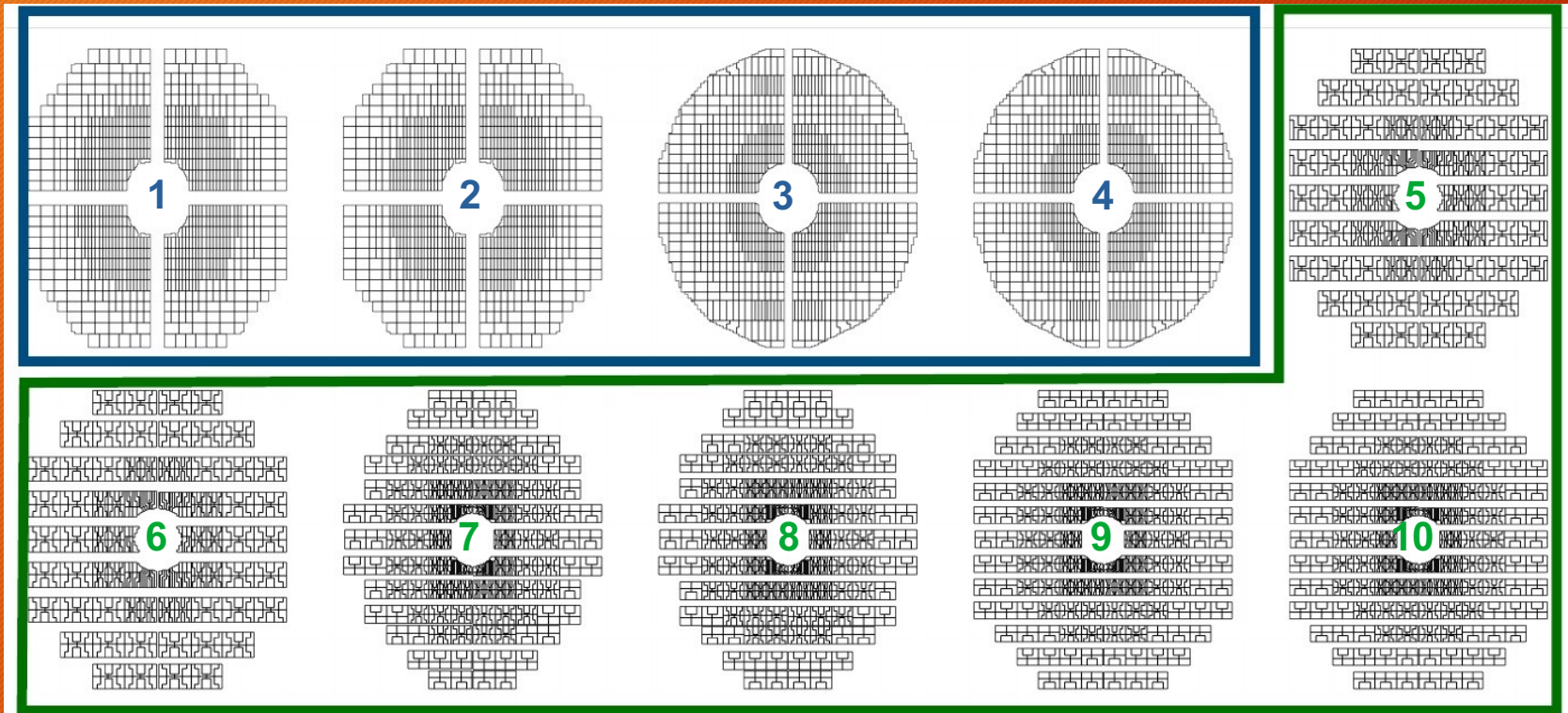
Control room



SOLAR board

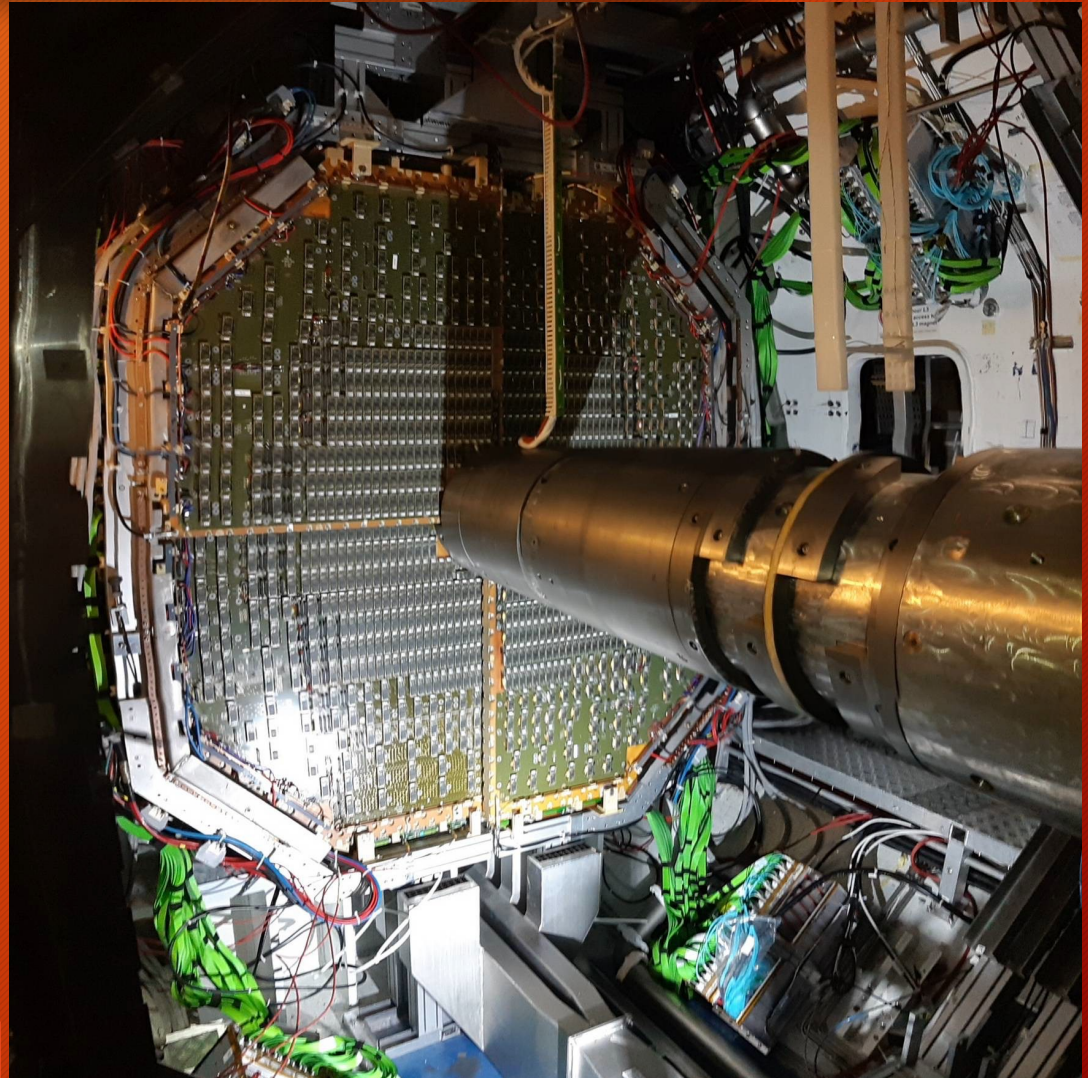
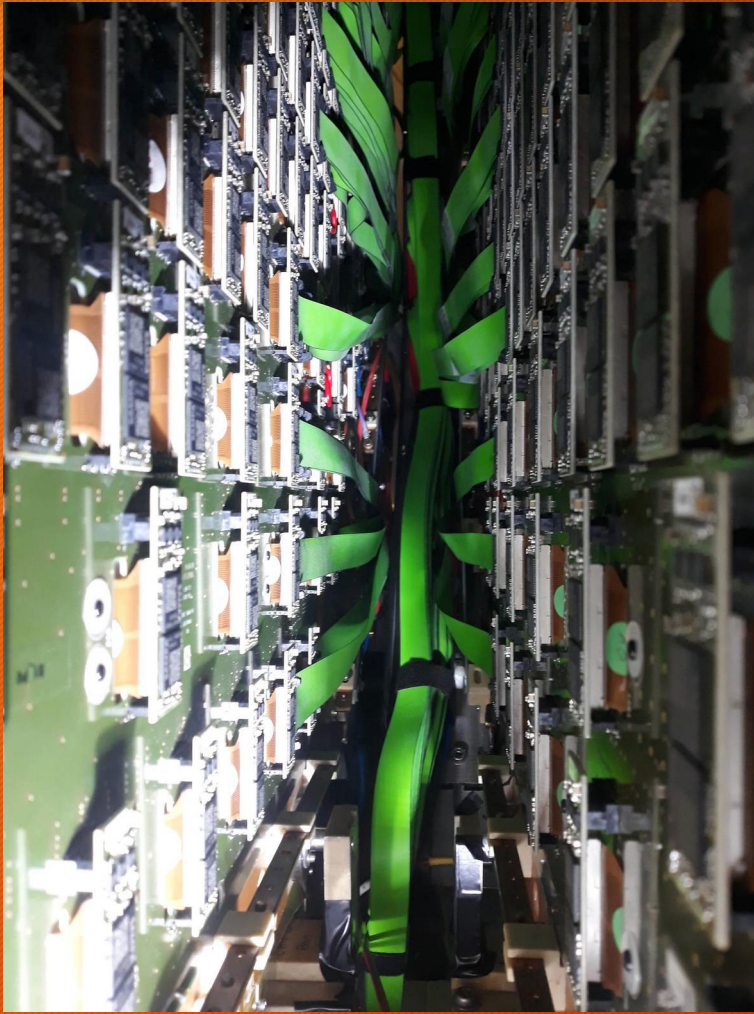
ALICE Muon Spectrometer : 10 chambers

16 DE quadrants, 2 types, 43% of pads



140 DE slats, 19 types, 67% of pads
1063528 pads readout by 16820 Dual Sampas readout by 624 Solars
readout by 30 CRUs.

Station 1



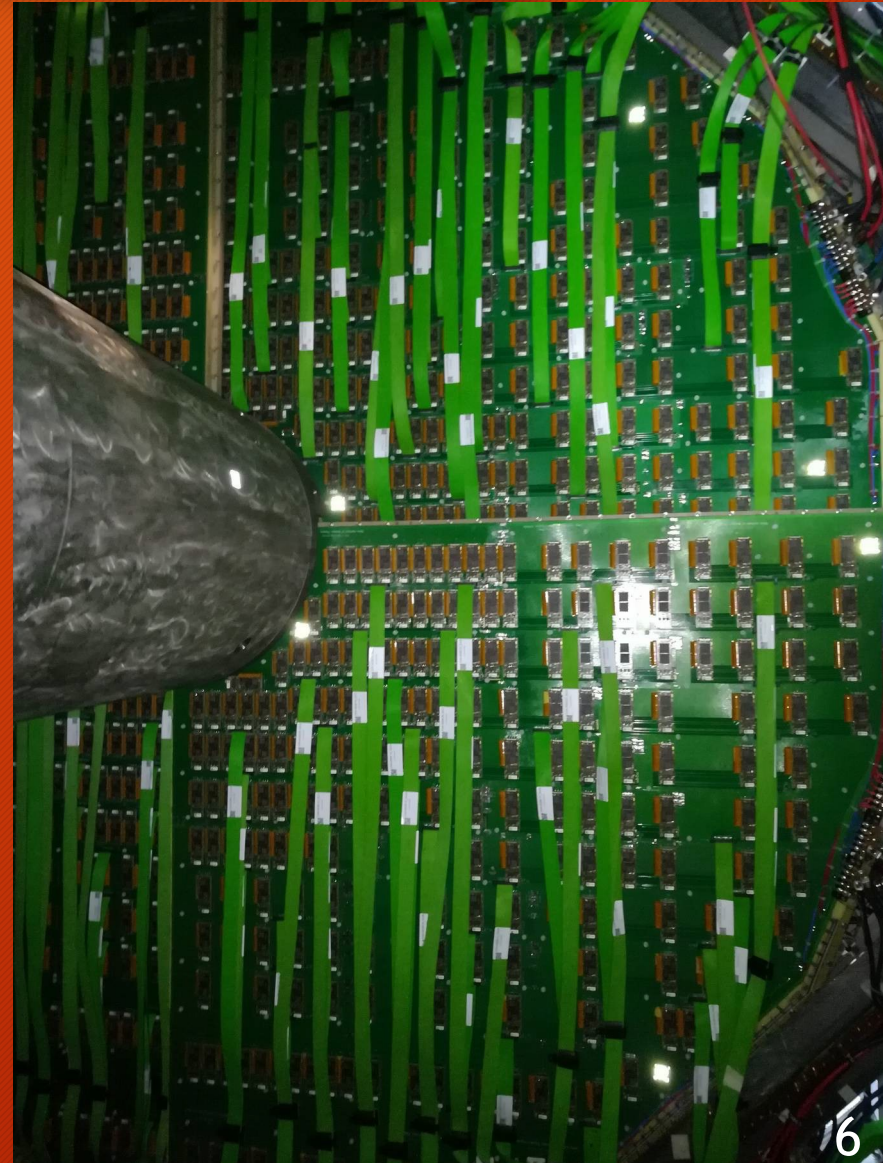
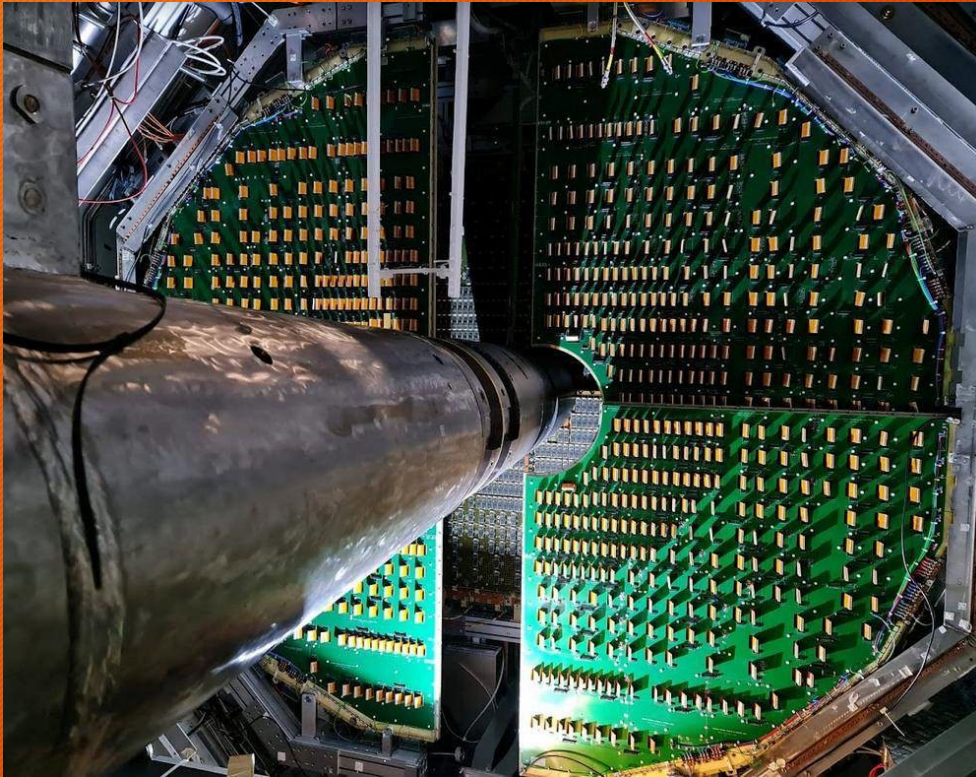
↑ View between chamber 1 and 2
Chamber 2 closed →
Four sides still to be connected

18-19 Luglio 2024

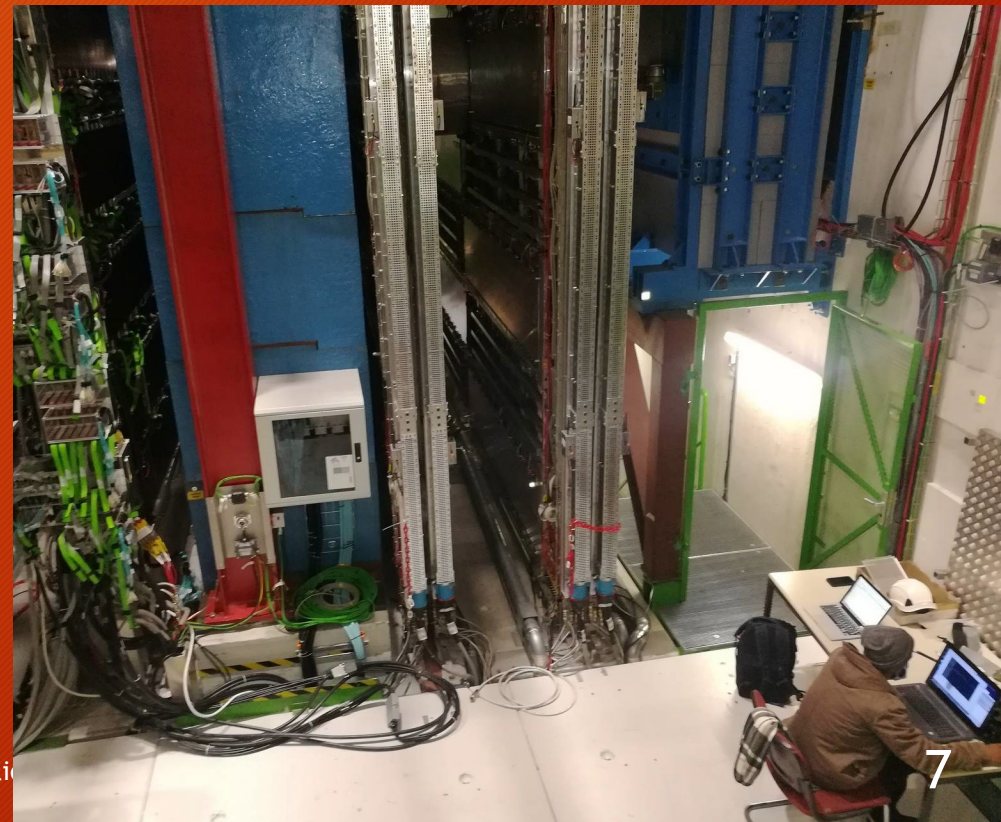
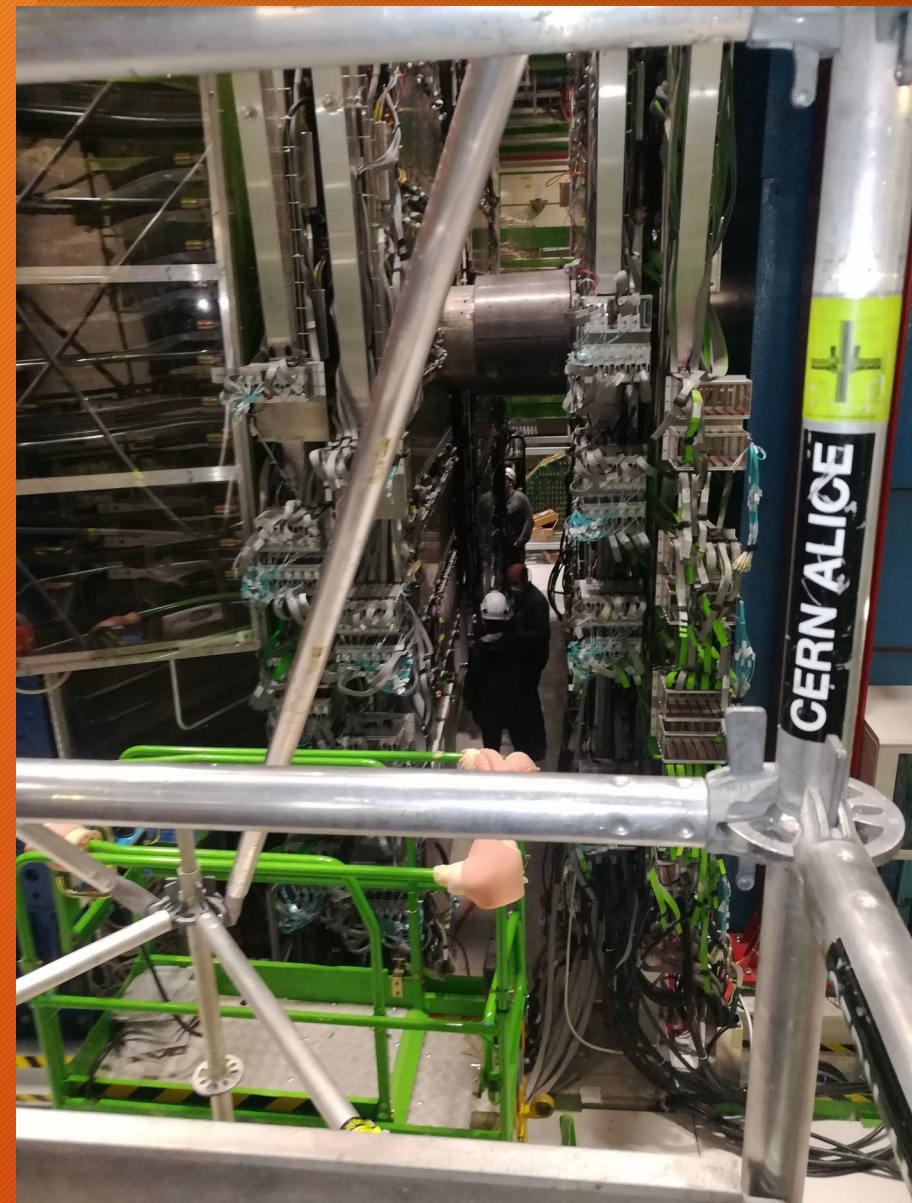
Station 2

Chamber 4 fully cabled →

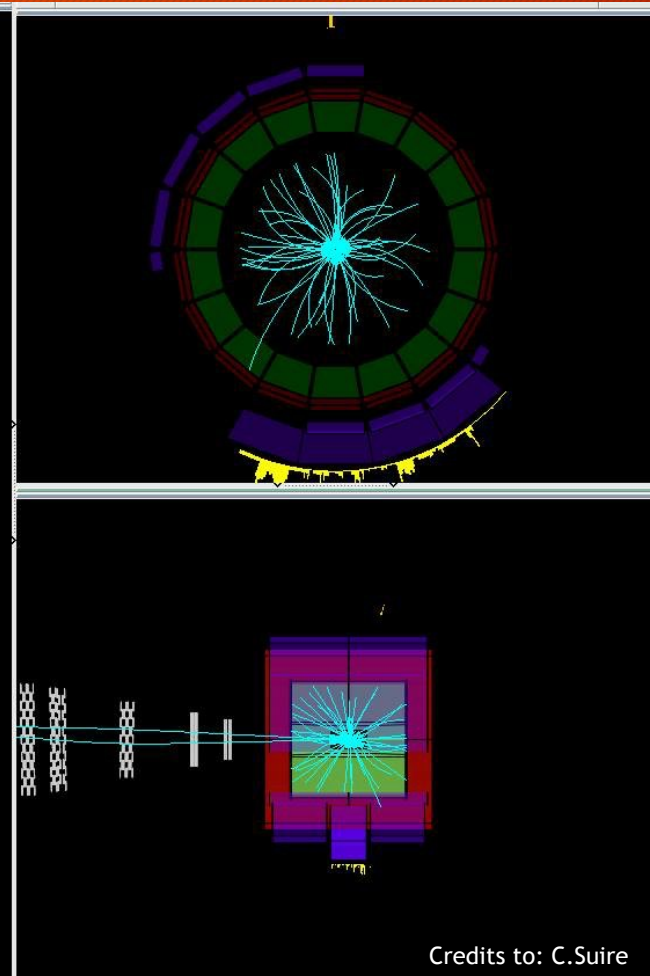
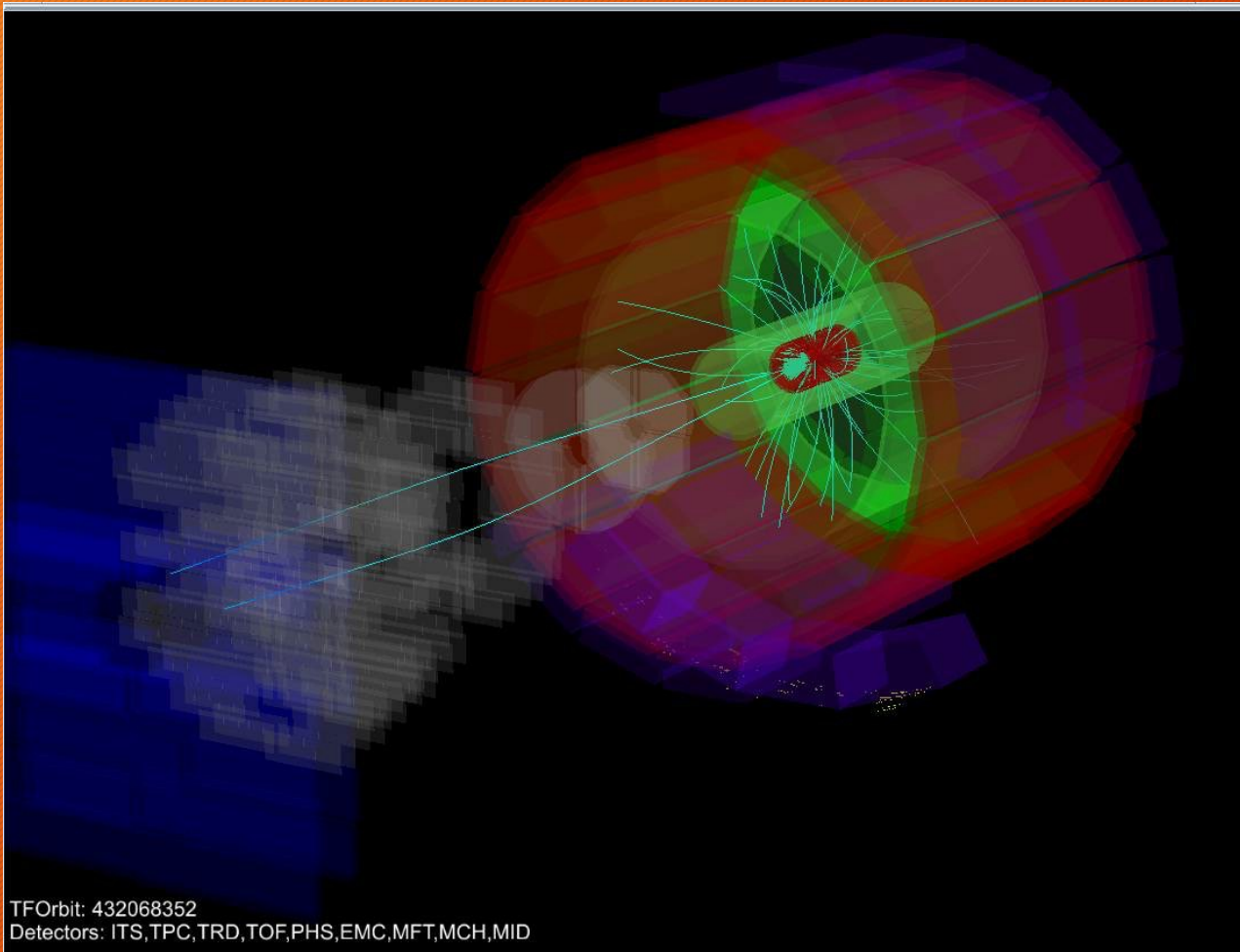
Chamber 3 half closed during installation (chamber 2 visible behind) ↓



Stations 4 and 5

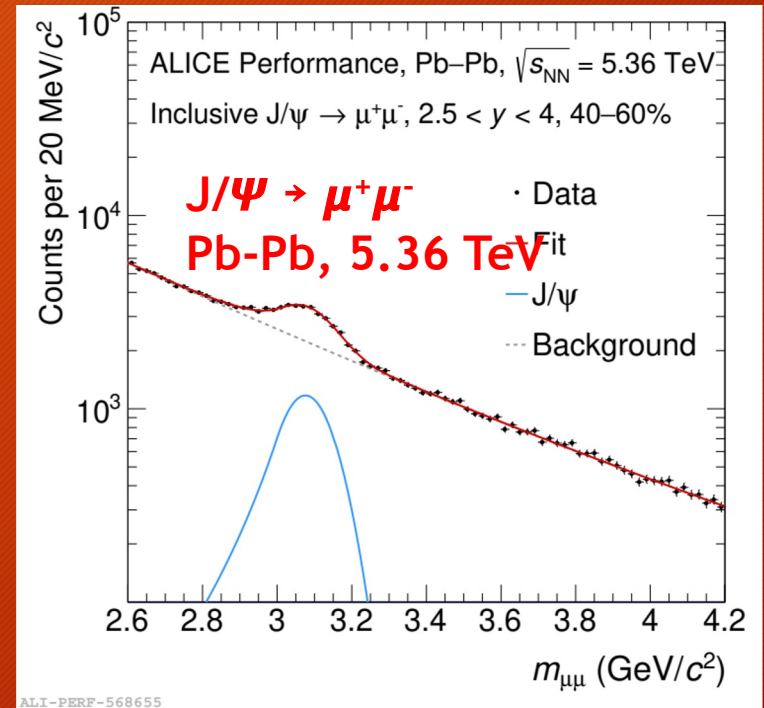
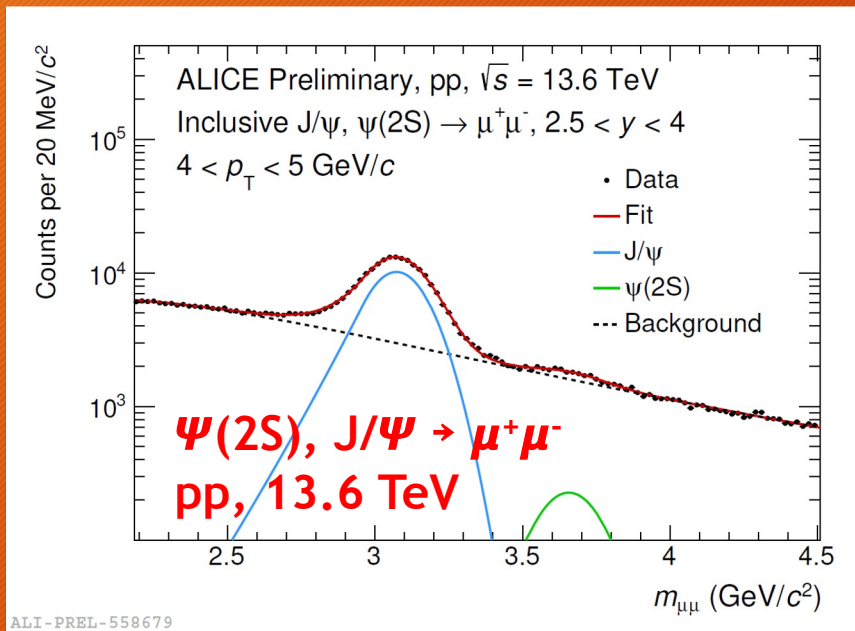


MCH data taking in pp



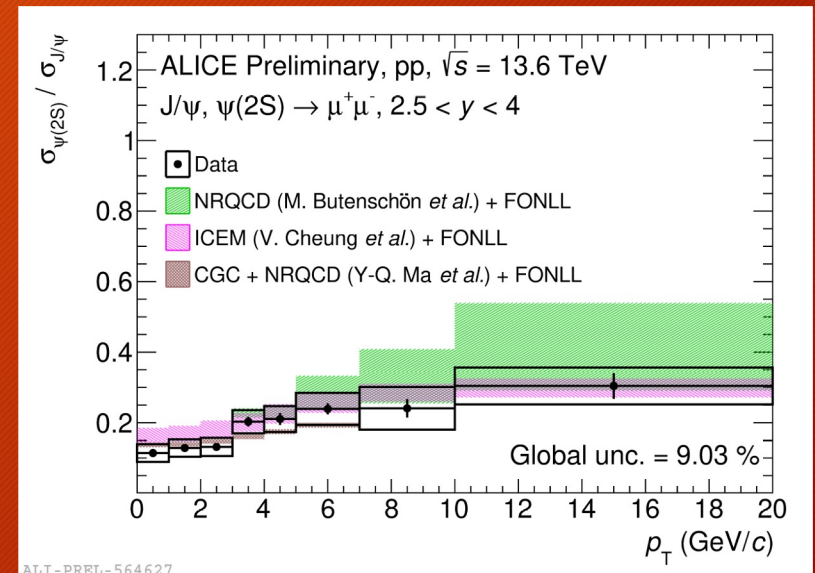
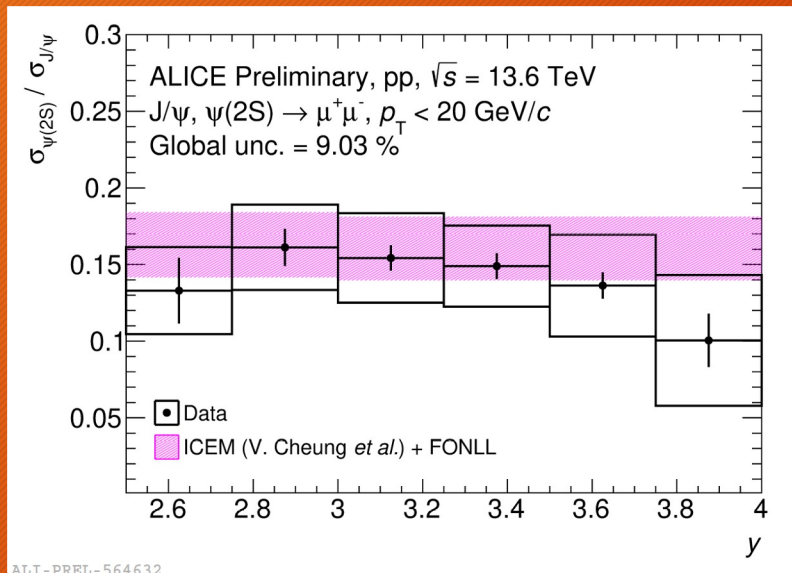
MCH in Run3: a glimpse of physics performance

- Quarkonia reconstructed in the dimuon channel down to $p_T = 0$, both in pp collisions at $\sqrt{s} = 13.6$ TeV and Pb-Pb collisions at $\sqrt{s_{NN}} = 5.36$ TeV



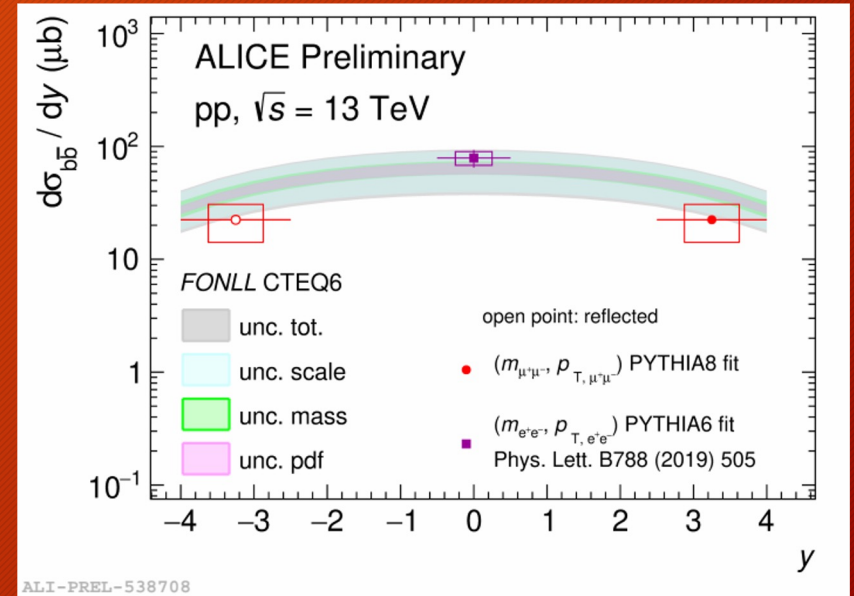
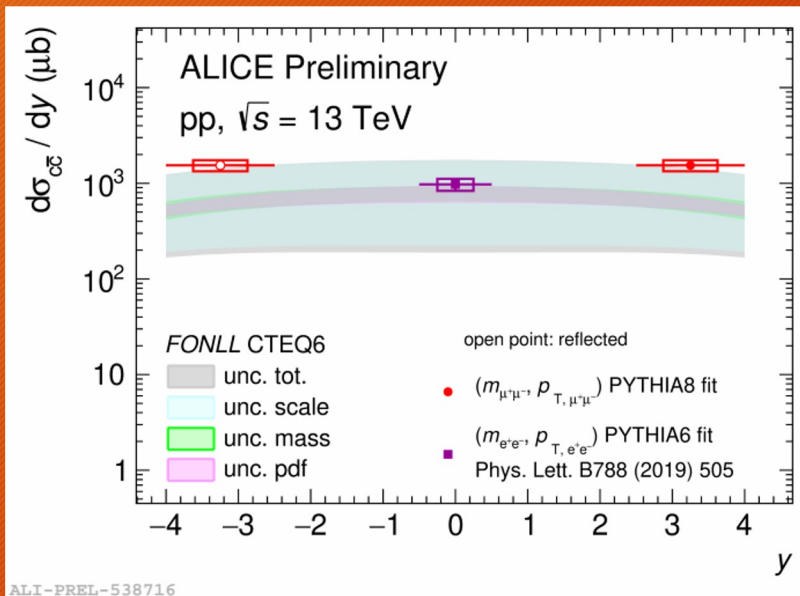
$\psi(2S) / J/\psi$ at forward rapidity - pp at $\sqrt{s} = 13.6$ TeV

- Charmonium p_T and y differential measurements using fresh collected Run3 pp data
 - constrain charmonium production mechanisms in hadronic collisions
 - input for the determination of the baseline in Pb-Pb collisions
- Preliminary measurements shown at Quark Matter 2023 and Strangeness in Quark Matter 2024
 - approved for publication by ALICE in May 2024



Charm and beauty via high-mass dimuons - pp at $\sqrt{s} = 13$ TeV

- Charm and beauty quark pair production cross sections based on Run2 pp data (13 TeV) extrapolated from high-mass ($m_{\mu\mu} > 4 \text{ GeV}/c^2$) continuum dimuons at **forward rapidity**
 - Simultaneous unbinned fit to $p_T^{\mu\mu}$ and $m_{\mu\mu}$ distributions from data via a cocktail of templates (estimated from PYTHIA 8) to account for the different signal and background sources
- Results in agreement within uncertainties with FONLL, although they lie at the upper (lower) edge of the uncertainty band for charm (beauty) cross section
 - approved for publication by the ALICE collaboration



MCH status

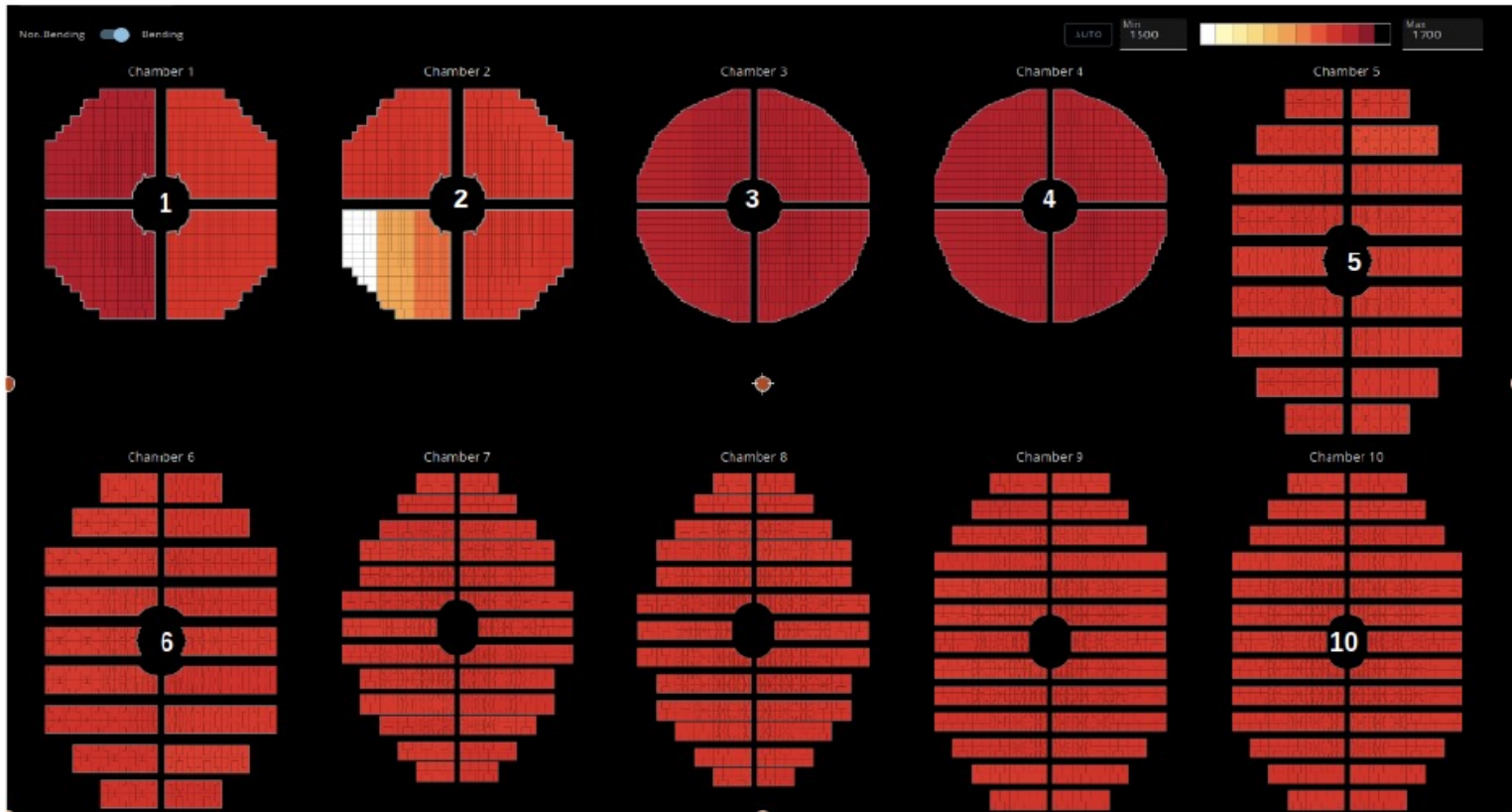
- **MCH ha funzionato regolarmente durante tutte le prese dati del 2023 e 2024**
 - HV + LV generalmente stabili
 - Tuttavia ancora alcuni problemi con gli alimentatori LVPS Wiener.
 - Alcune sostituzioni e riparazioni richieste (fondi M&OB)
- **Attività in caverna durante lo stop invernale**
 - Sostituzione flussimetri causa malfunzionamento
 - Nuovo controllo umidità installato durante lo stop invernale
 - Stazione 3: pulizia fibre. Connessioni LV controllate. Problemi di configurazione → sostituzione di diverse SOLAR boards
 - Stazione 4: apertura e riparazioni su CH7R e CH8R
 - Stazione 2: manutenzioni del gruppo indiano in dicembre e febbraio
- **Alcuni interventi richiesti anche durante TS1 (Technical Stop) nel 2024**



Situazione HV nel 2024

All nominal HV (same as 2023) :

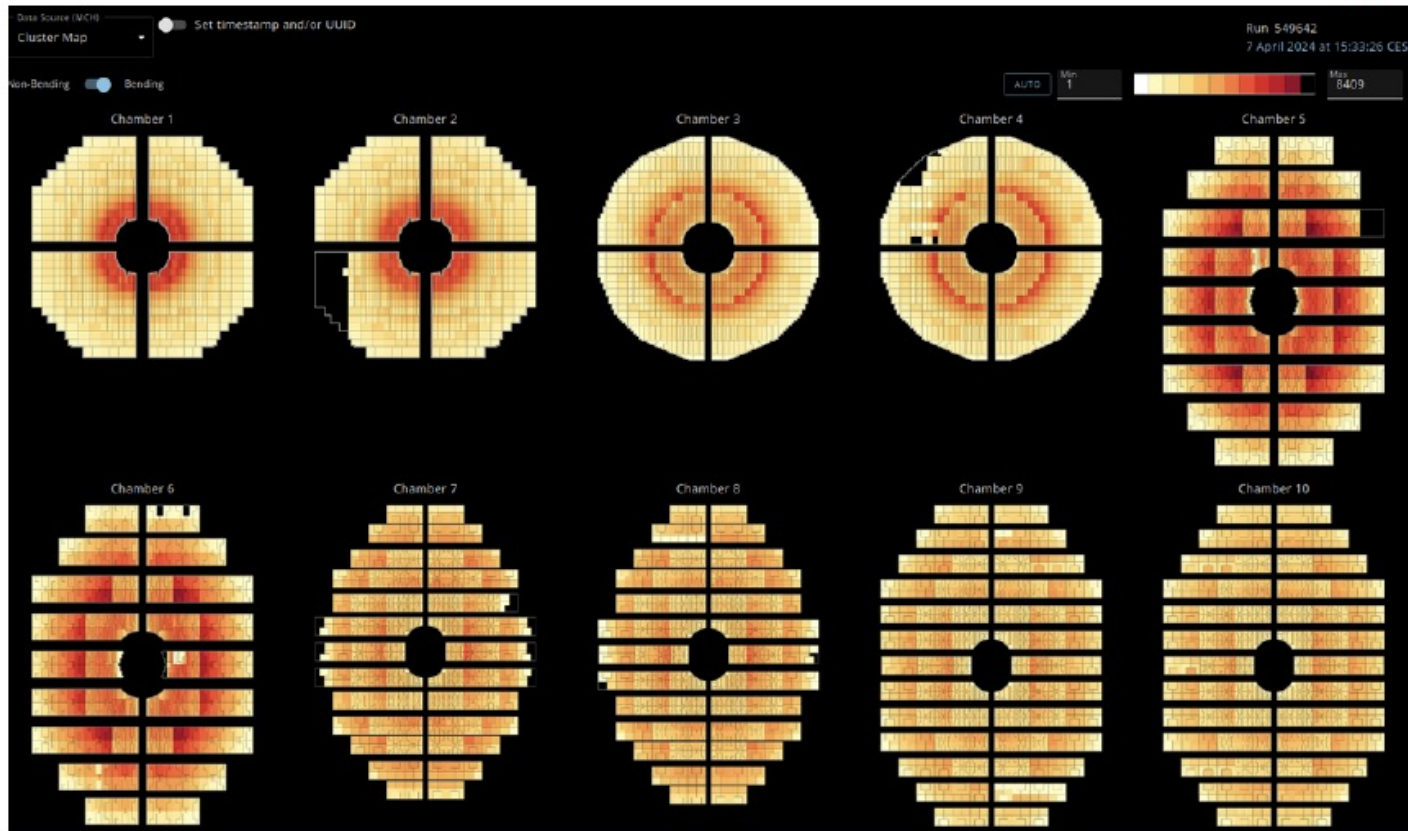
- Ch1 (1675V and 1650V), Ch2 (1650V + customs settings on a high gain quadrant - 1 sector OFF), station 2 (all at 1675V) and stations 3,4,5 (all at 1650V)



Allineamento

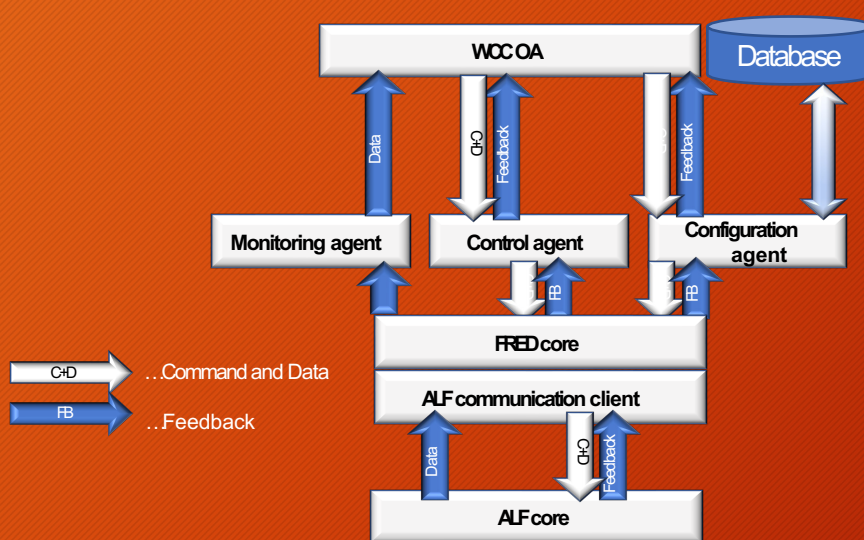
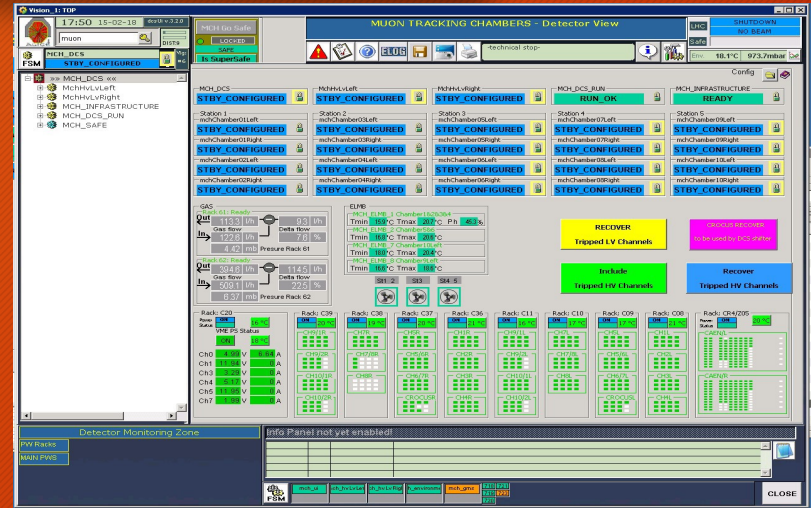
Runs with B field-off taken 7/4/24

- almost 6 hours of data taking at 10kHz
- estimate of 6×10^6 matched MID-MCH tracks (same as 2023)
→ sufficient statistic in all Detection Elements : **OK for MCH alignment**



Detector Control System (DCS)

- Siamo responsabili del DCS del tracking (M.Arba)
- Nel 2024: Manutenzione
- Nel 2025: Riscrittura script di configurazione dell'elettronica in modo da renderlo più efficiente e più facilmente upgradabile. Intervento sul FRED Server (interfaccia tra il DCS e le CRU) per cambio configurazione da gestione per ogni singolo detector a parte commune ad ALICE e parte con gestione Muon Arm.



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- WINCC tasks**
 - Full control functionality
 - Alert handling
 - Configuration
 - Control and Monitoring
 - Archival
 - User interface
- FRED tasks:**
 - Execution of macro commands
 - Translates complex DCSsubscriptions to ALF commands
 - Can decode and analyze data
 - Publishes data to WINCC (possibility to add smoothing)
- ALF tasks:**
 - Basic I/O
 - Translation of commands (read I2C) into atomic I/O operations
 - Possibility to execute periodically
 - No detailed knowledge on detector structure

Richieste per il 2025 (MCH+ZDC)

Composizione del gruppo ALICE Cagliari:

- 6.6 FTE (calo rispetto al 2024, causa fine dottorato). Richieste due deroghe al 70% (NA60+)
- 4 incarichi di responsabilità (2 L2 + 2 L3)
- Le richieste per turni, meeting, responsabilità, sono in linea con le tabelle di ALICE Italia

Richieste specifiche Missioni:

- Per interventi sull'apparato (MCH e ZDC): 8 kEuro

Richieste specifiche consumo:

- 5.5 keuro auto CERN x turni e oncall
- 1.5 keuro consumo per interventi su MCH e ZDC

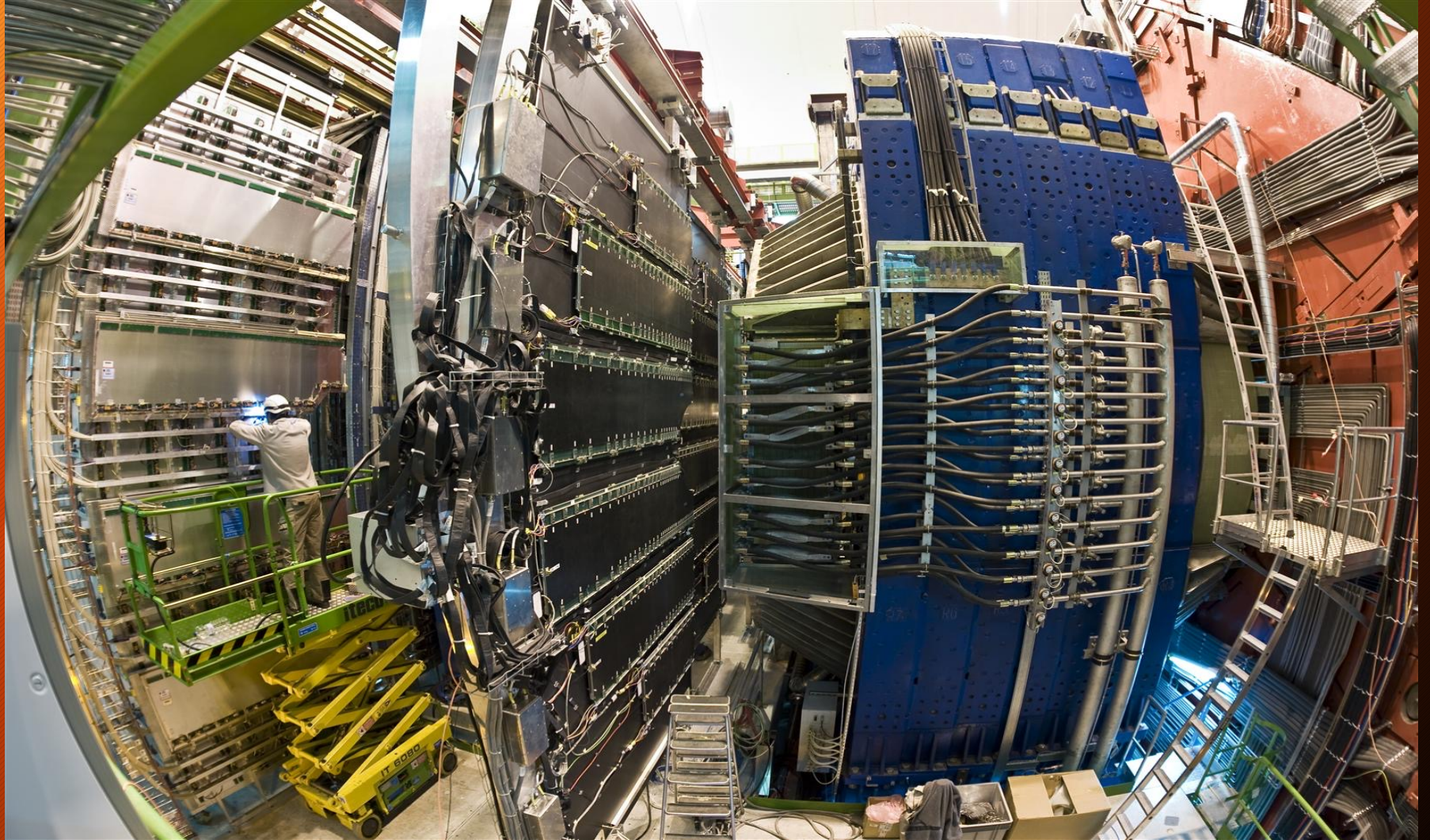
Richieste CAGLIARI 2025

Capitolo	Descrizione	Parziali (K-EUR)	Totale/Cap (K-EUR)
apparati	Acquisto 3 CRU (18keuro) +DSE (Detector Service Board) per equipaggiare 1/2 Half Barrel (24keuro)	42.00	42.0
consumo	Auto CERN per spostamenti interni degli shifter e del personale oncall	5.50	
consumo	Richiesta specifica per componenti per la riparazione dei rivelatori esistenti	1.50	7.0
Missioni	M.E.: Viaggi legati a incarichi di responsabilita' (coll.board, PWG-DQ, team leader)	12.0	
Missioni	M.E.:Partecip Alice Week, Offline W., Alice Phys.W., meeting Phys. Working Groups (0.5m.u.per FTE, per 6.6 FTE)	17.00	
Missioni	Partecipazione a riunioni ALICE Italia e contatti scientifici (1 keuro per 6.6 FTE)	6.50	
Missioni	M.E. interventi tecnici sul sistema di tracking e sullo ZDC durante gli shutdown	8.00	
Missioni	Partecipazione al RUN (shift e on call) (0.64mp*8 M&OA)	26.00	
Missioni	Richiesta specifica per test beam ITS3 (18ggx4persone)	12.50	82.0
speservizi	MU-TRACK contributo agli M&O-B, previsto nella riunione RRB di Aprile 2024	26.00	26.0
trasporti	Trasporto e spedizione CA-CERN e viceversa di materiale per test ITS3 e manutenzione ZDC e MTrack	2.00	2.0
Totale			159.0

Conclusioni

- Upgrade elettronica concluso 2022
- Il muon arm ha funzionato correttamente durante tutte le prese dati del 2023 e 2024
- Alcuni problemi su rivelatori hanno richiesto interventi durante lo stop invernale
- Sostituzione e riparazione di alcuni moduli Wiener Low Voltage. High Voltage regolari con pochissimi trip
- DCS. Interventi di manutenzione e miglioramento
- Richieste finanziarie 2025 in linea con le tabelle della collaborazione
- Richieste specifiche sulla base degli interventi normalmente richiesti

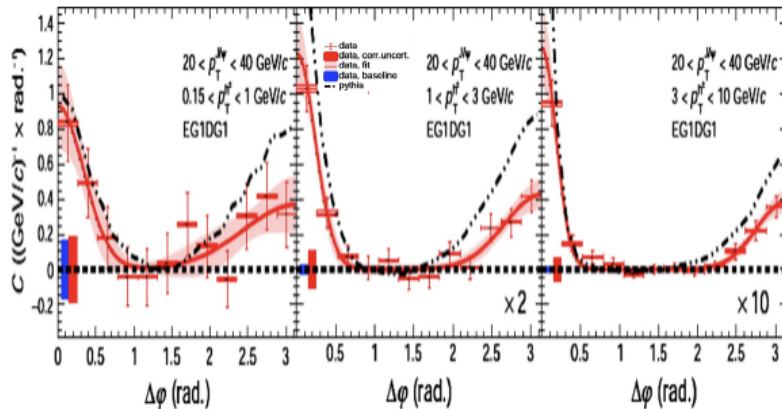
END



Physics Analysis 2023/24

Finalization of J/ψ-hadron correlation analysis publication (Lucas's Altenkamper thesis) based on Run 2 data (full pp statistics collected in pp at 13 TeV, including MB and HM / TRD triggered data)

❑ Publication in post collaboration round 1, expected to be published by Hard Probes (September 2024)



- J/ψ-h correlation function:

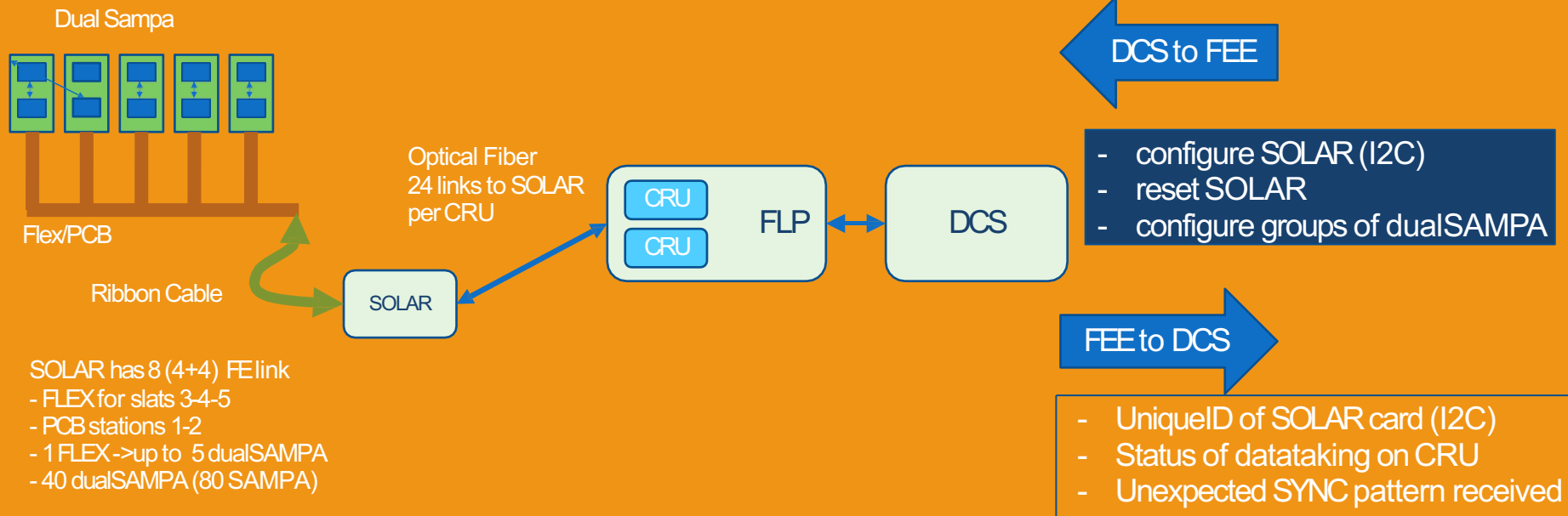
$$C(\Delta\eta, \Delta\phi; p_T^{J/\psi}, m_{e^+e^-}, p_T^{h^\pm}) = \frac{1}{N_{\text{trig}}} \cdot \frac{S(\Delta\eta, \Delta\phi)}{B(\Delta\eta, \Delta\phi)} \cdot B(0, 0)$$

Data analysis in pp collisions at 13.6 TeV (Run3 data):

- ❑ Prompt and non-prompt J/ψ separation at midrapidity
- ❑ J/ψ-hadron correlation analysis in pp collisions at 13.6 TeV (Run 3)

F. Fionda: deputy Physics coordinator of ALICE from June 2024

CONTROL AND CONFIGURATION THROUGH DCS



- SOLAR has 8 (4+4) FElink
- FLEX for slats 3-4-5
 - PCB stations 1-2
 - 1 FLEX -> up to 5 dualSAMPA
 - 40 dualSAMPA (80 SAMPA)

Numbers are different for the 5 stations:
Every ALF: (max) 48 SOLAR
1900 DS, 3800 SAMPA

Credits to Mauro ARBA – INFN Cagliari