



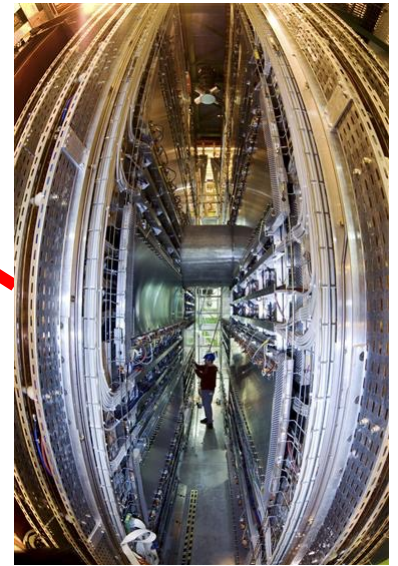
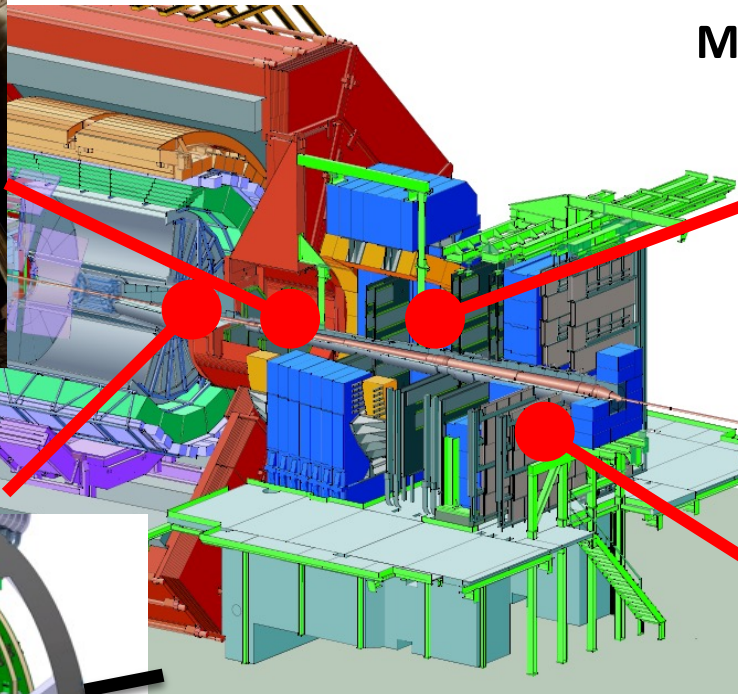
# The Muon Tracking Upgrade

15 luglio 2021

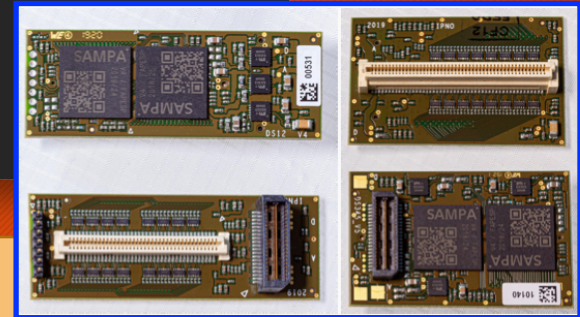
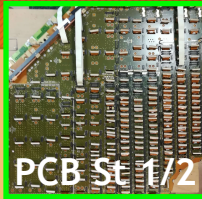
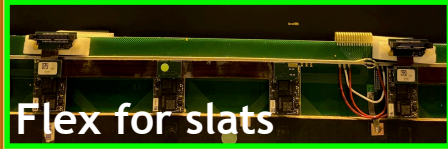
Corrado Cicalò - Cagliari

Corrado Cicalò - Cagliari

# Il muon tracking

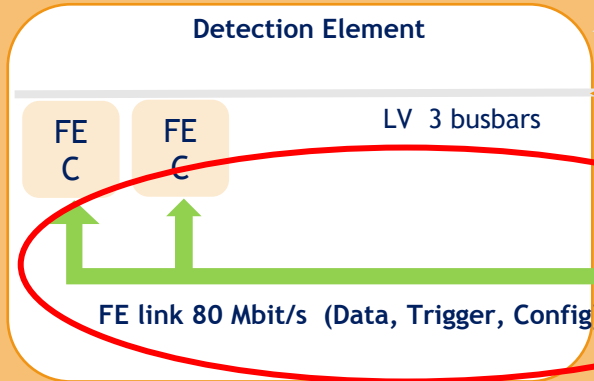


# MCH upgrade project



DualSampa FEC

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



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

Cavern

LVPS  
WIENER  
PL512

HVPS  
No change

Filter  
box

DCS

SOLAR  
700

30  
CRU  
FLP (O2)

LTU ↔ CTP

GBT link  
3.2 Gbit/s

SAMPA: Brazil  
CRU: Hungary, India

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



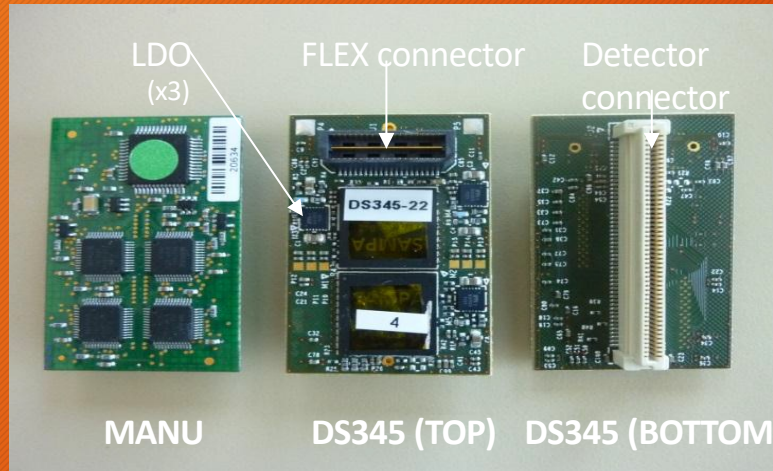
SOLAR board

Control room



# MCH Upgraded Readout - DualSAMPA Front-end Boards

IPN Orsay

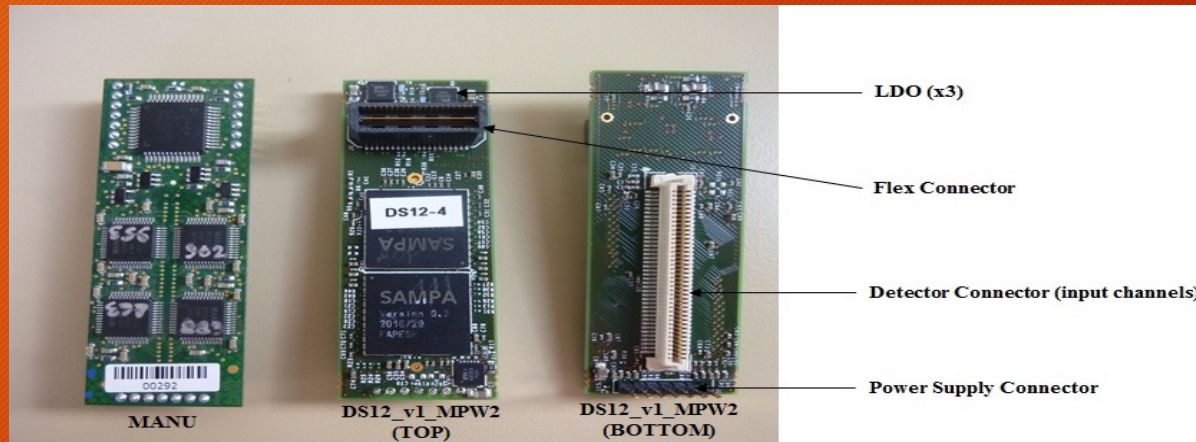


2 SAMPA chained on one DualSAMPA board

2 types of DualSAMPA:

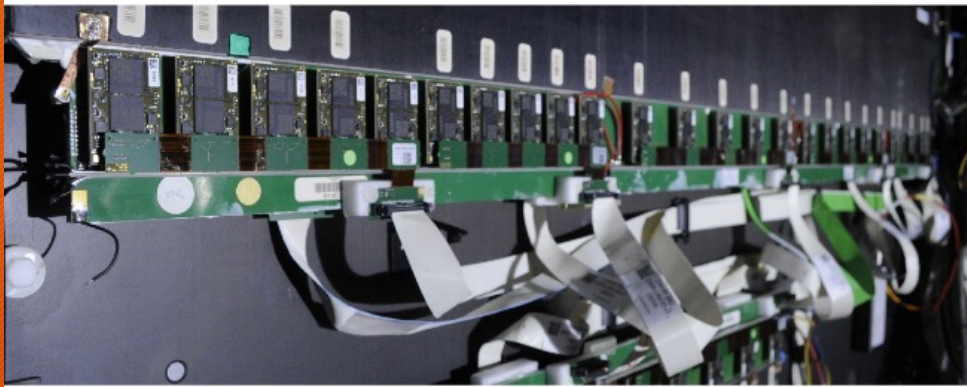
DS12 for quadrants,

DS345 for slats



# Istallazione in caverna stazioni 3,4,5

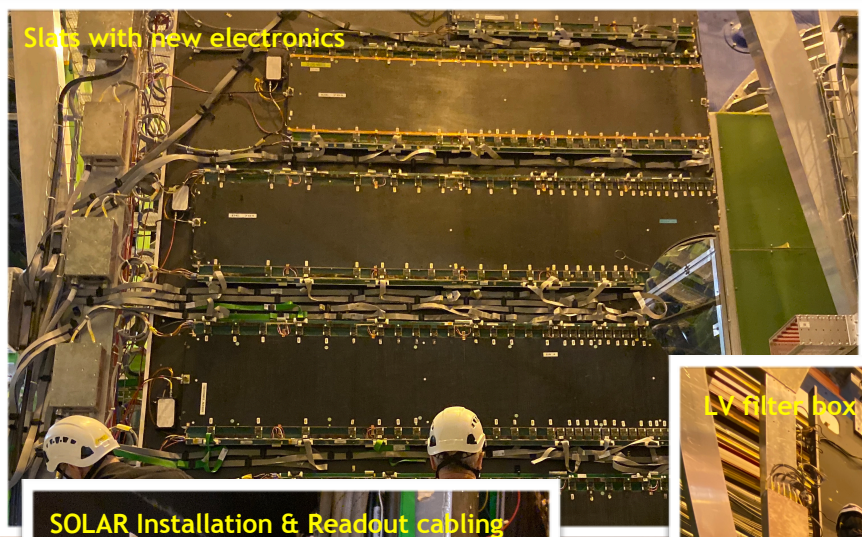
**FLEX/DS345 installation and glueing of FLEX supports**



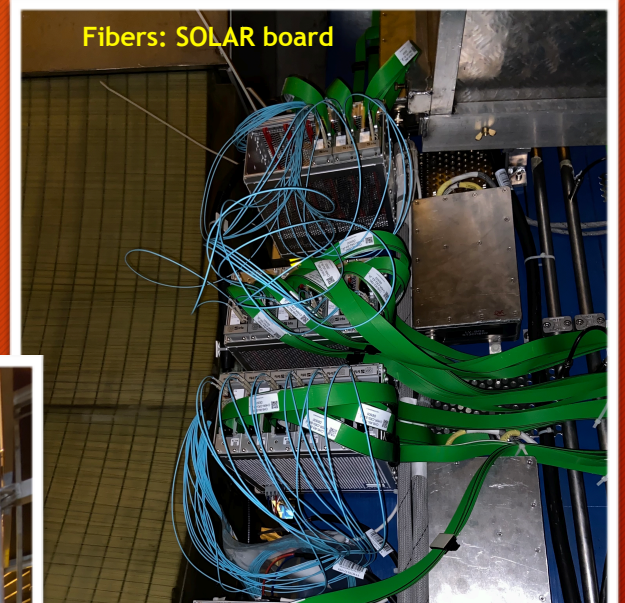
# Istallazione in caverna stazioni 3,4,5

Istallazione terminata. Il sistema è attualmente pronto per il Commissioning Globale

Slats with new electronics



Fibers: SOLAR board



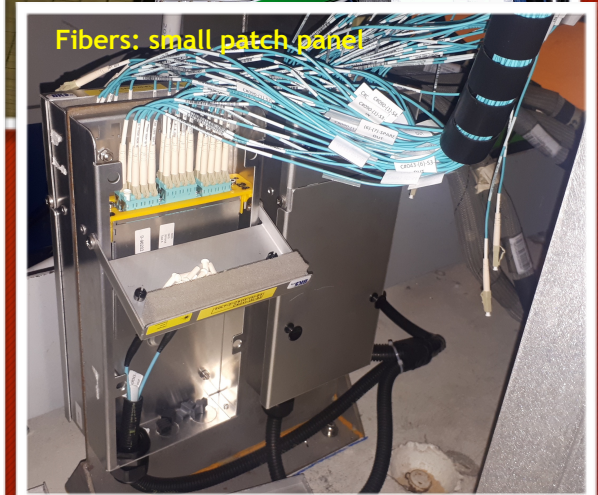
LV filter box cabling



SOLAR Installation & Readout cabling

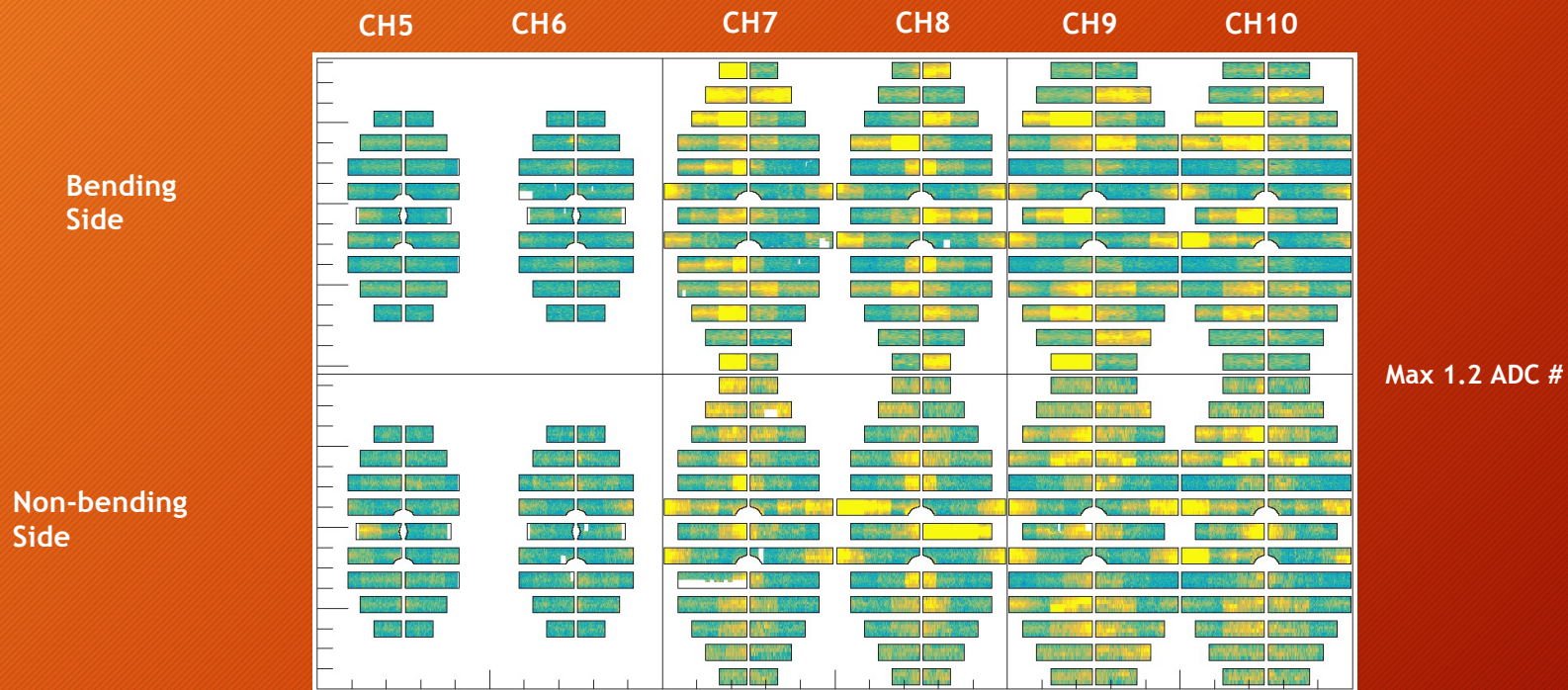


Fibers: small patch panel



# Station 3,4,5 installation status

- Stations 3,4,5 ready for global commissioning
  - Installation finished
  - Gas, HV, full readout checked

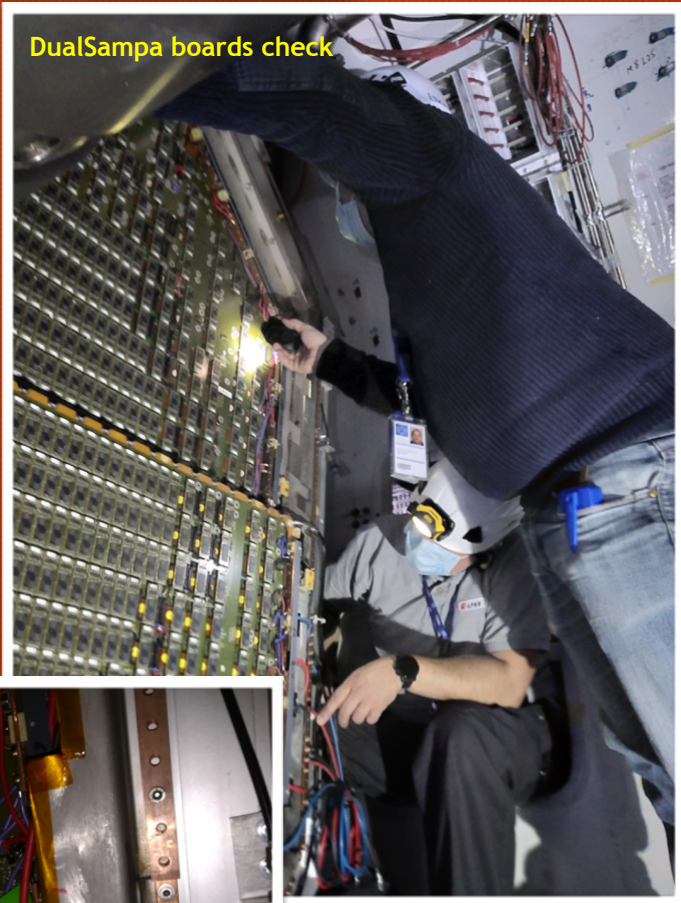


- Ongoing activities (small fixes)
  - ▶ Reducing gas leakage (CH7R/CH10R)
  - ▶ LV cable CH9L need to be repaired
  - ▶ About 10 flexes with readout issues => to be fixed
  - ▶ Noise studies



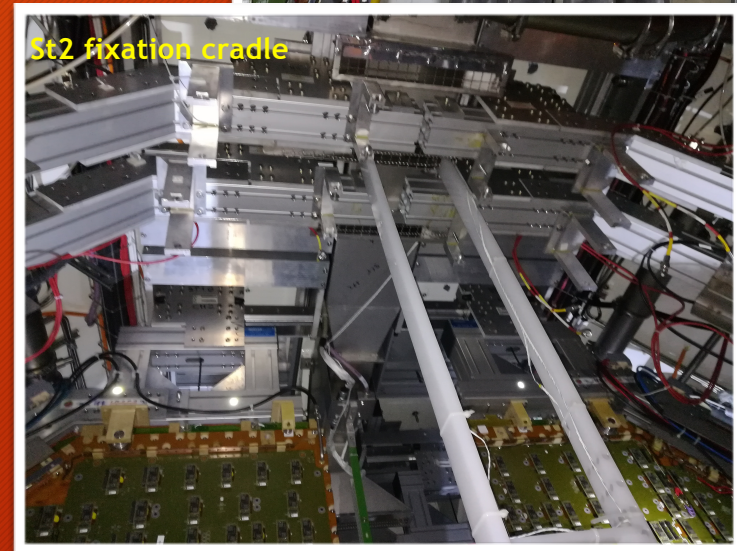
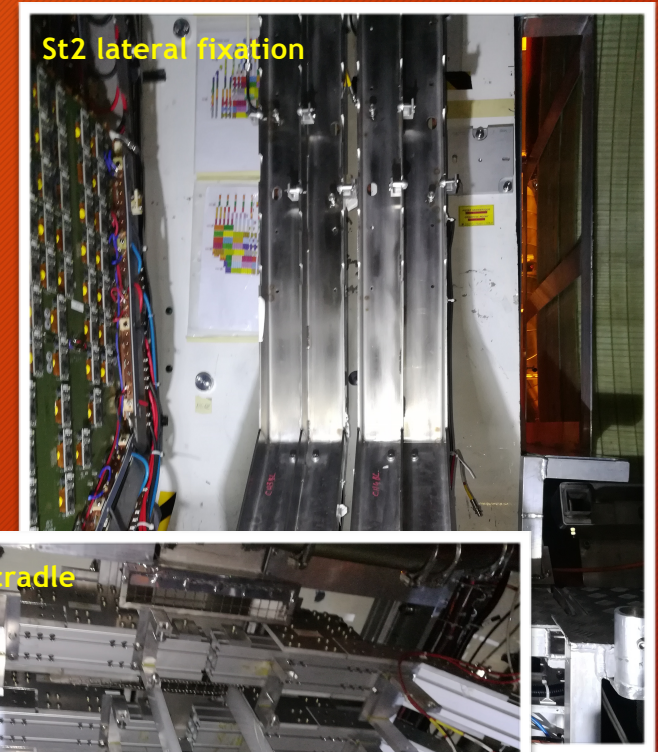
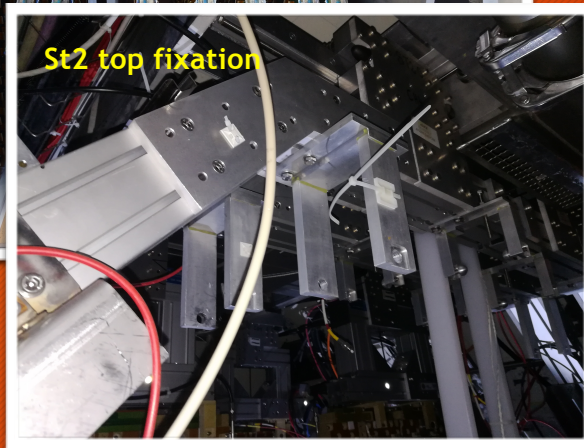
# Station 1 installation status

- Detectors
  - Mechanical installation done
- Gas & HV
  - Gas leaks are OK
  - HV OK @ 1650 V (nominal)
- Cabling and readout
  - Three quadrants cabled and tested
  - Nominal noise ( $\sim 0.5$  ADC ch)
  - Other quadrants readout cabling ongoing



# Station 2 Installation preparation

- Responsibility of Kolkata colleagues
  - Travels issues due to pandemic
  - Help from Orsay + personnel on site: Install. starts on July 19th
- Station 2 vs Station 1
  - Fixation mechanics quite similar to St 1 and cabling as well
  - Reduced space between quadrant and support



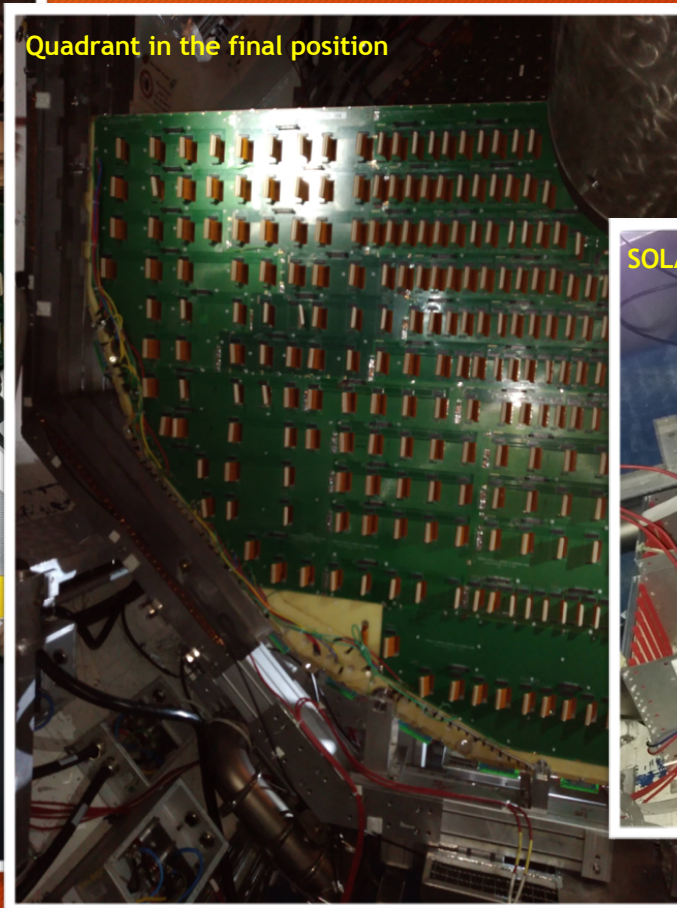
# Station 2 Installation preparation

- Quadrant insertion test (w24)
  - Check the mechanics & cabling placement
  - Spare quadrant used
  - Some SOLAR crates needs to be moved (preventing to properly open chamber 3) => ongoing

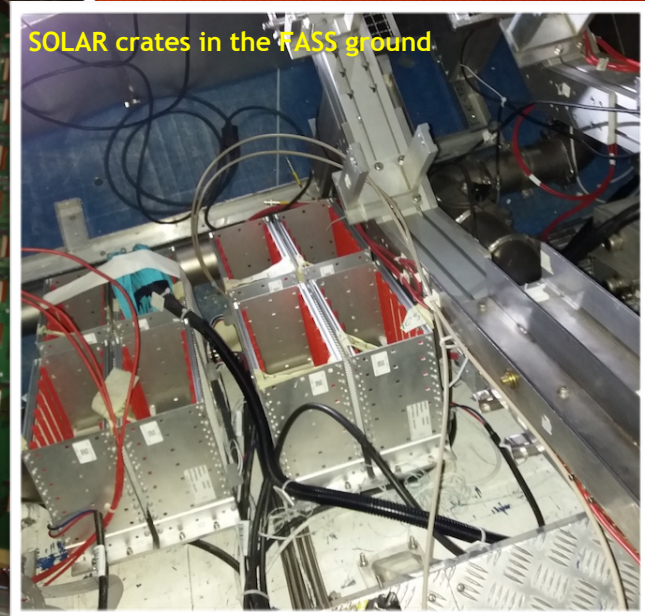
Handling the quadrant



Quadrant in the final position

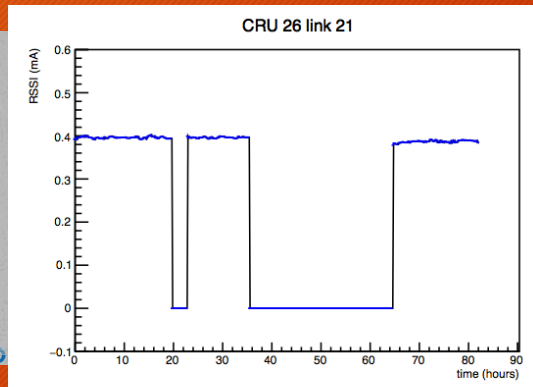
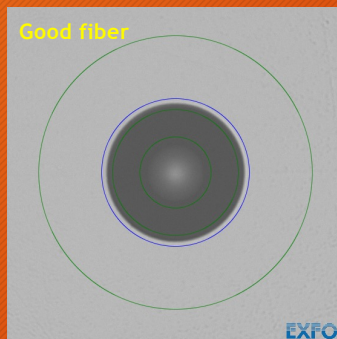
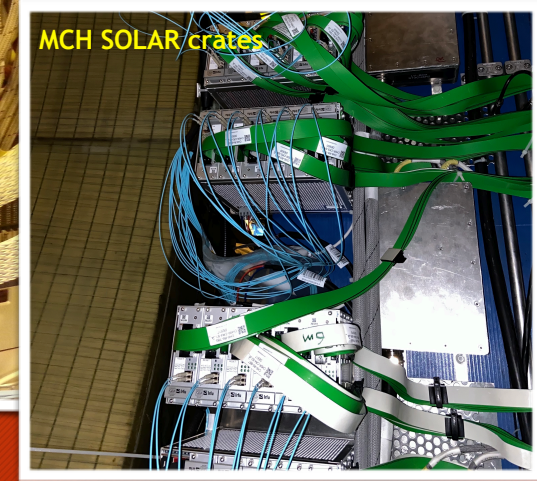
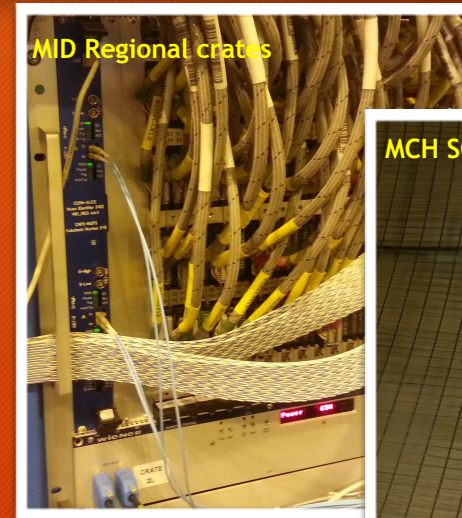


SOLAR crates in the RASS ground

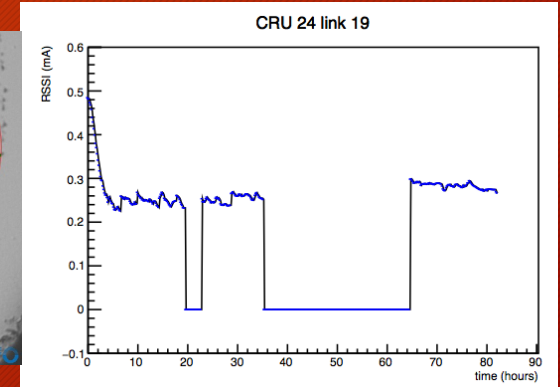
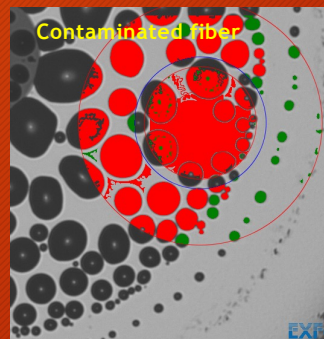


# VTRx optical fibers contamination

- Fibers contamination observed
  - Due to the outgassing of some component
  - Happen at temperatures  $> 35^{\circ}\text{C}$
  - **Solution: Cooling / Cure the components**
- MID
  - The 32 VTRx are located in ventilated crates
  - Crates located in gangways on the upper sides of the MID planes
- MCH
  - 624 VTRx mounted on SOLAR boards in 115 crates.
  - Crates not ventilated (unless the FASS one's). All are accessible



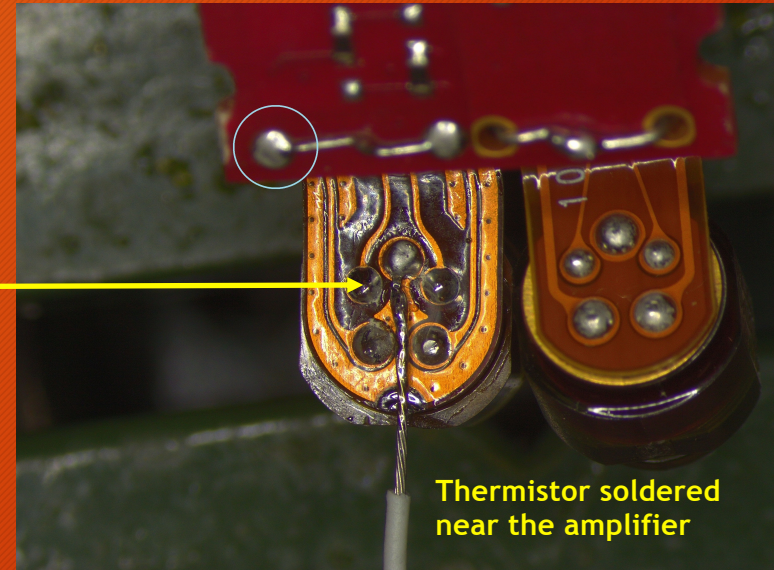
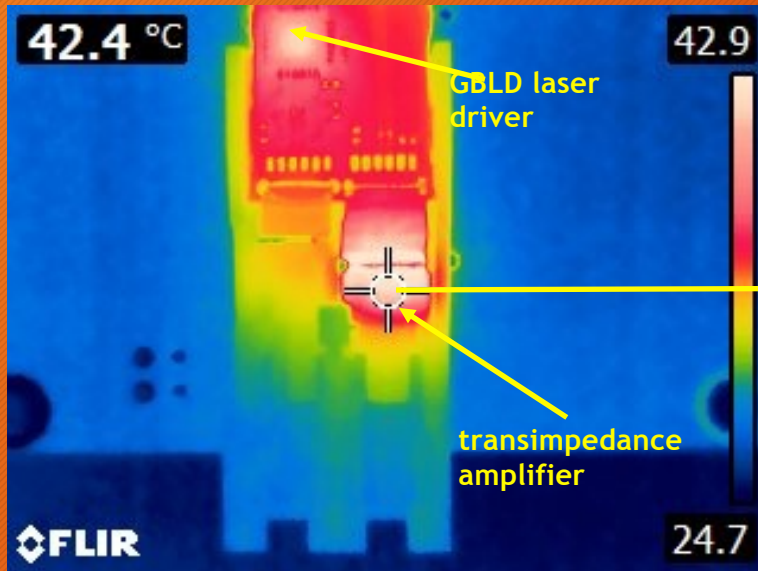
VTRx RSSI monitoring current **high and stable**



VTRx RSSI monitoring current **unstable** but still rather high and flattening

# VTRx Temperature measurements

Typical VTRx temperature distribution without cooling



- Temperatures measured on the MCH SOLAR boards:
  - SOLAR crate in FASS, direct cold air ( $\sim 20^\circ$ ): VTRx at  $-33^\circ$
  - SOLAR crate in FASS, no direct cold air: VTRx at  $-39^\circ$
  - SOLAR crate on ST5, no air cooling: VTRx at  $-45^\circ$
- Temperature measured on MID cards
  - Depends on VTRx position (2 per card): Bottom  $32^\circ-33^\circ$ , Top  $39^\circ-40^\circ$

Cooling  
Baking



No link failure observed so far

# Time Planning

- St. 3,4,5 conclusione installazione e commissioning locale: Jun 2021
- stazione 1: in corso di completamento
- stazione 2: in ritardo causa trasferte gruppo indiano. Inizio 19 Jul 2021 con supporto del gruppo di Orsay
- MCH Pre-global commissioning: in corso
- Problema VTRx: 'baking' in due lotti entro ottobre
- inizio commissioning globale: Lug 2021

# Milestones

**INSERIRE COMPLETAMENTO AL 30/06/21 e COMMENTI IN COLONNA H**

Milestones 2021						
		Data	Descrizione	Completamento al 30.06.2021 (%)	Completamento al 31.12.2021 (%)	Commenti al 30/06/2021
1	MCH	28-feb-2021	Fine installazione stazioni 3,4,5 e	100%		
2	MCH	31-mag-2021	Pre-global commissioning del Muon Tracker	80%		Completamento test DCS e sostituzione VTRx

Milestones proposte per il 2022 MUTRACK

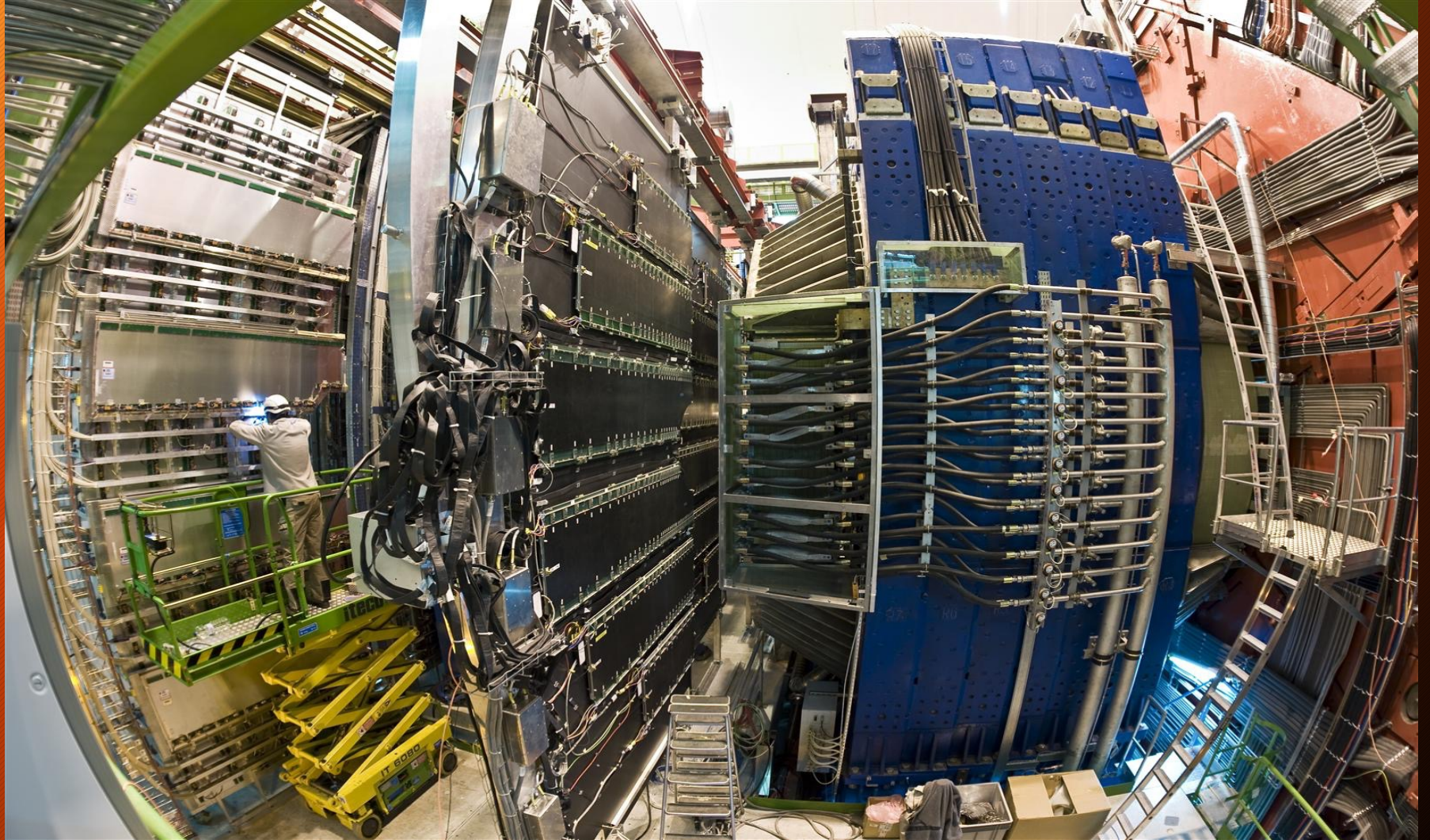
1) Partecipazione alle prese dati pp e Pb - Pb

# Richieste per il 2022

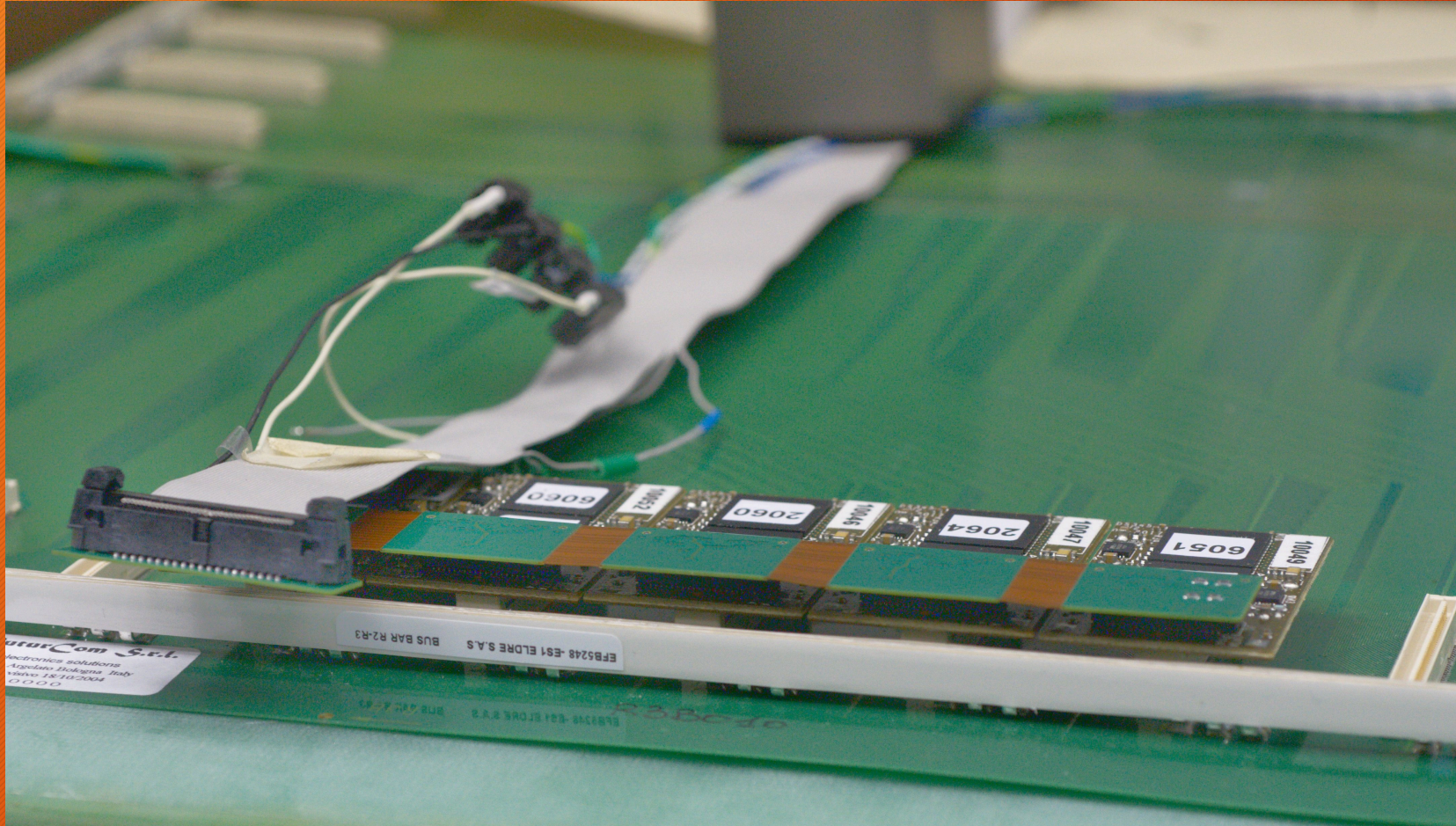
- **Aumento composizione del gruppo ALICE Cagliari (da 14,0 a 15,5 FTE)**
- **Sigle Sinergiche: CA\_2020, PON(Usai)**
- **Richieste specifiche Missioni:**
  - Per completamento commissioning globale e interventi sull'apparato: 5 m.p. → 25.5 keuro (CERN)
- **Richieste specifiche consumo:**
  - 4.5 keuro auto CERN x turni e oncall
  - 1.5 keuro consumo per interventi su MCH (e ZDC)



# END



# FLEX Board test

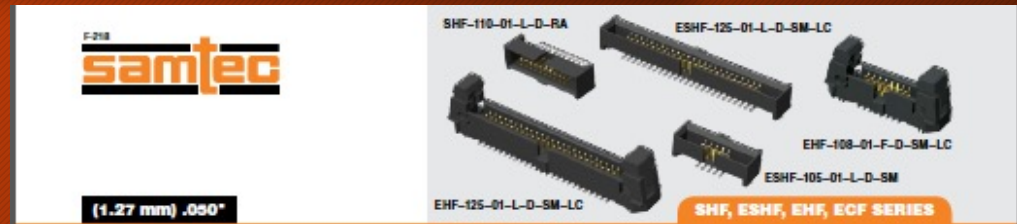


# Produzione FLEX: completata

- 3000 pezzi, 26 tipologie, 16 kit (raggruppamento codici)
- Gara vinta dalla SOMACIS di Ancona. 137 keuro.
- Primi lotti: 20/7/2019. Fine produzione: settembre 2019
- Consegna al CERN



# Connettori FLEX - Dual SAMPA - CAVI FLAT

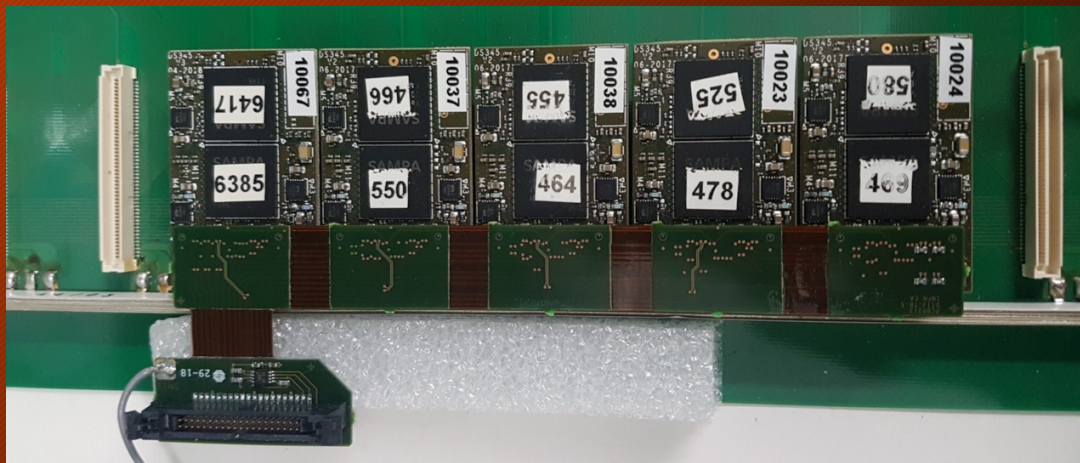


- 12000 connettori SAMTEC (DS-FLEX) QSE-020-01-L-D-A
- 5000 connettori SAMTEC (FLEX-Ribbon) EHF-120-01-L-D-SM
- Assegnazione 2018: 45keuro.
- Vincitore gara: ADELSY(distributore SAMTEC).
- Acquistati e consegnati al CERN



# Montaggio FLEX: completato

- Budget INFN 32keuro
- Montaggio connettori (SMD) + componenti : BA.EL. (Ancona)
- Completato: Ottobre 2019
- Tutti i FLEX montati sono stati testati dal nostro personale (al CERN). Su 3000 pezzi solo 2 difettosi. Lavoro concluso a Gen 2020



# Cavi FLAT (Ribbon) - connessione FLEX - SOLAR

- Circa 3000 cavi FLAT (RIBBON) di lunghezze comprese fra 1.7m e 4.5m
- Totale circa 11 km di cavi
- CERN Safety Compliance: non è possibile usare gli stessi cavi attualmente installati
- Lavorazione presso l'atelier CERN
- Ordine eseguito per cavi e connettori.
- Completati i cavi per le camere 5,6,7,8,9,10
- In lavorazione quelli per le stazioni 1,2

