

# Update from Technical Coordination: material procurement and new solutions

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*Centro Fermi*

# Summary

- Material requests
- New power supply
- Temperature and pressure monitoring
- New FEA cards
- HV boxes
- “Masking” of noisy channels
- Setup for task force
- Telescopes material

# Material requests

Last stations completely equipped:

- ◆ BOLO-05
- ◆ CARI-01
- ◆ CAGL-04
- ◆ GENO-01
- ◆ LODI-03
- ◆ TORI-05

Site with all needed information for technical coordination

<https://sites.google.com/centrofermi.it/3etech/home>

Material request

\* Required

your email address \*

Your answer

Telescope ID \*  
example: ALTA-01

Your answer

Request (multiple choice is possible) \*

VME crate

VME bridge

TDD 64 ch

TDC 128 ch

Trigger card

FEAs

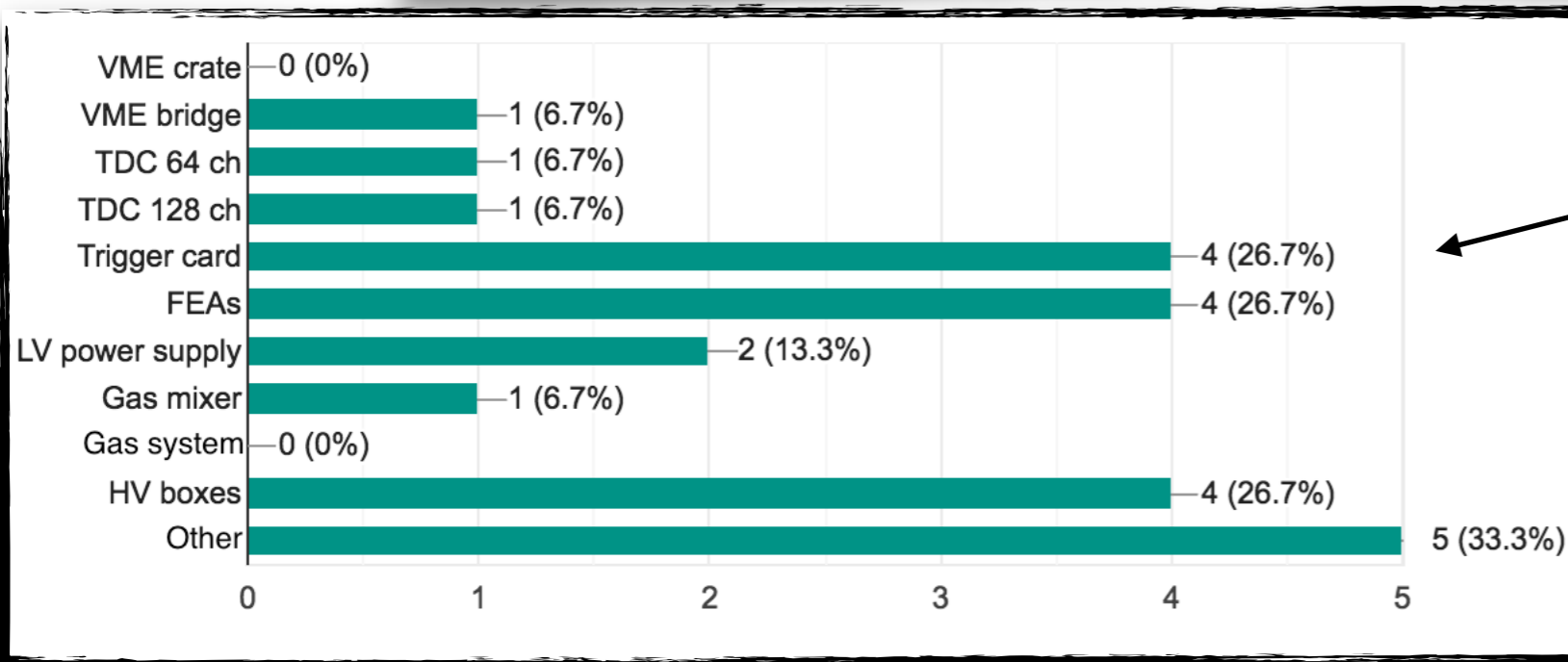
Gas mixer

Timestamp	Telescope ID	Trigger card, FEAs, notes	Please specify the number of needed FEAs	Notes - please ask here the material not included in the list or other special needs	your email address	Please specify the number and the polarity of needed HV boxes
8/27/2018 11:08:23	LODI-03	Trigger card, HV boxes, notes		adattatori amphenol-fea, pezzi mancanti del sistema del gas. Mancherebbe anche il sistema di alimentazione a bassa tensione che però non è disponibile. Sto guardando per un possibile sostituto e ho anche parlato con la scuola della possibilità di avere almeno degli alimentatori da banco semplici.	stefano.grazzi@ge.infn.it	6 (3+3)
8/27/2018 11:09:53	GENO-01	notes		adattatori amphenol-fea	stefano.grazzi@ge.infn.it	
8/27/2018 11:13:04	SAVO-03	Trigger card, notes		Sostituzione scheda di trigger necessaria per sopperire alla mancanza della scheda gps spectracom che si è rotta. Si deve sostituire una camera già pronta al CERN (camera 30 o 31) in attesa della box	stefano.grazzi@ge.infn.it	
8/28/2018 16:48:58	BOLO-05	FEAs, HV boxes	6	6 Amphenol Cables+6 Amphenol/TDC adaptors+Remote controlled Power supply	garbini@bo.infn.it	3 positive, 3 negative
9/5/2018 16:11:58	CAGL-04	Trigger card, FEAs, notes	6 FEAs, possibly 3L 3R	Amphenol CABLES (6).	corrado.cicalo@ca.infn.it	

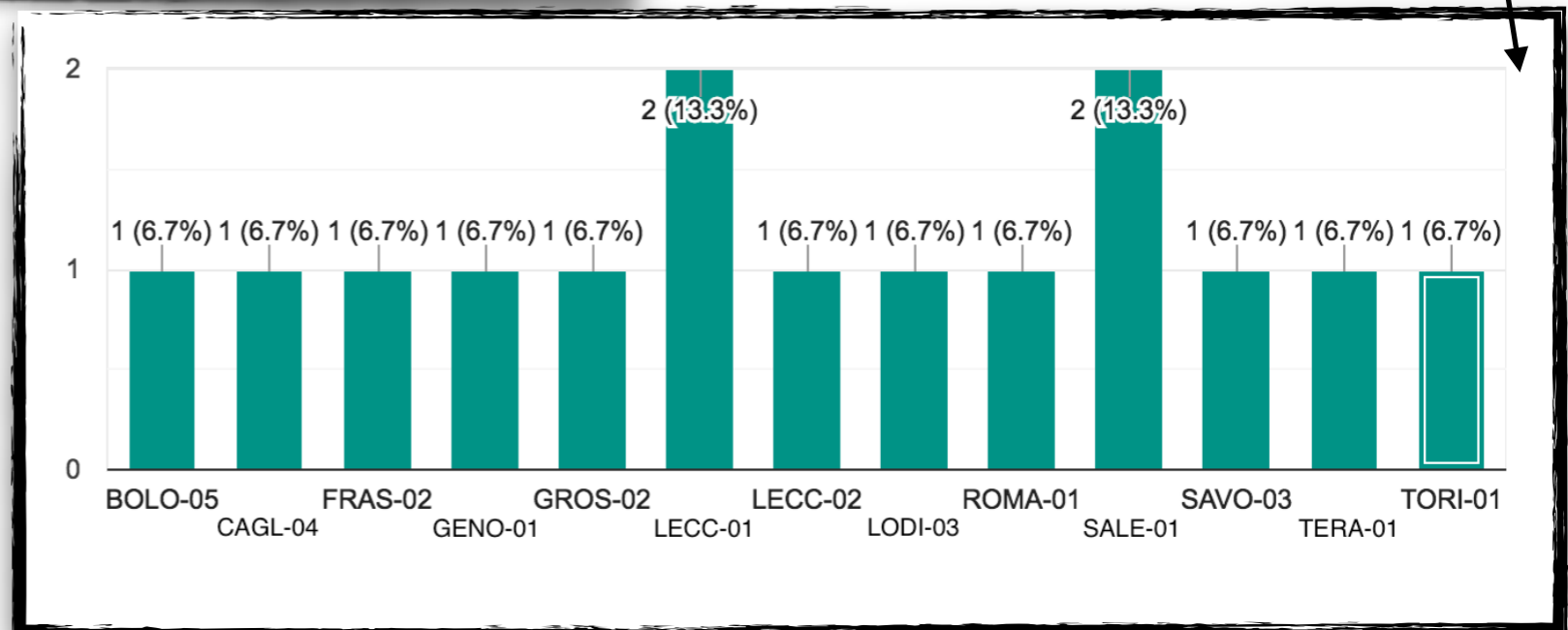
- Material requests are done via this form
- Easy tracking of requests
- Possibility to produce an **Excel sheet with a summary**

# Material requests

- Tracking requests
- Percentage of requests can help with spotting:
  - weakness in terms of material
  - telescopes requiring more interventions/replacements



Orders for new stations are listed together with replacement requests (it can be separated)



# New power supply

- ◆ Power supply (RS) with **3 independent channels** to supply **DC/DC** converters + 1 channel for **FEAs**
- ◆ **Remote control** with possibility to be connected via USB to the computer
- ◆ The cost is 649 € (2 already bought and delivered to Centro Fermi)
- ◆ **Reading voltage and currents in a separate homemade module** (N. Mazziotta, C. Pellegrino, F. Coccetti, D. De Gruttola)



## FEATURES

- 4 Independent Isolated Output ( $V_{out}$  0→30 V, 0→5 V,  $I_{out}$  0→1 A, 3 x 0→3 A)
- 4 LED Display Sets : 3 Digits After Decimal Point (IPS-2303S/3303S/4303S)
- Minimum Resolution : IPS-2303S/3303S/4303S (1mV/1mA)  
IPS-3303D (100mV/10mA)
- Digital Panel Control (Rotary Encoder Switch, Rubber Key With Indicator)
- User-Friendly Operation, Coarse/Fine Volume Control
- 4 Sets Save/Recall
- Key-Lock
- Output ON/OFF
- Tracking Series and Parallel Mode
- Smart Cooling Fan Achieving Low Noise
- Compact Design
- PC Software & USB Driver
- USB Standard Interface

~649 €

[link to RS Datasheet](#)

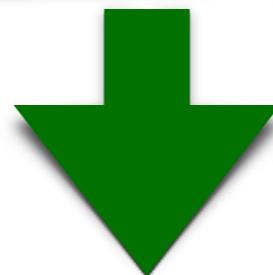
- ◆ 1 PS is under test in Lodi (S. Grazzi): **some issues with remote control** contact with RS support service
- ◆ Additional tests at Centro Fermi this week (D. De Gruttola)

# New PS and V and I monitoring

- ◆ Power supply (RS) with **3 independent channels** to supply **DC/DC** converters + **1 channel for FEAs**
- ◆ **Remote control** with possibility to be connected via USB to the computer
- ◆ The cost is 649 € (2 already bought and delivered to Centro Fermi)
- ◆ **Reading voltage and currents in a separate homemade module** (N. Mazziotta, C. Pellegrino, F. Coccetti, D. De Gruttola)



- ◆ System with Arduino (Raspberry) and ADCs
- ◆ Connected to computer via USB or Ethernet (best option)
- ◆ Possibility to connect it on the net
- ◆ **Cost <300 €**



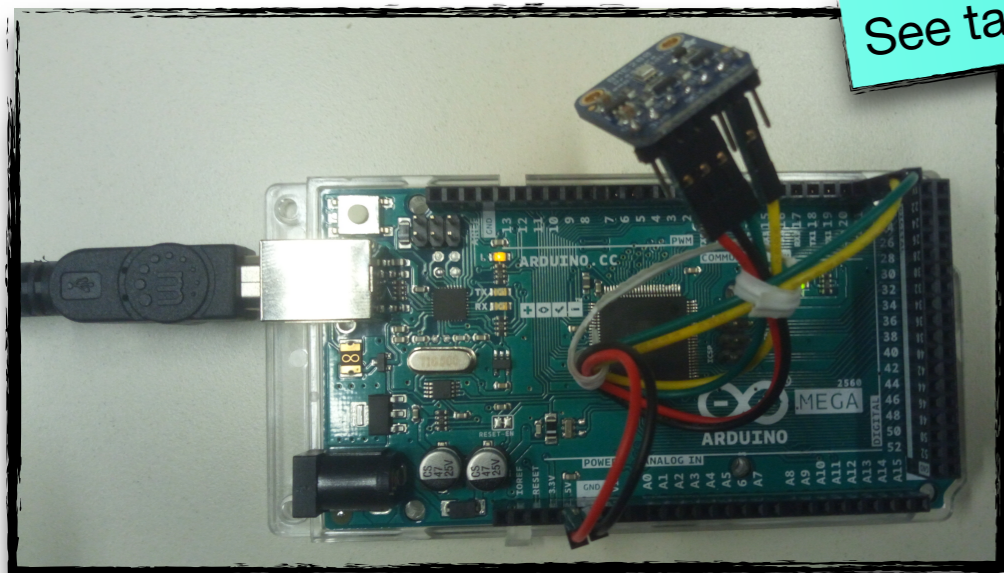
*Total cost of power supply ~ 1000 €*

Saving more than 50% wrt previous solution → possibility to supply **each single DC/DC polarity separately** by using 2 of them

# T and p monitoring

- ◆ New telescopes need sensors
- ◆ Some old telescopes have broken sensors and need new ones
- ◆ Oregon station can no longer be used (issue with software compatibility)
- ◆ Homemade solution using Raspberry (N. Mazziotta, C. Pellegrino, F. Coccetti, D. De Gruttola)
- ◆ System is almost ready (hope to use them on a couple of telescopes very soon)
- ◆ Two systems under test in Bari and Bologna

See talks by N. Mazziotta and C. Pellegrino for details



- ◆ Current situation:
- ◆ Arduino system with internal T, p and humidity Installer ready
- ◆ Data are saved in the required format for EEE DAQ
- ◆ Code working on Windows and Linux
- ◆ Code available on a repository (private at the moment)
- ◆ Ongoing work to add external T sensor
- ◆ User-friendly graphic interface

Reading of voltage and current can be easily added to this system (channel already prearranged)

Outlet power cycle could be added too

# New FEA cards

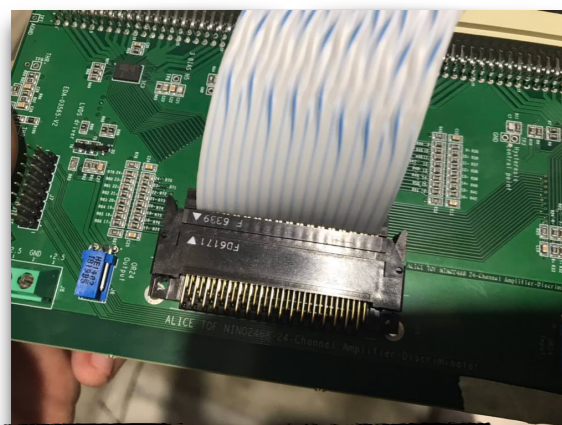
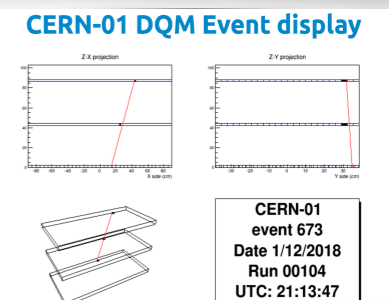
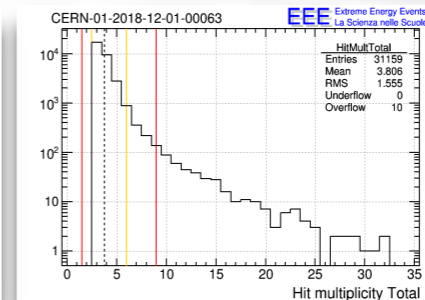
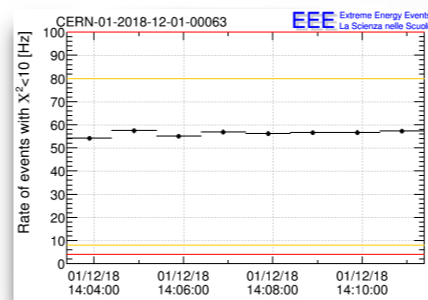
- ◆ Same technology as old cards (NINO ASIC)
- ◆ **Optimization** of PCB and new connector
- ◆ Shielded Amphenol cables needed with old FEAs
- ◆ New FEAs use **flat cables** (twisted pairs)
- ◆ Easier to handle
- ◆ No need of Amphenol-TDC adaptors used with old cards
- ◆ **160 cards** produced by an Italian Company (INGEL) and delivered at mid-November at Centro Fermi
- ◆ 160 cables and a card to test them can be done by a technician in Salerno University in the coming weeks



old FEA with Amphenol cable



Amphenol-TDC adaptor



New FEA with flat cable

- All quantities checked with DQM
- The cards **work properly** (15 bad cards will be reworked by company)
- Good quality of data in terms of telescope performance and coincidences
- **Long period test** performed on random samples (more than 1 month)
- CERN-01 taking data with new FEAs

All **160** FEAs have been **tested** at CERN in December  
They will be used on new telescopes  
All cards labelled and corresponding infos stored



FEA	Rate and Mult.	Reco	Date	File	Problem or note
1	ok	ok	01/12/2018	00063-79	-
2	ok	ok	01/12/2018	00063-79	-
3	ok	ok	01/12/2018	00063-79	-
4	ok	ok	01/12/2018	00063-79	-
5	ok	ok	01/12/2018	00063-79	-
6	ok	ok	01/12/2018	00063-79	-
7	ok	ok	01/12/2018	00080-82	-
8	ok	ok	01/12/2018	00080-82	-
9	ok	ok	01/12/2018	00080-82	-
10	ok	ok	01/12/2018	00080-82	-
11	ok	ok	01/12/2018	00080-82	-
12	ok	ok	01/12/2018	00080-82	-
13	ok	ok	01/12/2018	00083-85	-
14	ok	ok	01/12/2018	00083-85	-
15	ok	ok	01/12/2018	00083-85	-
16	ok	ok	01/12/2018	00083-85	-
17	KO		01/12/2018		Power fail (short?)



# HV BOXES

- ◆ HV boxes assembled in Torino and Cagliari
- ◆ All boxes from Torino (44) are being used
- ◆ All boxes from Cagliari (48) are available at Centro Fermi
- ◆ **Please send bad boxes to Centro Fermi**



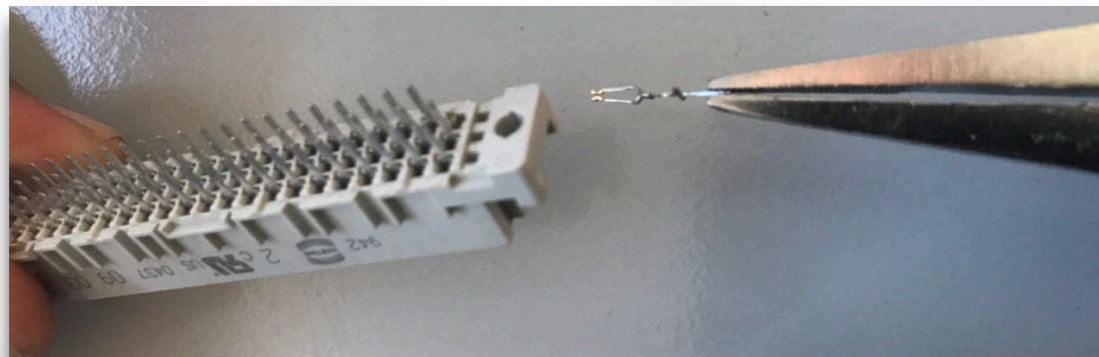
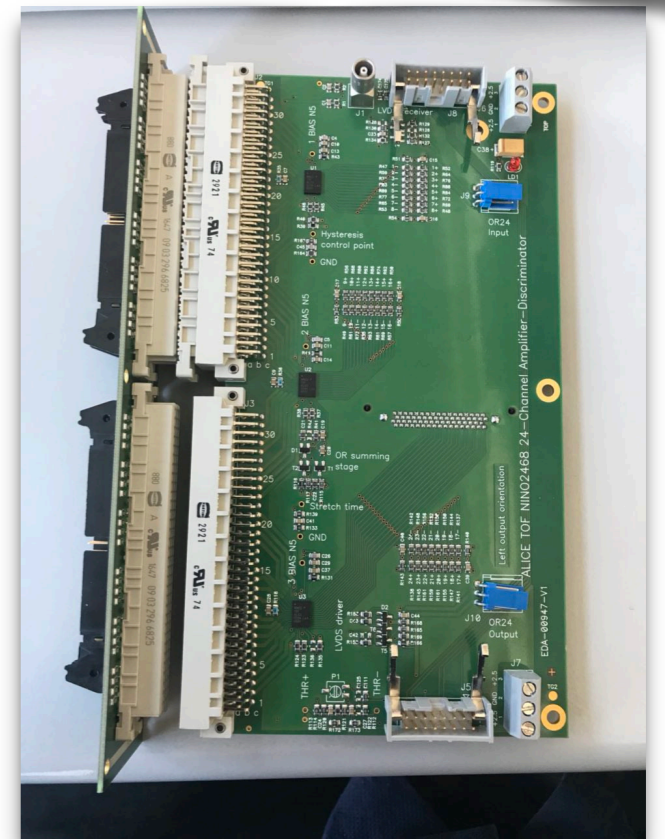
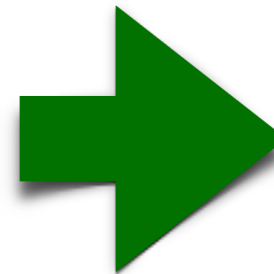
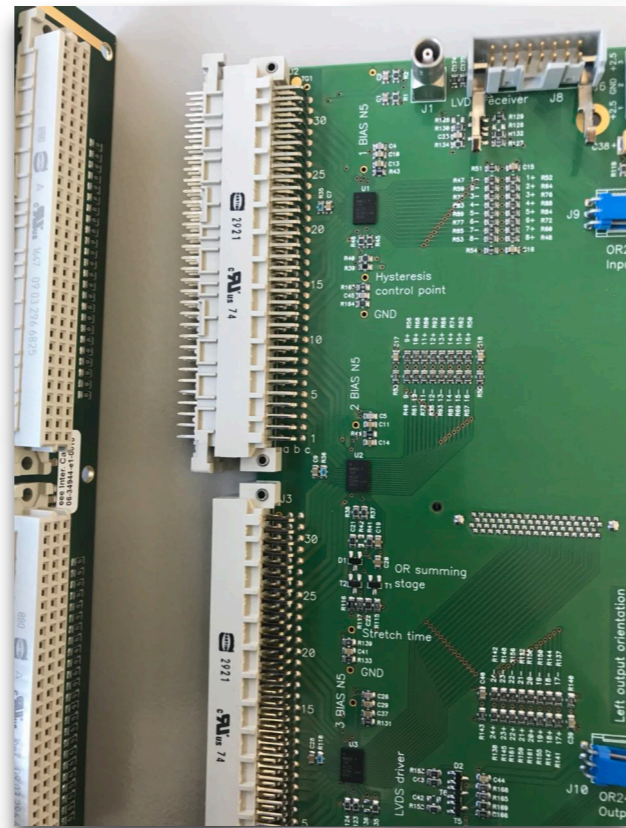
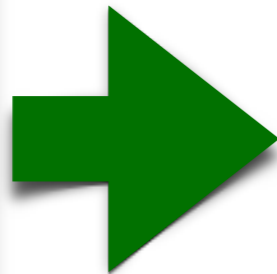
- ◆ HV boxes are **expensive**
- ◆ HV boxes represent a ***weakness for data taking***
- ◆ A **splitter** could be used
- ◆ Proposal to assemble one splitter per each telescope
- ◆ It could be used as a **backup solution** in case HV boxes are needed but not available (this could save days of missing data taking)

# Noisy channels

- ◆ A few telescopes have noisy strips
- ◆ “Masking” them is important (crucial for data taking in some cases)
- ◆ Proposal to make flat cables to connect FEAs to the chamber and cut the wire corresponding to the noisy channel

Easier, cheaper and reversible solution

• Successfully checked on SALE-01



- Connection easily removed
- Possibility to easily reconnect

# Setup for task force

- ◆ Mini-crate with 4 slots with bridge, TDCs and trigger card (Lecce), including connections
- ◆ It is used by the **task force** to speed up debug on a problematic telescope
- ◆ This page on the technical coordination site can be used to track crate's shippings and usage

Extreme Energy Events Science Inside Schools  
EEE\_tech\_coord

## Test crate for Task Force

4 slots crate ready for tests (Lecce trigger card; TDCs: external clock - 128ch 0A00 - 64ch EE00)

ask Daniele (daniele.degruttola@centrofermi.it) to book it

- 12 - 16 September 2018 in Teramo
- 16 September - 8 October 2018 in Bologna
- 9 - 11 October in Frascati
- 12 - 19 October in Lecce
- 20 October - 2 November in Salerno
- 2 November in Salerno without trigger card (installed in SALE-01)

Additional material could be added:

- ◆ Pc with installed software
- ◆ **1 set of HV boxes**

# Telescopes material

## Tool and needs

### ◆ Telescopes and material

- List of telescopes including details on delivered and needed material

<https://sites.google.com/centrofermi.it/3etech/home>

EEE  
Material for telescopes

[telescopes and material](#)  
[available material](#)  
[expeditions](#)  
[new and past orders](#)  
[requests](#)

EEE general meeting 27 June 2018

## Tool and needs

### ◆ Table 1

- Details
- Make the DB interactive in the future?
- Include all telescopes could be useful

Telescope	Gas system	Read-out	Trigger card	GPS	FEAs + Signal cables + adapters	LV + HV supply	Weather station	Notes
BOLO-05	mixer + Air Liquide delivered on the 2nd of June 2018	4 slots. Bridge and TDCs delivered on the 4th of June 2018	new card to be delivered	included in the trigger card	to be delivered	HV boxes and PS to be delivered	to be delivered	HV boxes under construction
CAGL-04	mixer + Air Liquide delivered on the 2nd of June 2018	4 slots. Bridge and TDCs delivered on the 4th of June 2018	new card to be delivered	included in the trigger card	to be delivered	HV boxes to be delivered. PS to be tested	to be delivered	HV boxes under construction. Weather station is there, but outdoor sensor is not.

- ◆ Example at the following site (look at the tables)
- ◆ **Not everyone replied**
- ◆ **Please provide me with needed information**
- ◆ Useful to take decisions on the material to be delivered or possible exchange
- ◆ Useful to speedup information exchange:
  - What GPS is on XXXX-YY? (recent need)
  - Where the new trigger card is used at the moment? (recent need)
  - ...

<https://sites.google.com/centrofermi.it/3etech/home/table-3?authuser=0>

# Available material

can be checked here



## CAEN electronics

- 15 crate 4 slots
- 15 VME bridges V1718
- 16 TDCs 64ch V1190B
- 16 TDCs 128ch V1190A

## Task Force crate

- 1 "4slots" crate with 1 bridge, 2 TDCs and 1 Lecce trigger card available for Task Force
- [check where it is now](#)

## Front-end electronics

- 20? old FEAs at CERN
- 6? amphenol cables
- 2 (x6) Amphenol-TDC adapters
- 160 new FEA cards (tested at CERN) available at Centro Fermi in January

## custom electronics

- 5 trigger boards new type Lecce
- 1 trigger board Catania/CERN (in Salerno at the moment)
- 10 clock boards

## HV and LV system

- [click here for DC/DC converters and HV boxes](#)
- 3 LV power supplies Lecce

## Weather stations

- 0 Oregon stations

- x homemade stations (to be produced..)

## Gas system

- 1 Bronkhorst mixers
- 7 Air Liquide systems without cabinet
- 5 Air Liquide systems with cabinet

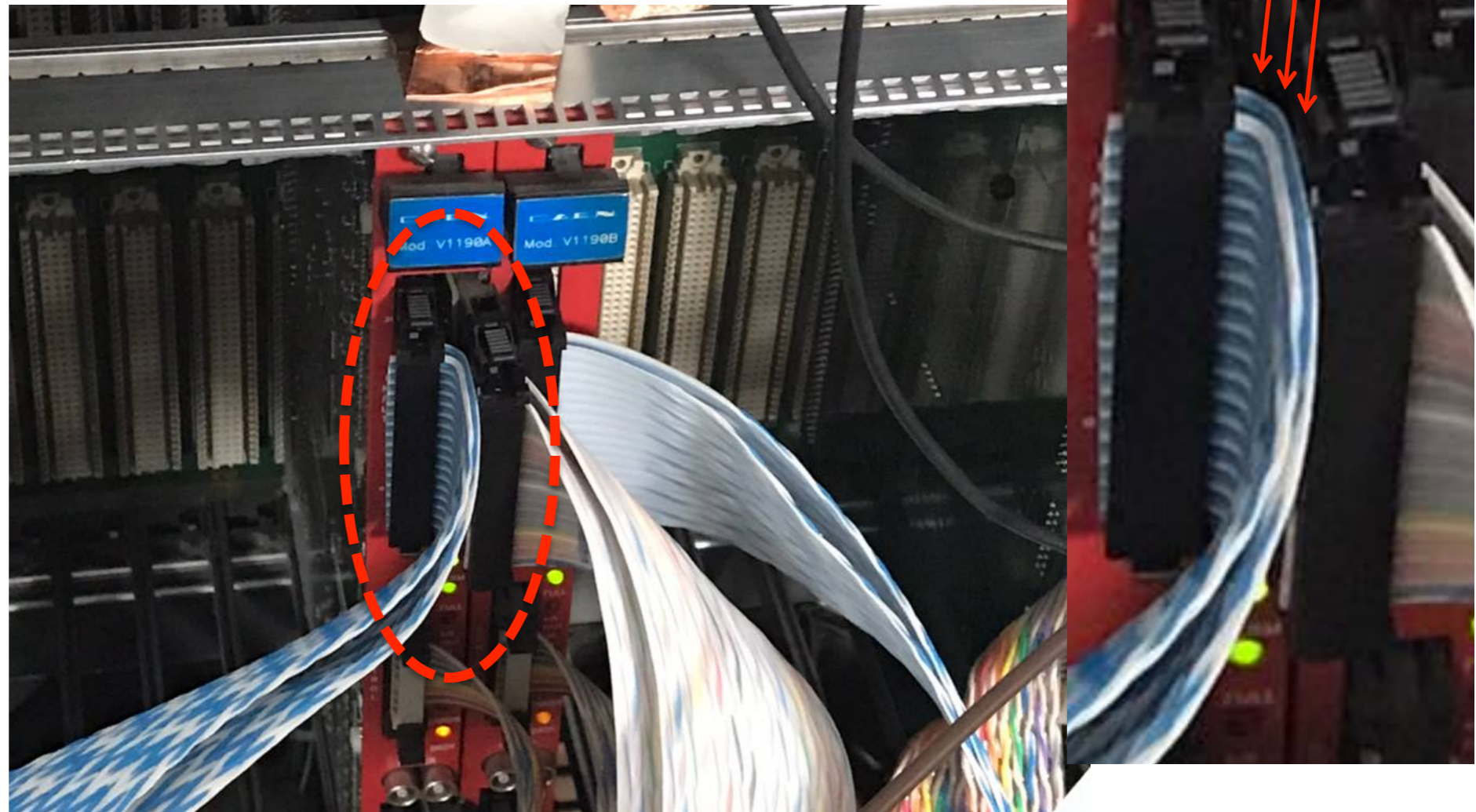
# Conclusions

- Material requests → site to easily submit and track requests, track material..
- New power supply → remote control, chip solution, under test
- Temperature and pressure monitoring → homemade system almost ready
- New FEA cards → 160 cards available (cables to be done in Salerno)
- HV boxes → all planned boxes were assembled
- “Masking” of noisy channels → easy and reversible solution successfully tested
- Setup for task force → frequently used by task force
- Telescopes material → many pieces of information available on tech coord site

Back up

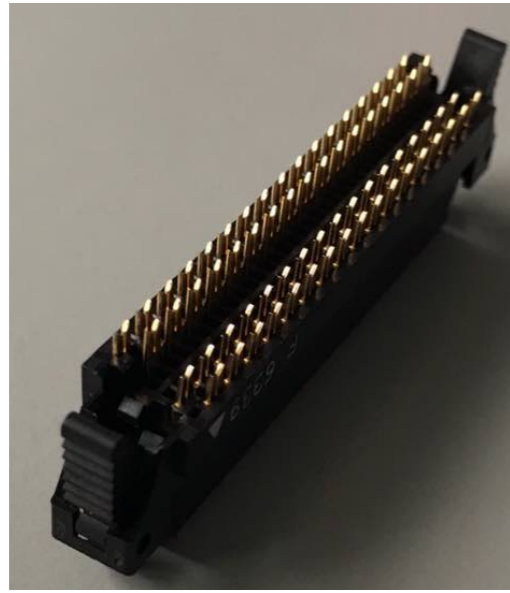
# Conclusions

- No space between connectors in TDC 128ch
- There is no way to modify the cable direction wrt the connector
- Need to be careful if no solution found

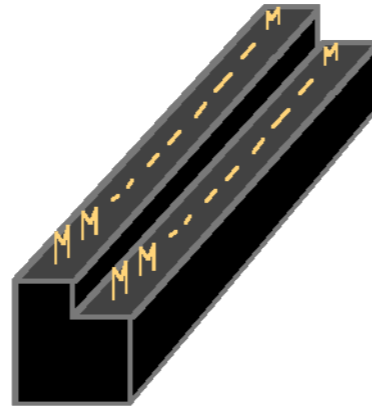




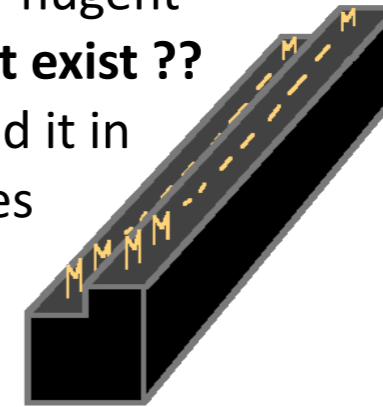
# Conclusions



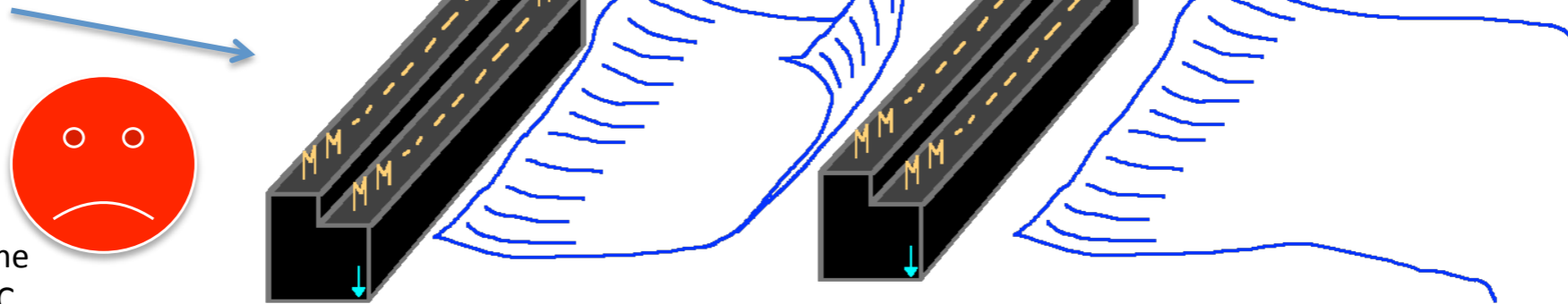
Connector 1  
Robinson-nugent



Connector 2  
Robinson-nugent  
**?? Does it exist ??**  
I can't find it in catalogues



Current configuration



The arrow ↓ is the key to fix the direction of connector wrt TDC

Possible configuration with connector 2

