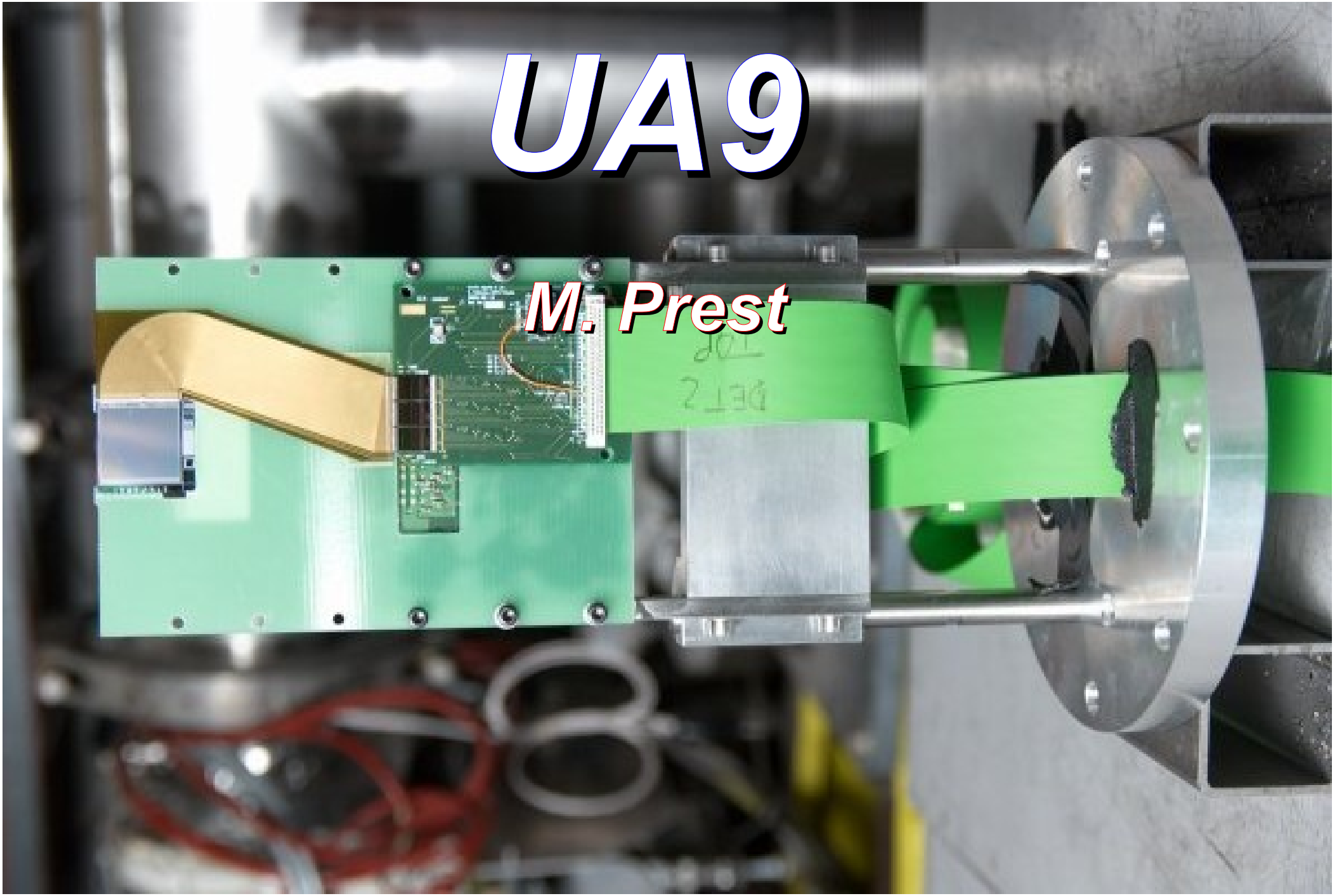

UA9
M. Prest

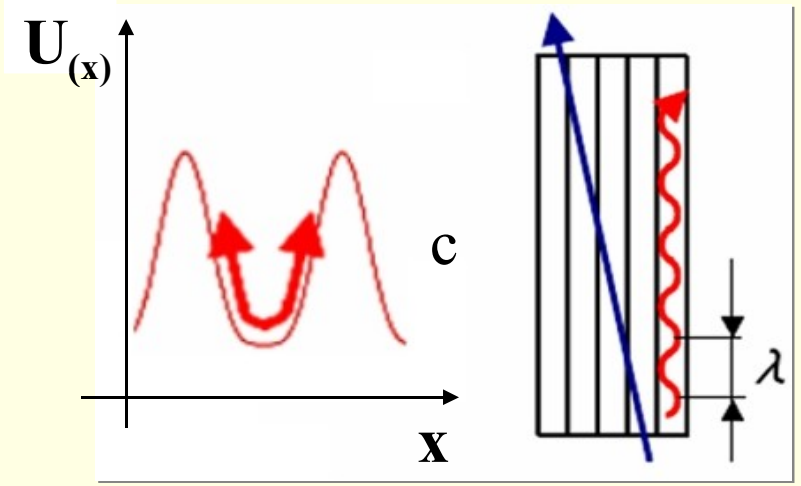
# 1976: l'IDEA !

**E. N. Tsyganov**: channeling cristalli curvati

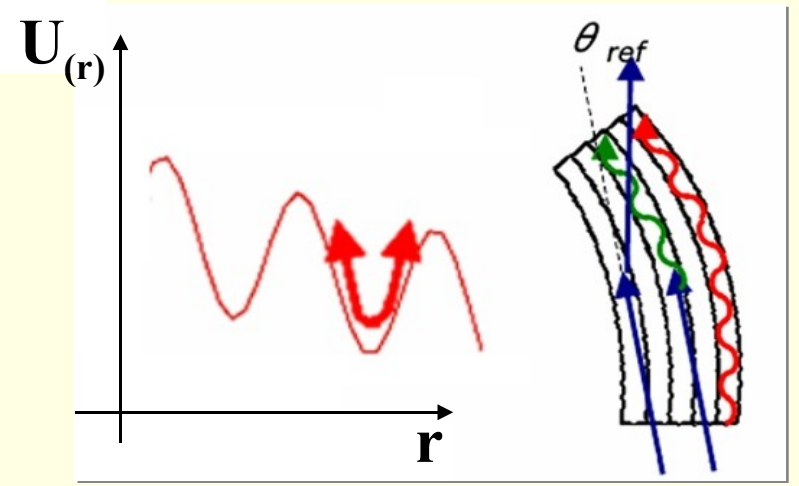
➔ *I cristalli possono essere usati per deviare le particelle*

➔ *Prima evidenza sperimentale: FNAL 1979*

## Potenziale interplanare



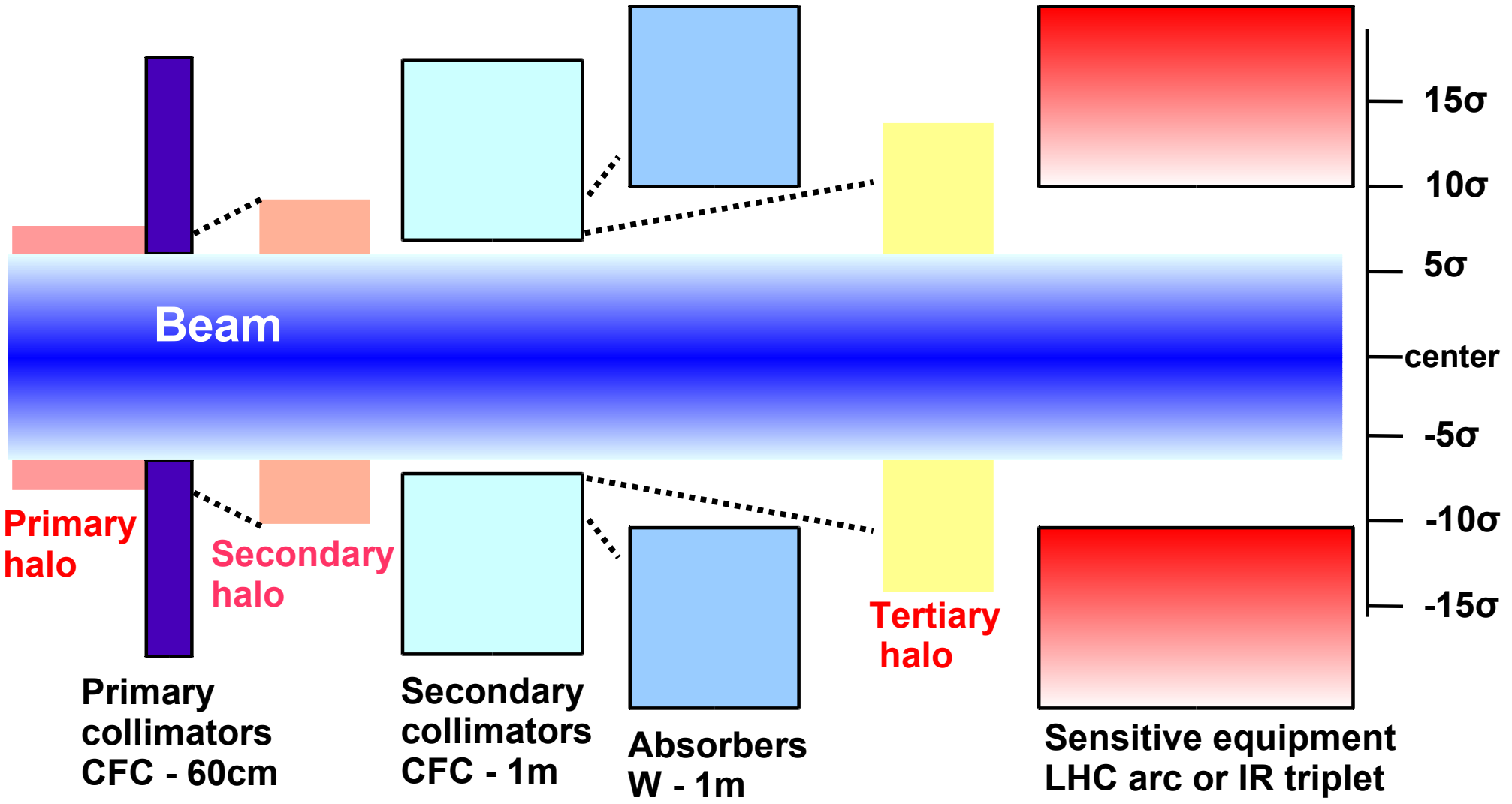

## Potenziale effettivo



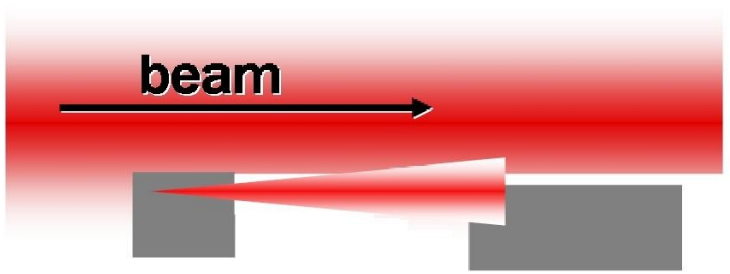

$$\Theta_C = \frac{L}{R}$$

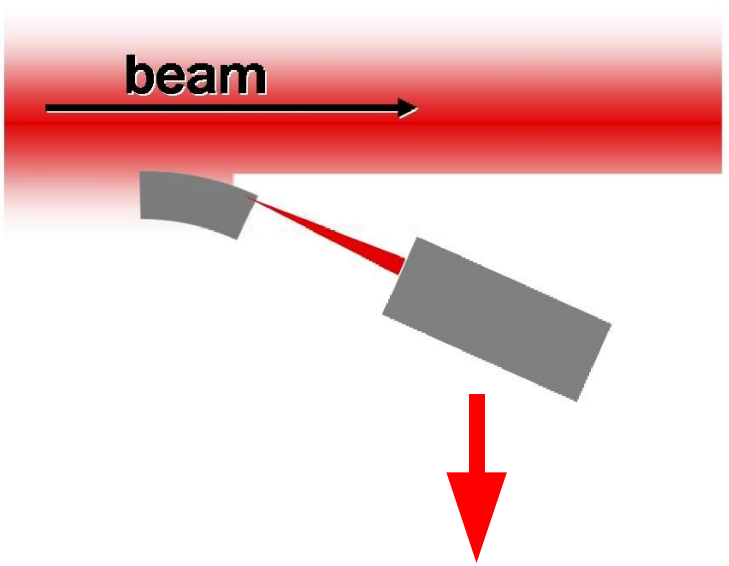
*Curvatura limite = Tsyganov's radius*
*~ 5cm x P (GeV/c)*

# La situazione attuale dei collimatori di LHC



# Il cristallo: un collimatore intelligente



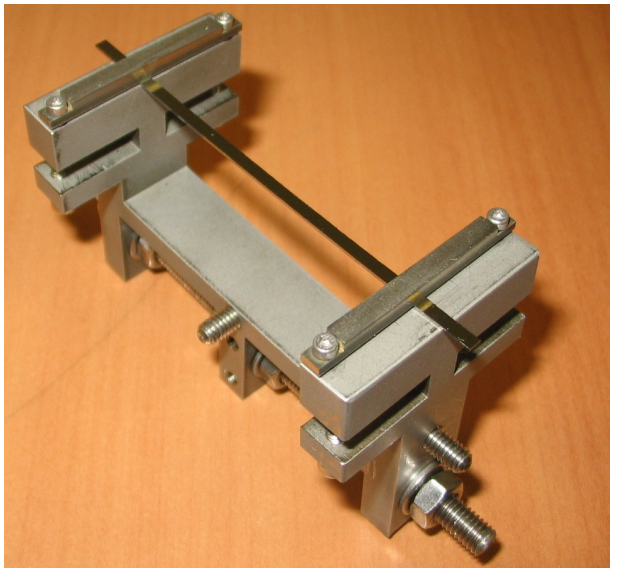

## L'alone viene diffuso su tutto l'angolo solido

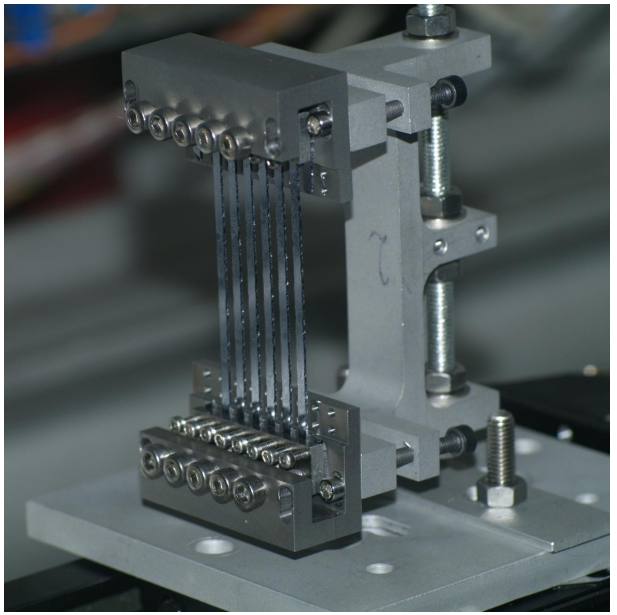
- ➔ *Il parametro d'impatto delle particelle sul collimatore secondario deve essere massimizzato*
- ➔ *Richieste stringenti sull'allineamento del collimatore secondario*

## L'alone viene deviato in una direzione specifica

- ➔ *Crescita della cleaning efficiency*
- ➔ *Rilascio dei constraint sull'allineamento del secondario*
- ➔ *Diminuzione dell'impedenza causata dalla vicinanza del collimatore secondario al core del fascio*

# Il cristallo moderno





***Un cristallo di silicio curvato di 3 x 0.9 x 70 mm$^3$ → campo magnetico equivalente > 100T !!!!***

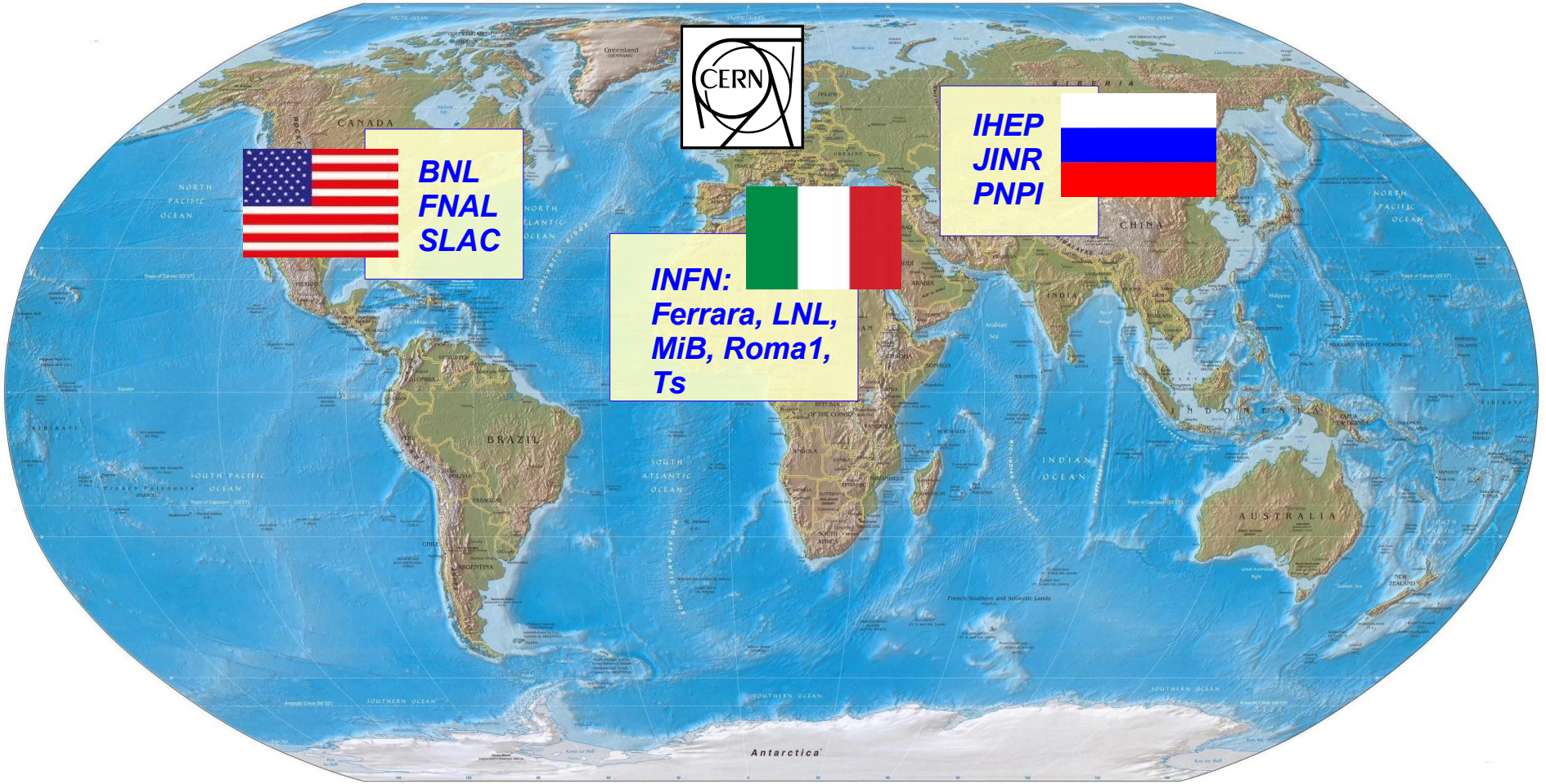
# Collimazione con i cristalli: UA9

- ➔ *SPS, sezione dritta LSS5*
- ➔ *Cristalli su goniometri in tank a vuoto*
- ➔ *GEM, scintillatori e BLM per la misura dell'allineamento*
- ➔ *Rivelatori a strip di silicio in roman pot per il tracciamento delle particelle deviate*
- ➔ *Creazione dell'alone ad hoc con un fascio di protoni di 120GeV/c durante gli MD dell'SPS*
- ➔ *Fase di commissioning in corso (cristallo allineato per la prima volta il 30 giugno)*

*(approvato dal CERN Research Board il 3 settembre; prima NTA-CRYSTAL in NTA ora UA9 in CSN1)*

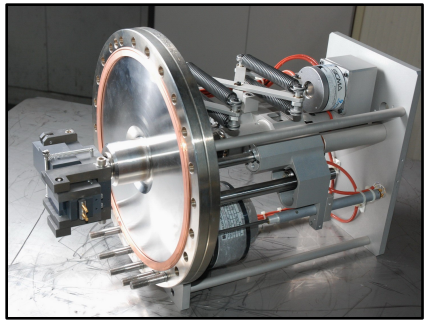
- ➔ *COLLIMATION EFFICIENCY*
- ➔ *MEASUREMENT OF THE PHASE SPACE*
- ➔ *MEASUREMENT OF THE LOSSES ALONG THE RING (with beam loss monitors)*

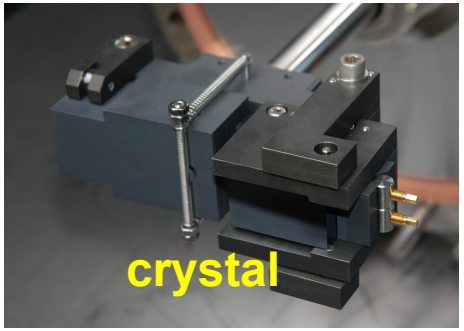
# La collaborazione UA9

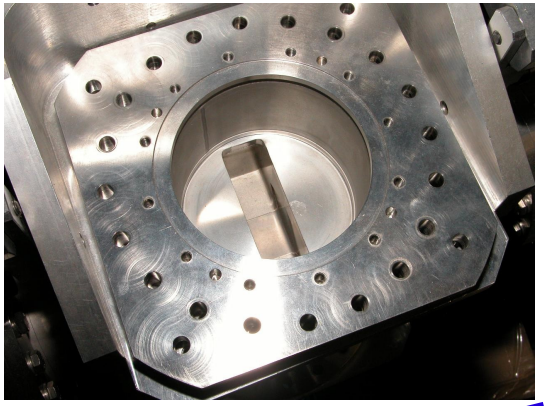


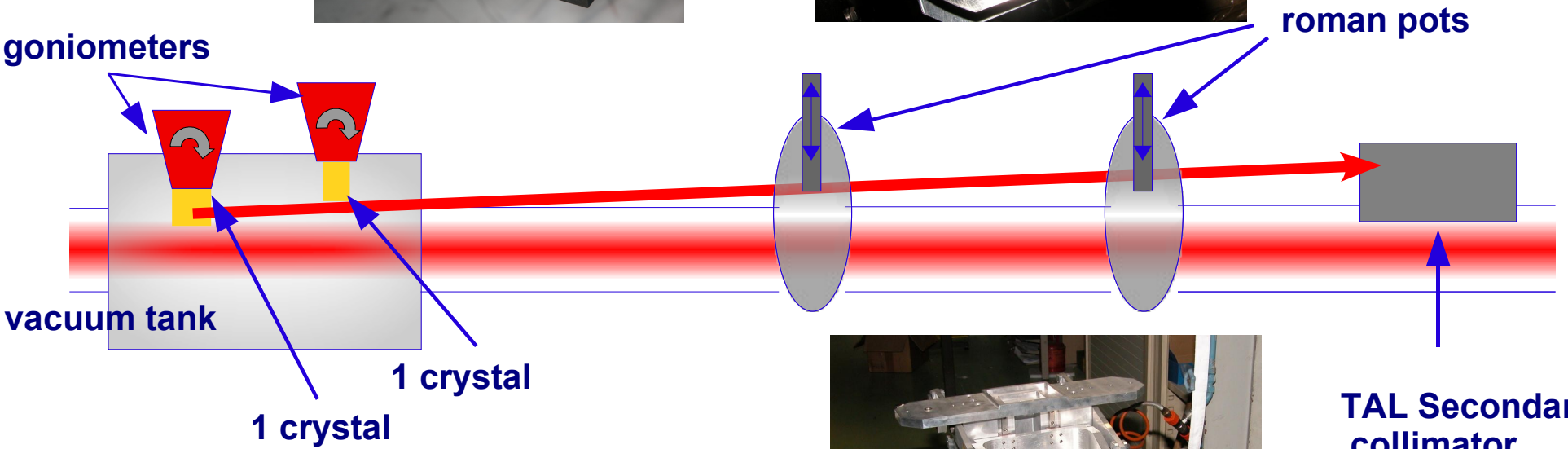

*Per un totale di circa 60 partecipanti*

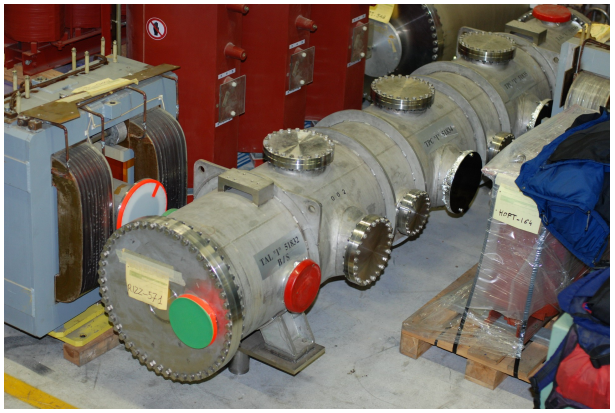
# L'idea di base: collimare e tracciare

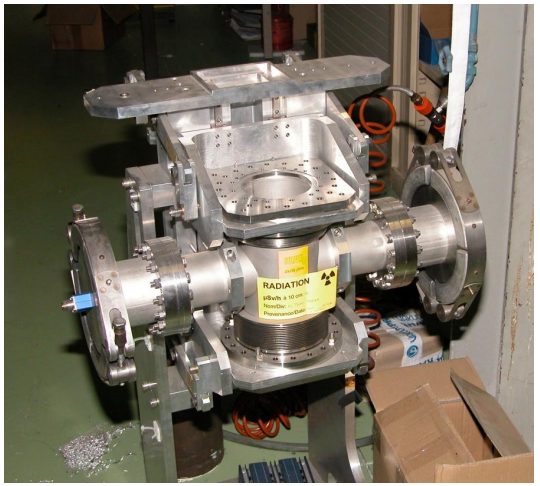


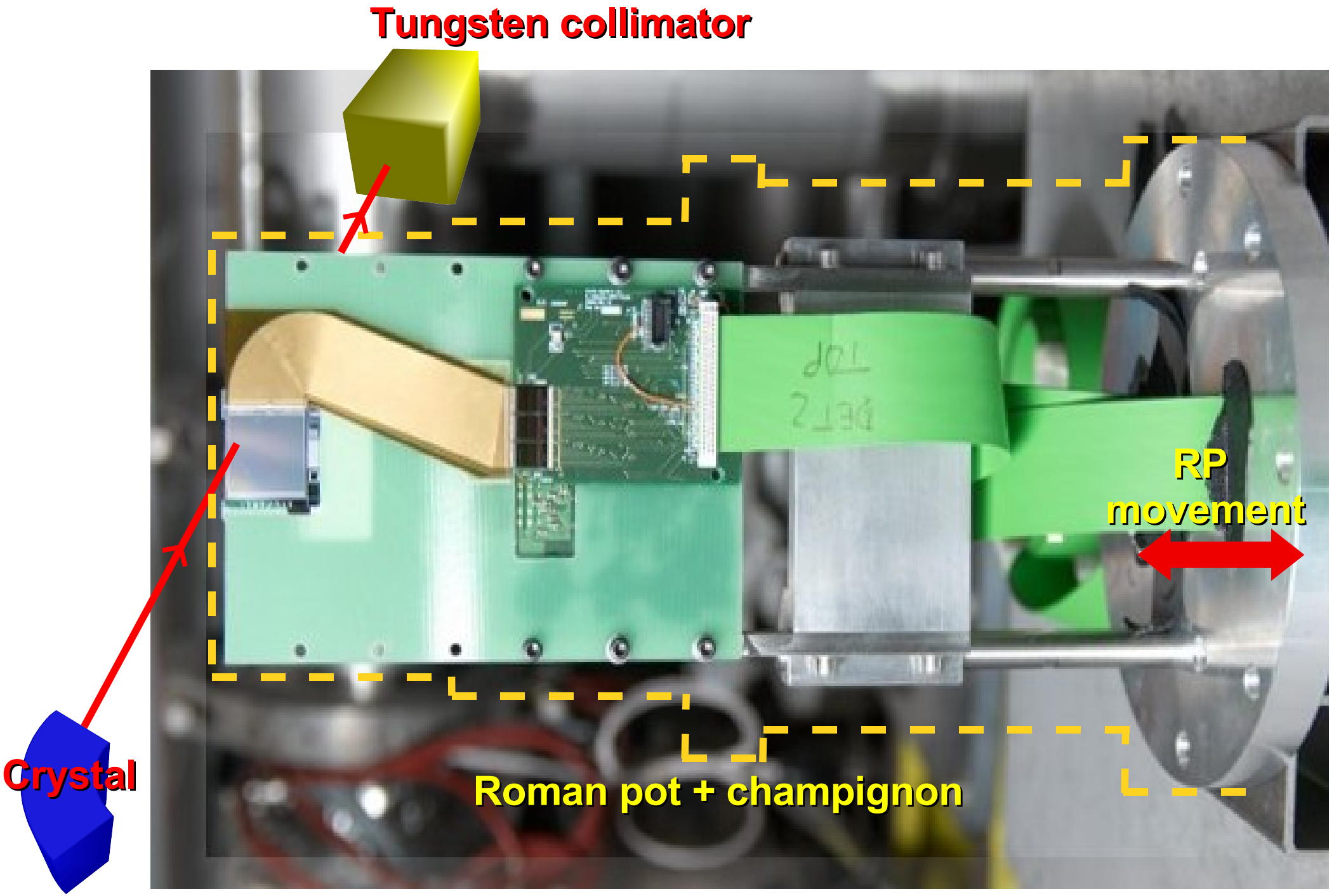


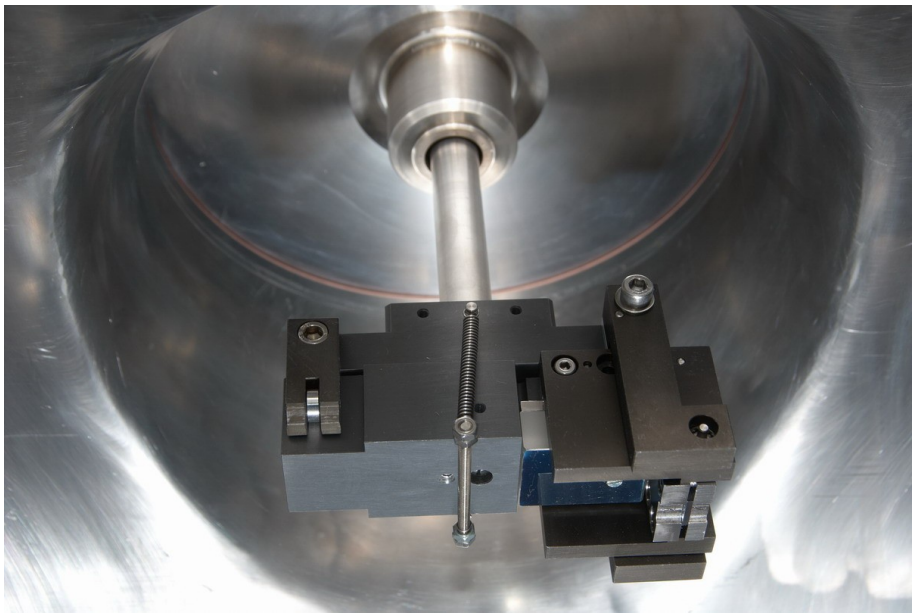


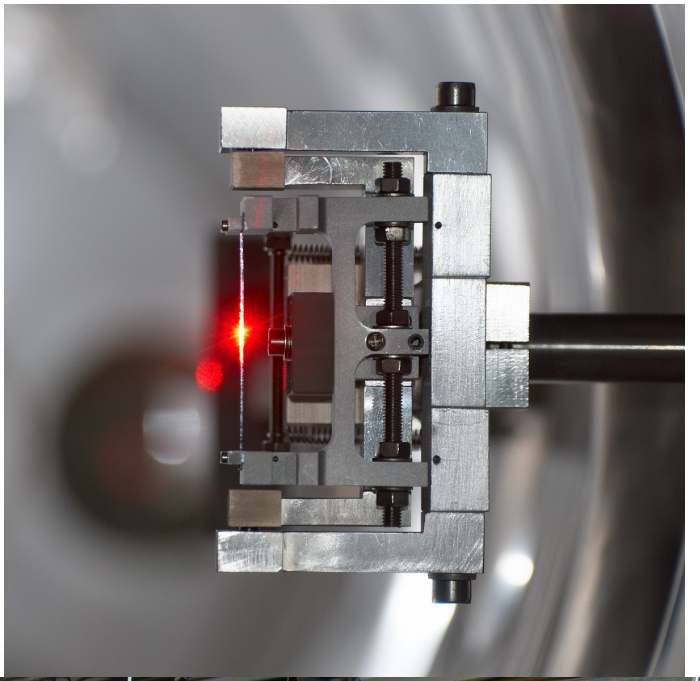



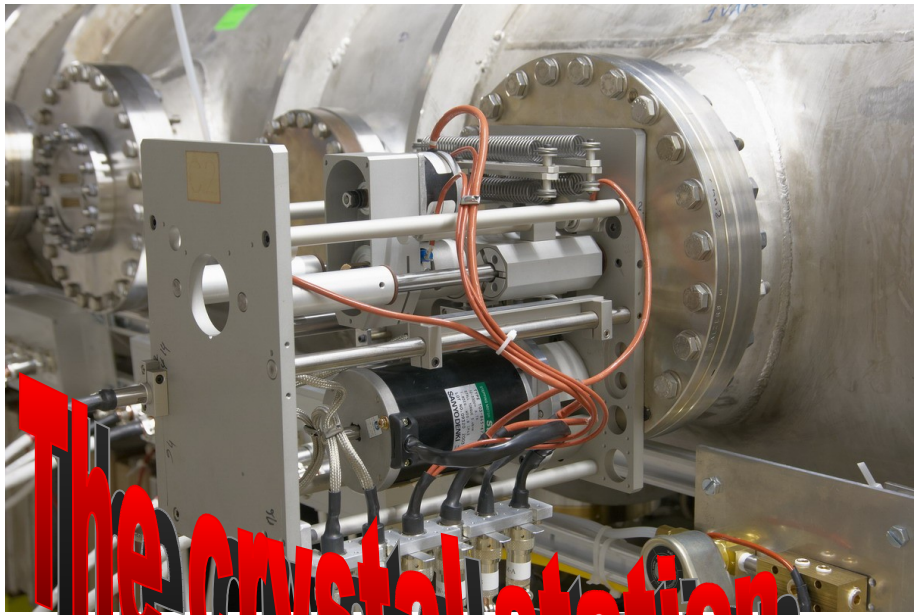



Tungsten collimator
RP
movement
Crystal
Roman pot + champignon

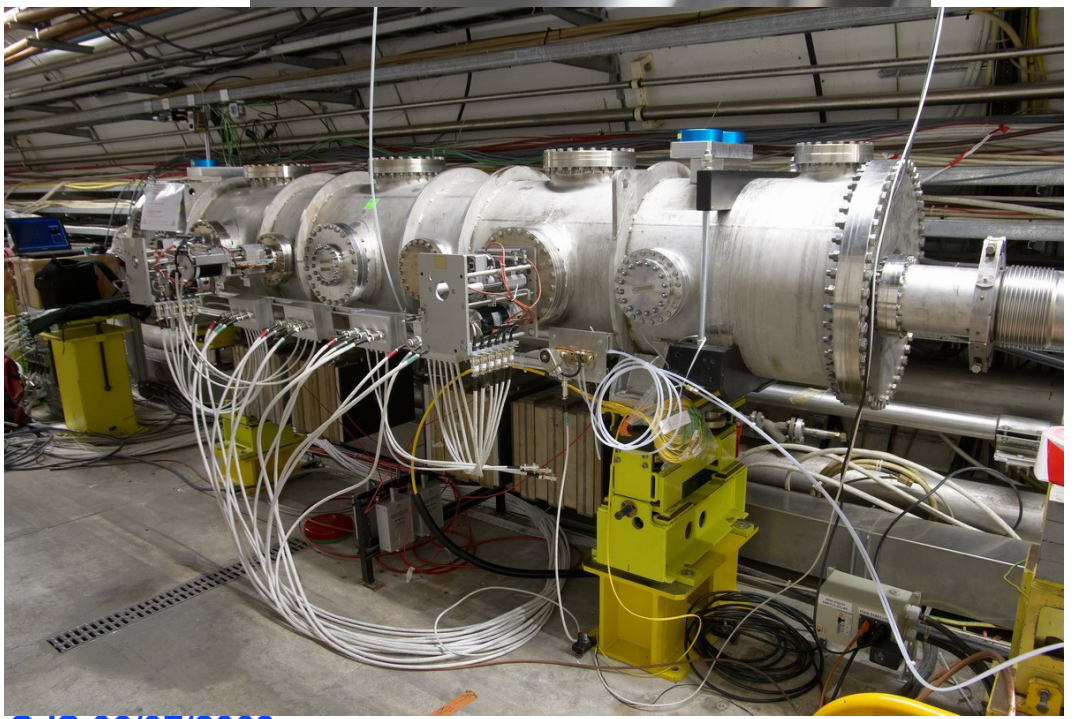
# Dall'idea alla realtà

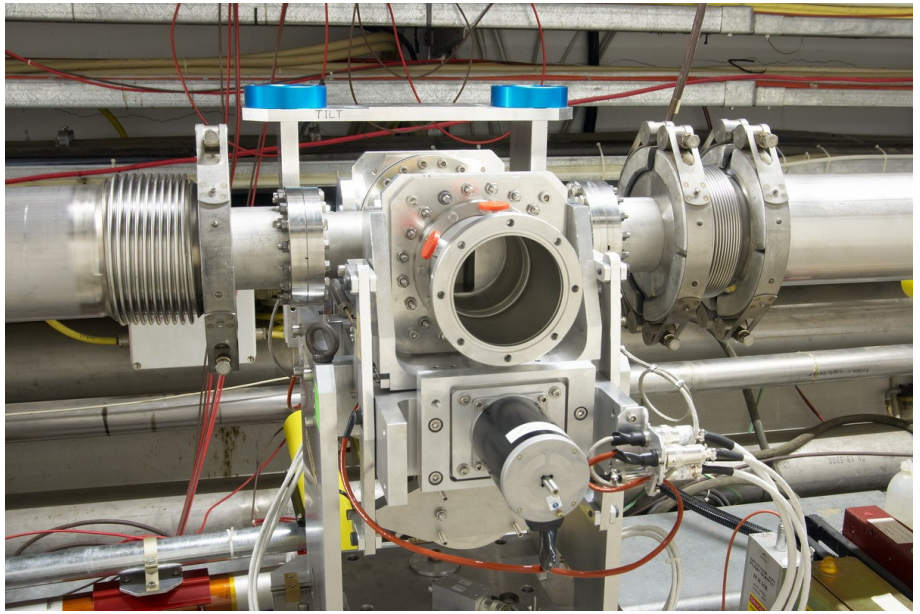


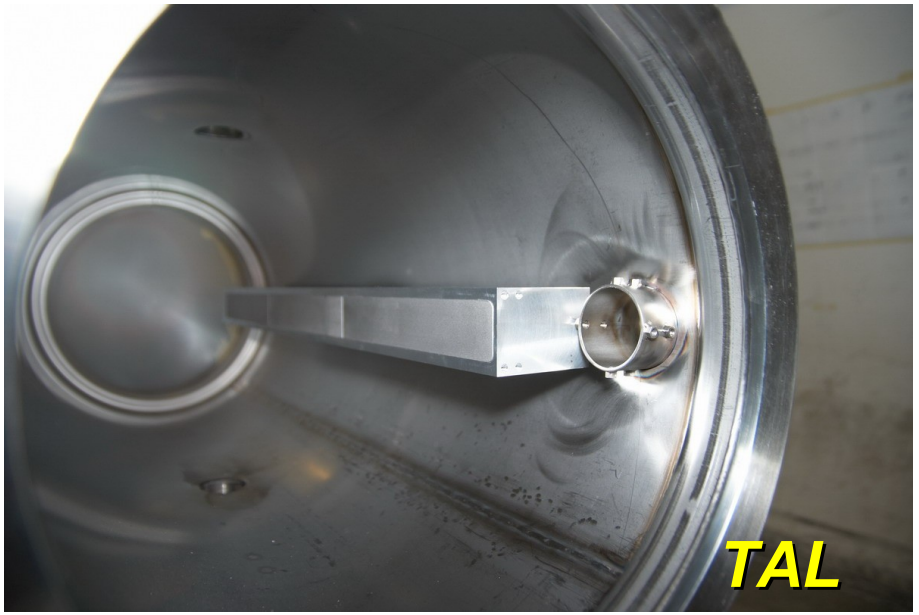


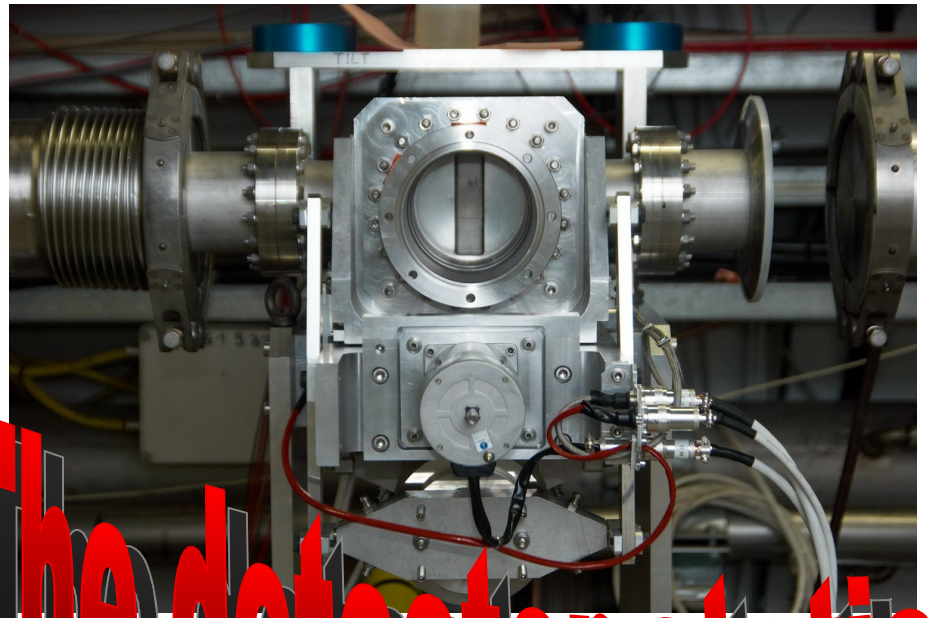


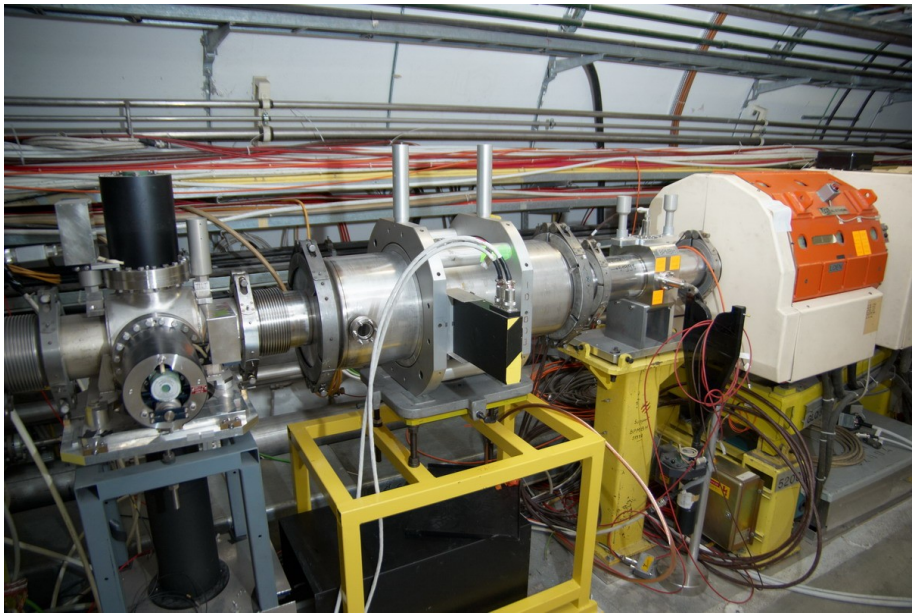
The crystal station





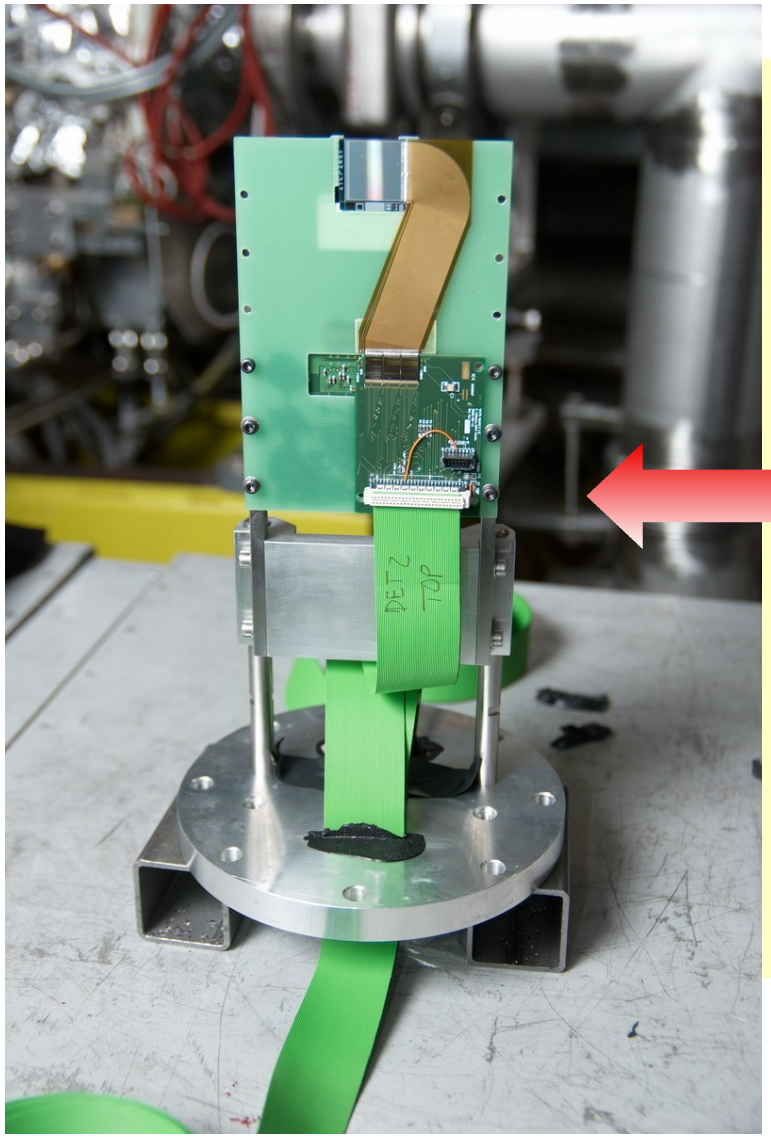




# The detector station

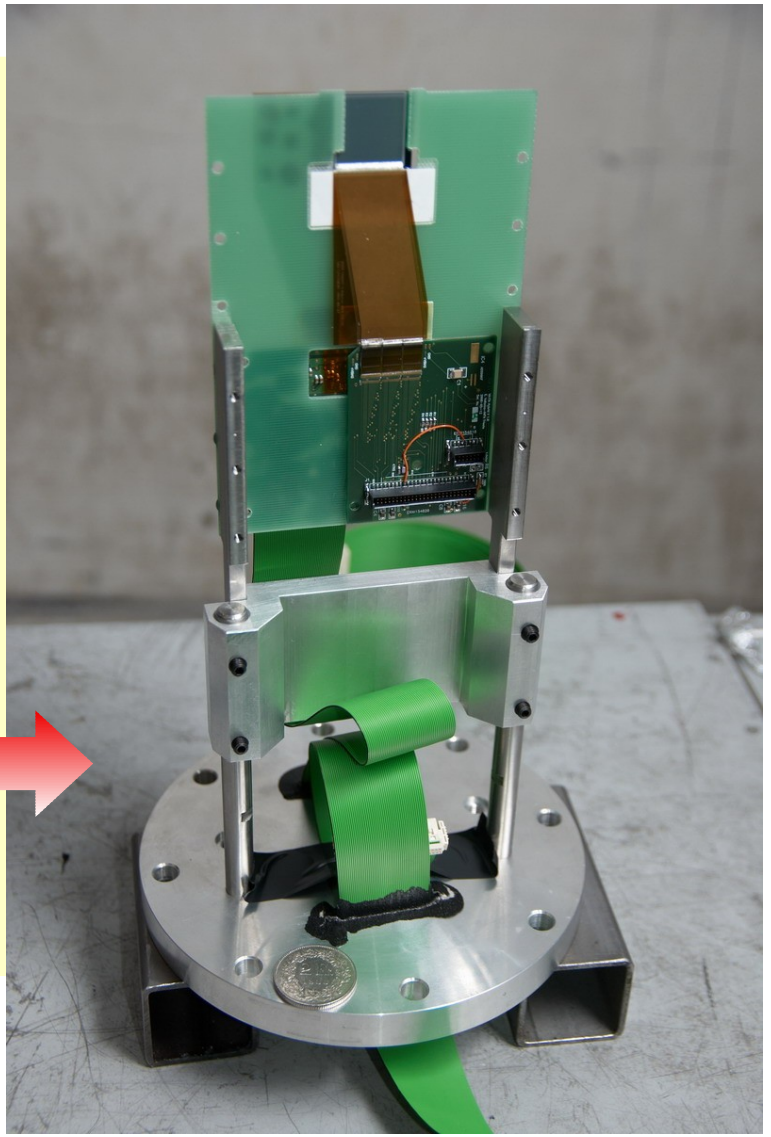
# Il prototipo

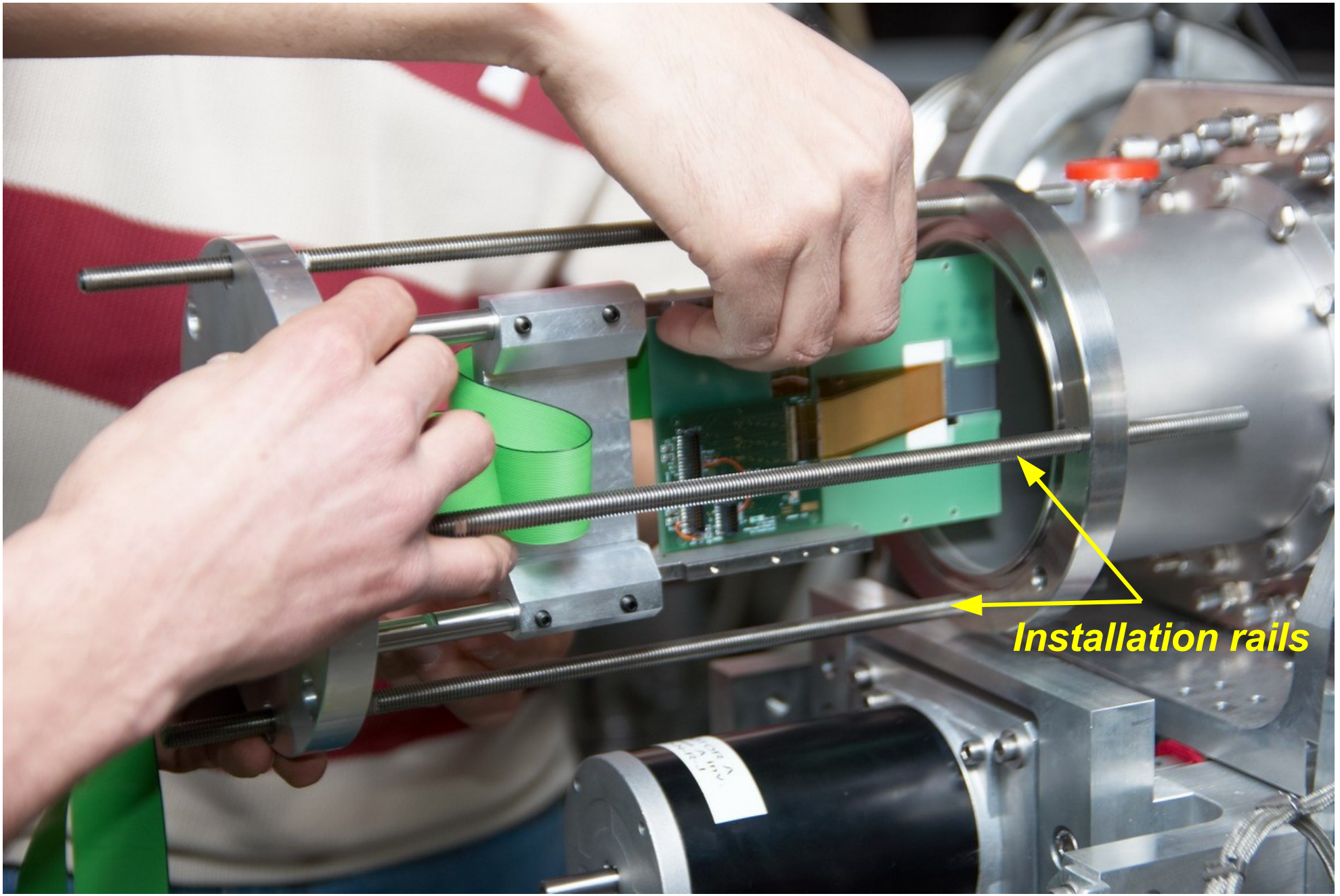


- ✔ *1 detector FBK letto da 6 ASIC VA1TA*
- ✔ *1 board FR4 per il supporto*
- ✔ *Fanout in upilex per la connessione con gli ASIC*

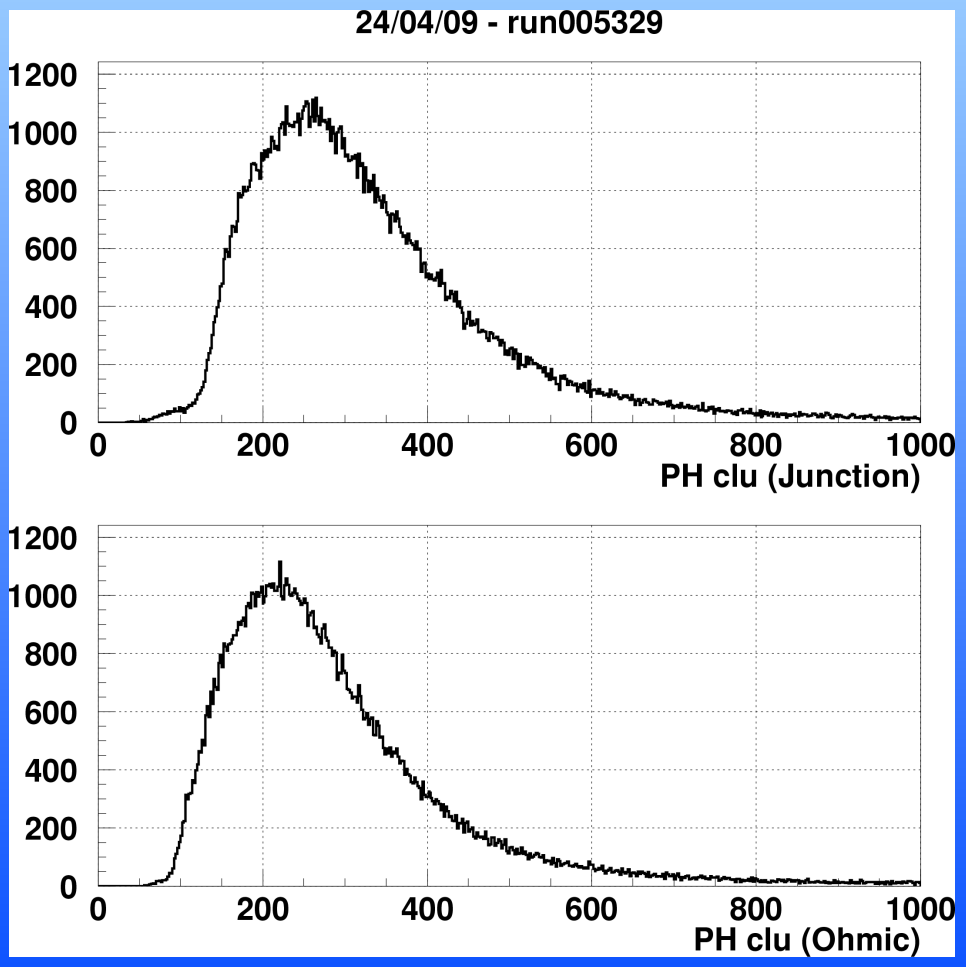
**JUNCTION**
*(orizzontale)*

**OHMIC**
*(verticale)*

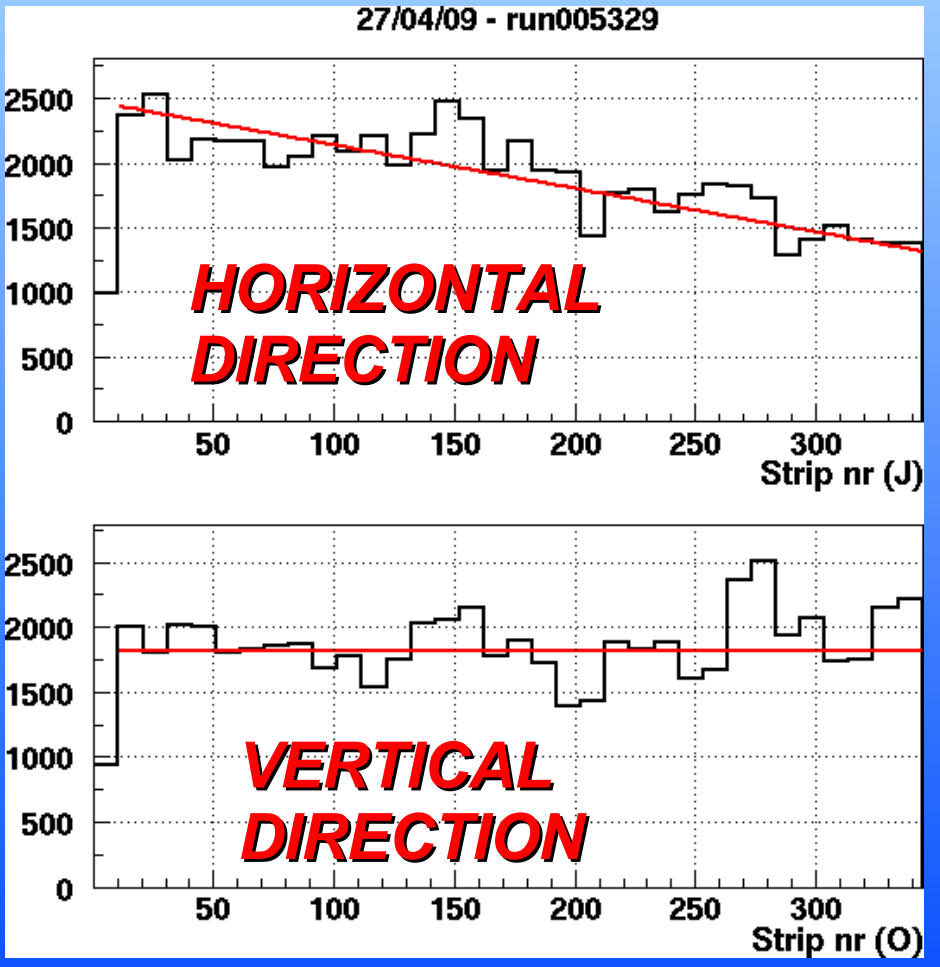



Installation rails

# Primi risultati

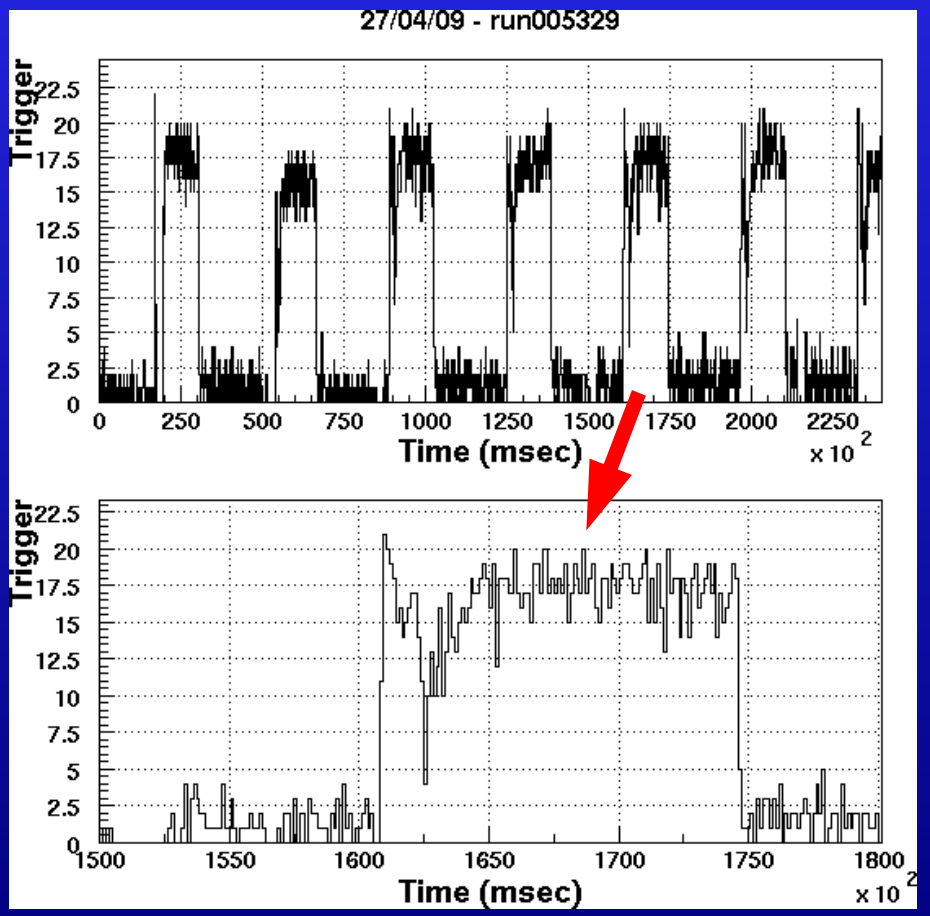


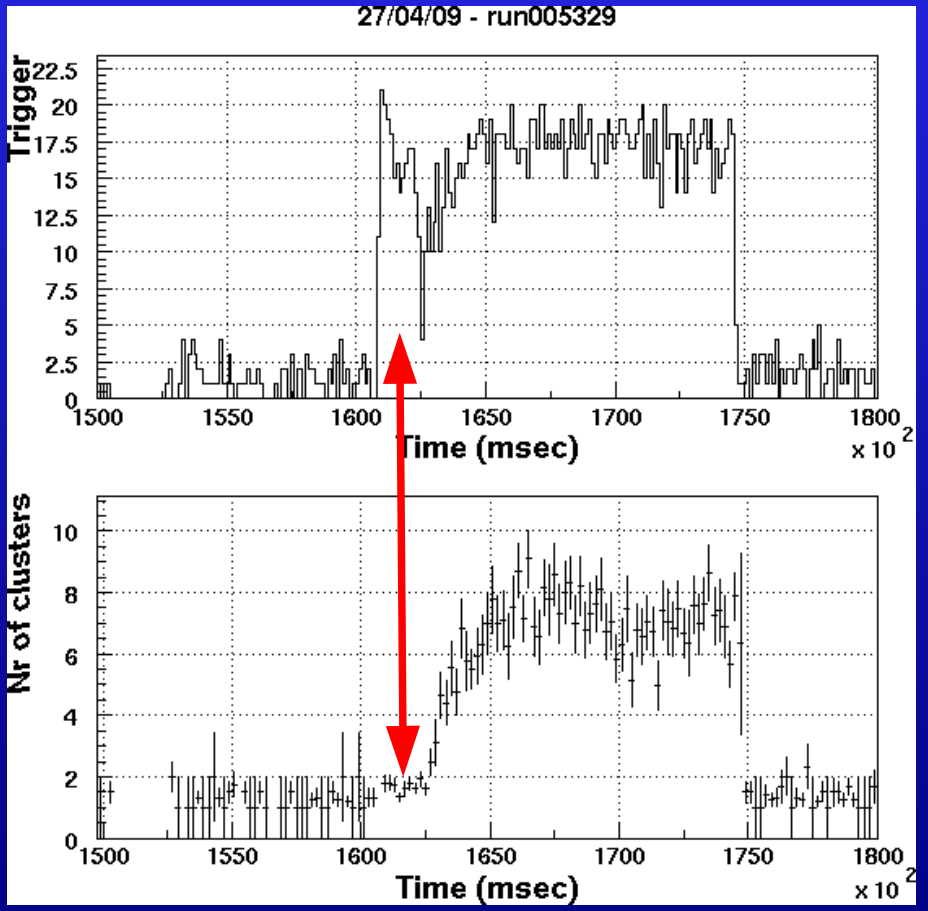

Pulse height



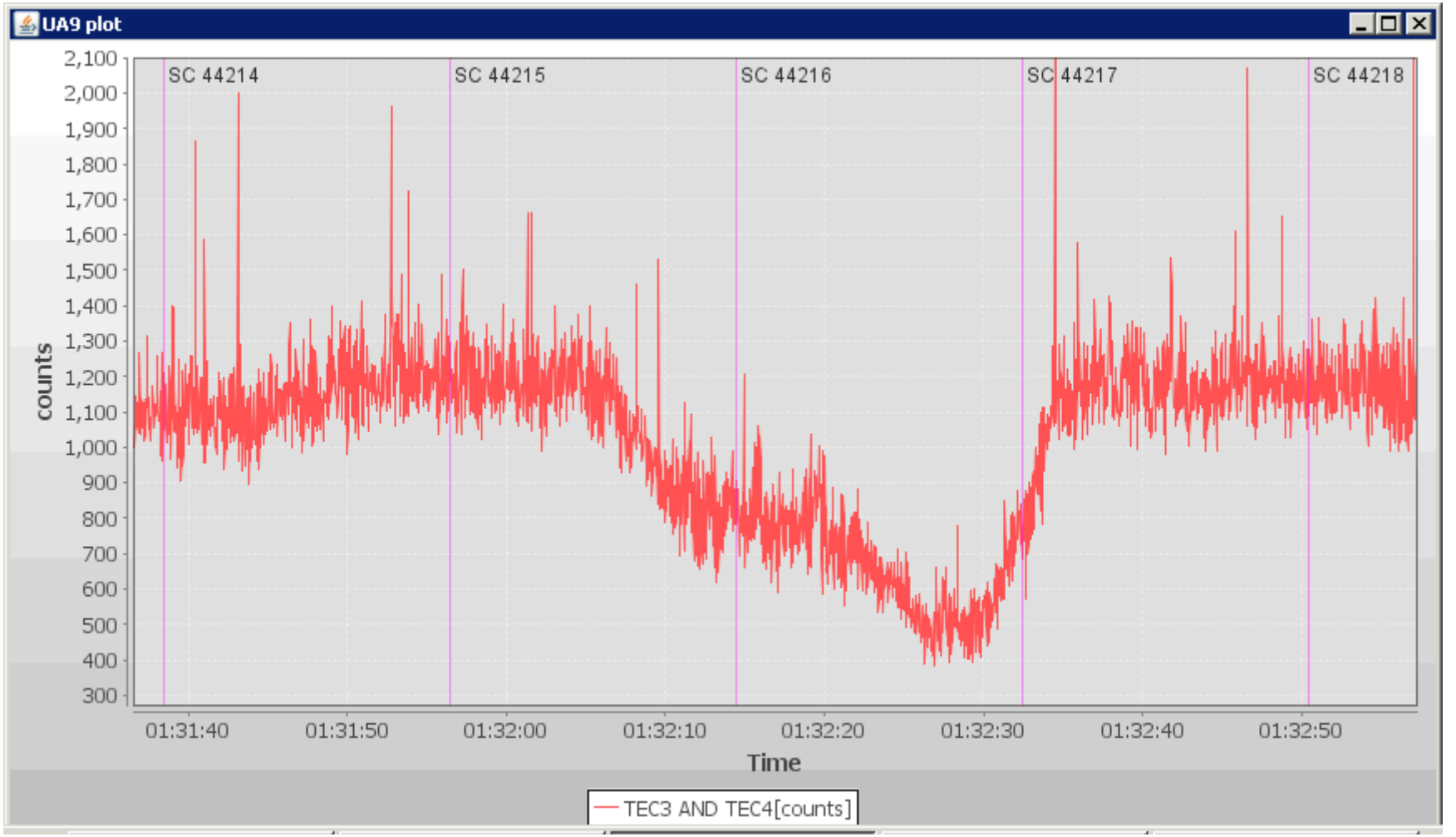

Beam profile

# Trigger e cluster



# Primo allineamento del cristallo in UA9




**01/07/2009**

# Richieste finanziarie

| MI | ME | CONS | INV | TOT |
|---|---|---|---|---|
| | | | | |
| 4 | 27.5 | 10 | 6.7 | 48.2 |

- **ME:**
  - 7 MD di 3 giorni per 3 persone
  - 1 periodo di 15 giorni per interventi sul rivelatore (x4 persone)
  - Test su fascio estratto (20 giorni x 3 persone)
- **CONS:**
  - Acquisto di 20 ASIC per moduli al silicio (per realizzare un certo nr di spare)
  - Refurbishing dell'elettronica
  - Elettronica per radiation monitor (visto che la dose rimane una quantità ignota)
- **INV:**
  - Bit3 della SBS
  - Crate a 64 bit

**PARTECIPANTI:**

- M. Prest (70%) responsabile nazionale e locale
- D. Bolognini (100%) - PhD
- S. Hasan (100%) - PhD
- S. Grigioni (100%) - tecnico meccanico
- M. Veronelli (100%) - tecnico meccanico