# Relazione Coordinatore CSN3@LNF

## Consiglio Laboratorio Aperto 02 Luglio 2018

### Alessandra Fantoni

| | | | | |
|---|---|---|---|---|
| ALICE | CERN | Fisica: QGP | 10.4 FTE | F. Ronchetti |
| FOOT | CNAO/TIFPA/ LNS/BTF | Fisica: framm. Nucleare | 2.3 FTE | E. Spiriti |
| e-JLab12 | JLAB | Fisica: adronica | 2.3 FTE | M. Mirazita |
| BGOOD | Bonn/Mainz | Fisica: adronica | 1.0 FTE | P. Levi Sandri |
|  | LNF | Fisica: nucleare | 12.4 FTE | C. Curceanu |
| VIP | LNGS | Fisica: nucleare | 7.7 FTE | C. Curceanu |
| +EIC_net | JLAB/RHIC | Fisica: adronica | 0.3 FTE | sotto DTZ |

Talk dedicato

**Totali: 36.4 FTE (Ric.+Tecnol.) + Tecnici**

# Nuclear Physics Exp. @ LNF in 2018

Funding 2018, SJ 2018 at the level of 0.5 kE

| Exp | Res | Tec | FTE | MIS | | CON | APP | INV | Other | |
|---|---|---|---|---|---|---|---|---|---|---|
| ALICE | 6 | 3 | 6.9 | 50 | | 13 | | 5 | 18.5 | TRA+SPS |
| FOOT | 1 | 4 | 2 | 5.5 | | 14.5 | 111.5 | 3 | 0.5 | TRA |
| JLAB12 | 5 | 1 | 3.2 | 23 | | 2 | 145 | | 3 | TRA |
| KAONNIS | 16 | 4 | 11 | 12 | | 28 | | 41 | 17 | ACON+MAN |
| MAMBO | 2 | 0 | 1.2 | 6.5 | 2.5 | 4 | | | | |
| VIP | 10 | 2 | 6.4 | 17.5 | 2.5 | 8.5 | | 4.5 | 16 | ACON+MAN |
| **DTZ** | **37** | **4** | **34.2** | **39** | | **8** | | **13** | **7** | **MAN+SEM** |

# FOOT
# FragmentatiOn Of Target

An experiment for the measurement of the nuclear fragmentation for Particle Therapy

Experiment with translational approach:

- focus on nuclear physics
- physics applied to medicine
- radioprotection in space

About 50 people for 24 FTE

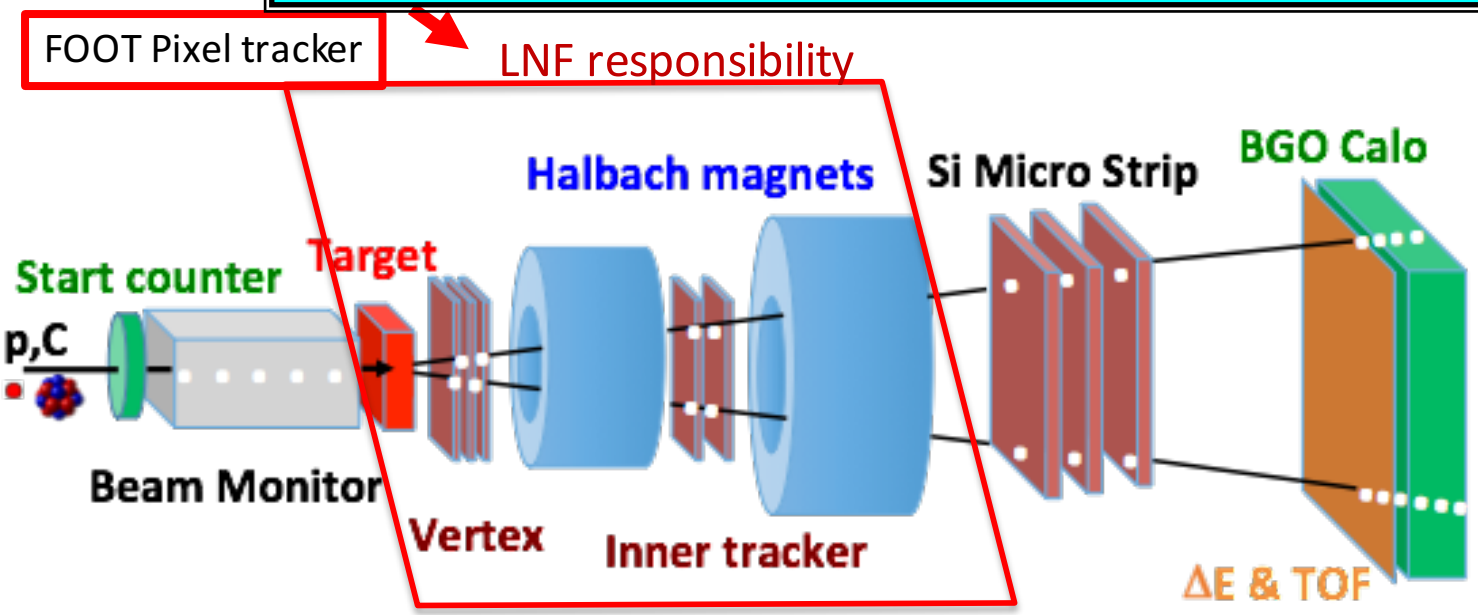
| LNF R & T | |
|---|---|
| 1. Raffone G. | 0.5 |
| 2. Sanelli C. | 0.6 |
| 3. Sarti A. | 0.3 |
| **4. Spiriti E.** | **0.6** |
| 5. Tomassini S. | 0.3 |

5 Physicists for 2.3 FTE
Average participation of 46%

DATA taking foreseen @ CNAO, GSI, Heidelberg, TIFPA, LNS, BTF

**CSN3**: Approved as R&D in 2017

# FOOT overall detector schematic picture

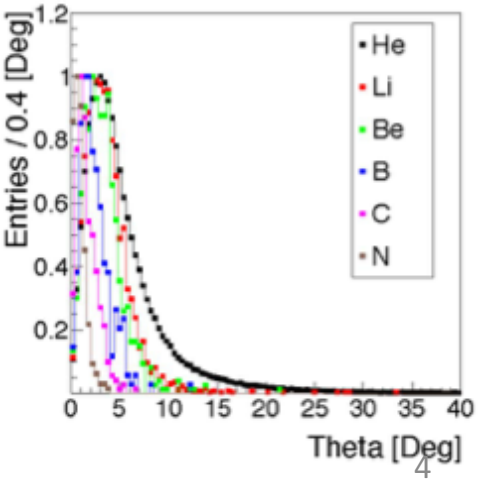



**Needed detector performances**

- **Δp/p** ~5%
- **TOF** resolution ~100ps
- **ΔEkin/Ekin** ~2%
- **Δ(dE)/dE** ~2%

| Sub-detector | Main characteristics |
|---|---|
| **Start counter** | plastic scintillator 250 μm |
| **Beam monitor** | drift chamber (12 layers of wires) |
| **Target** | C+$C_2H_4$ (2 mm) |
| **Vertex** | 4 layers silicon pixel (20x20 μm) |
| **Magnet** | 2 permanent dipoles (0.8 T) |
| **Inner tracker** | 2 layers silicon pixel (20x20 μm) |
| **Outer tracker** | 3 layers silicon strip (125 μm pitch) |
| **Scintillator** | 2 layers of 20 bars (2x40x0.3 μm) |
| **Calorimeter** | 360 BGO crystals (2x2x14 μm) |

- optimised for heavy (Z≥3) fragments
- less than 2m: can be easily movable to fit the space limitations from experimental and treatment rooms
- angle setup: ±10°

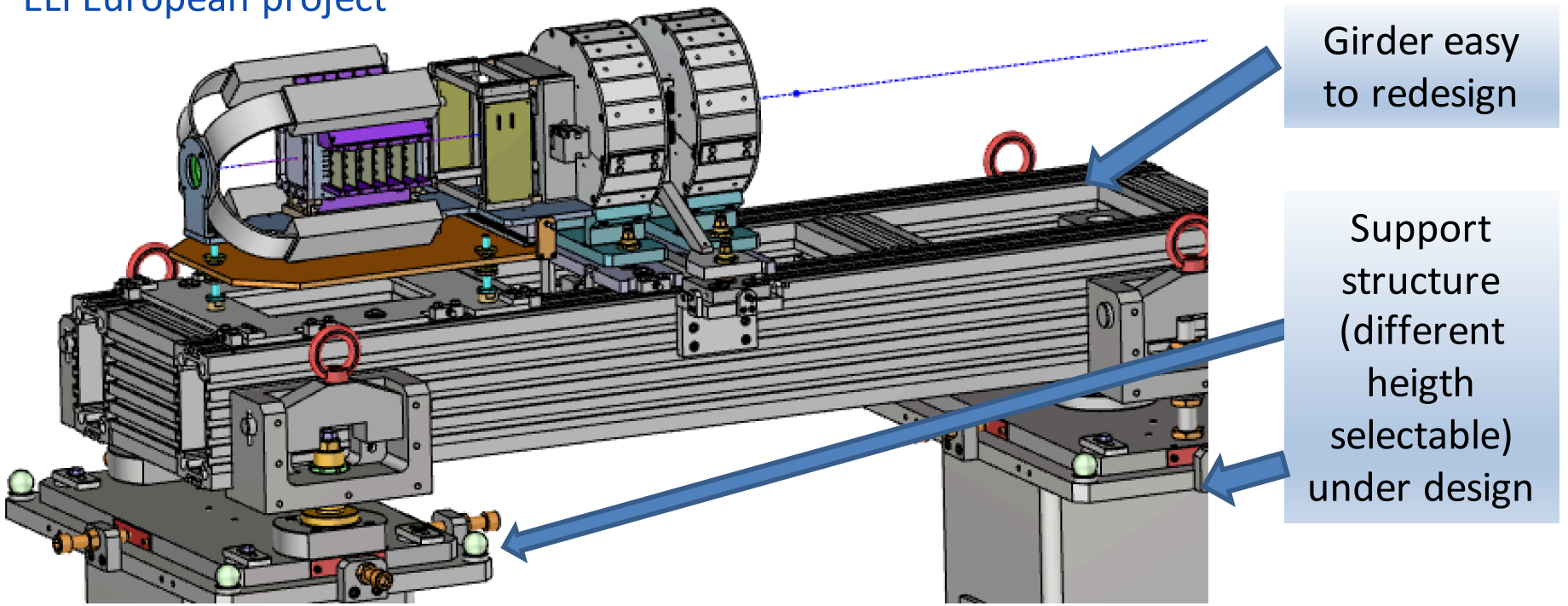


# FOOT tracker mechanical setup

## FOOT: a homeless setup !!

The (delicate) interaction + magnetic regions has a unique movable assembly ( ~ 150 kg x 150 cm)

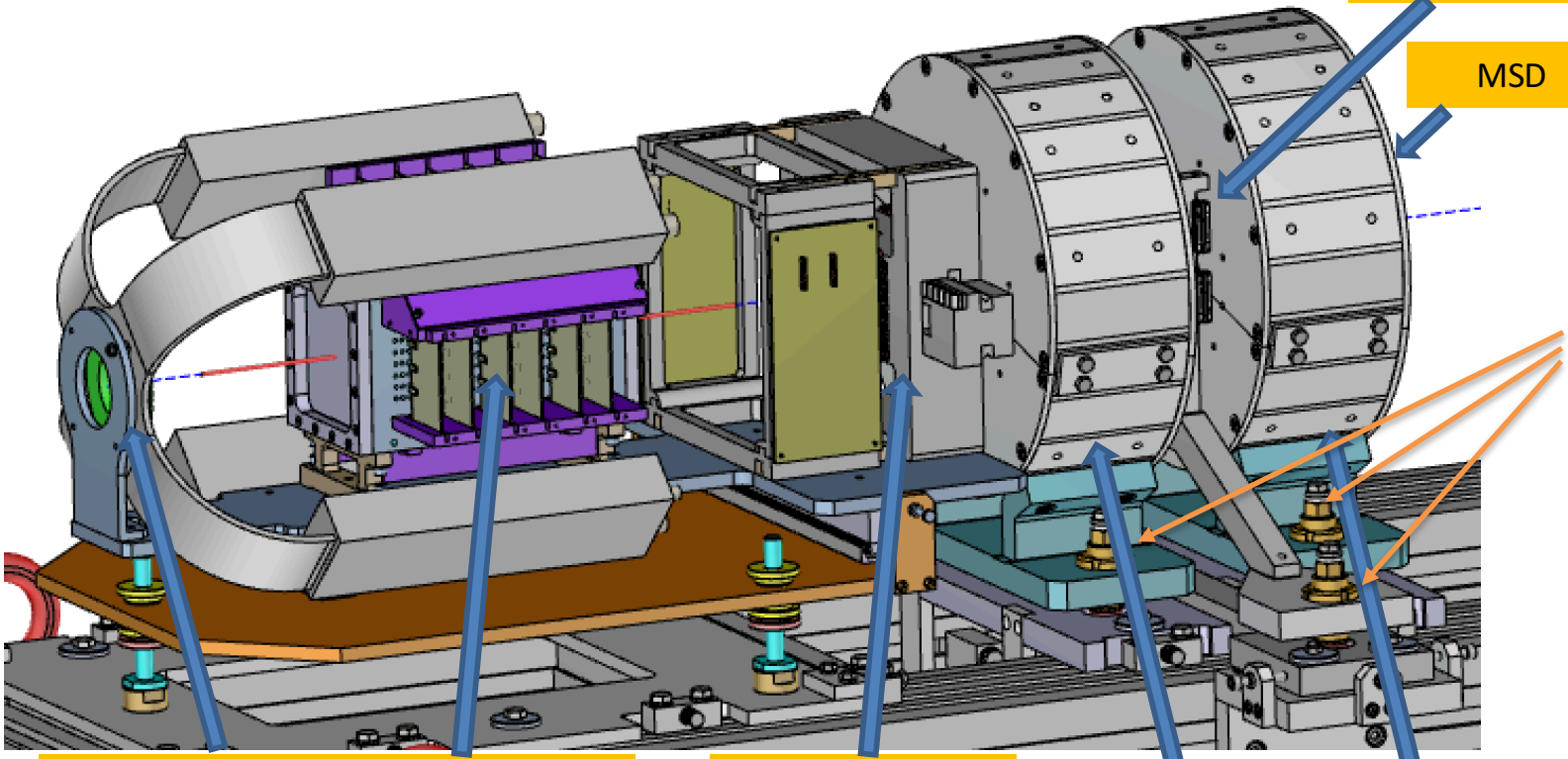
Clone of a structure used to move aligned accelerator section for ELI European project




S. Tomassini, INFN-LNF

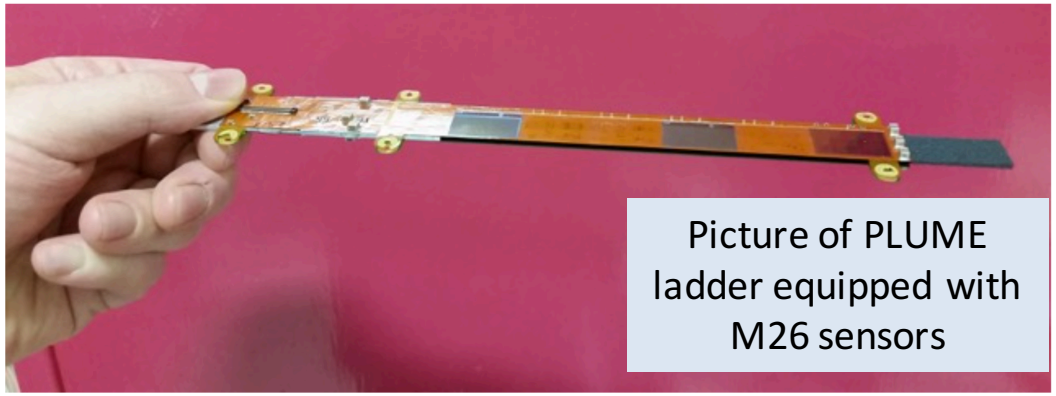
# FOOT tracker mechanical setup

## LNF responsibility

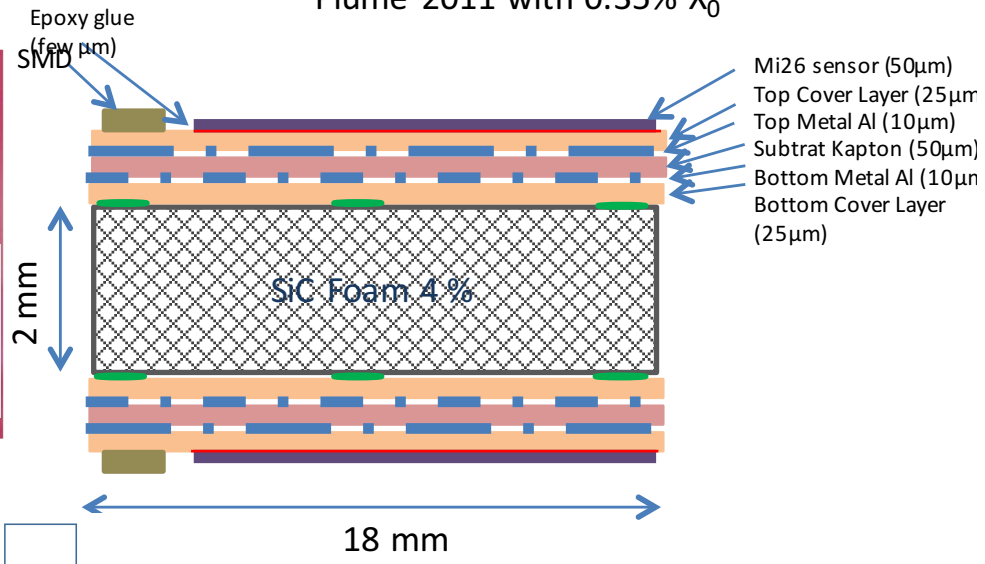


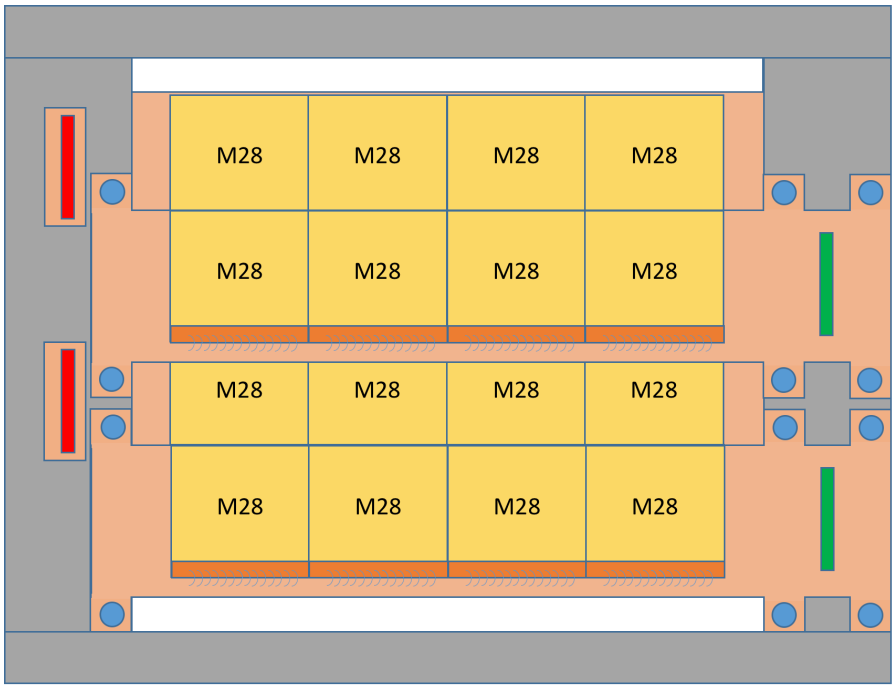

S. Tomassini, INFN-LNF

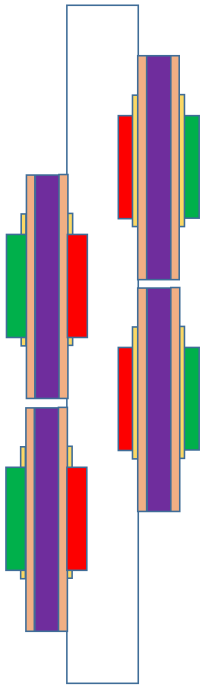
# FOOT Inner tracker




Plume 2011 with 0.35% $X_0$



1 modulo = 4 sensori Mimosa M28

1 Ladder = 2 moduli accoppiati

1 Layer = 2 Ladder

Inner tracker = 2 Layer (4 Ladder)

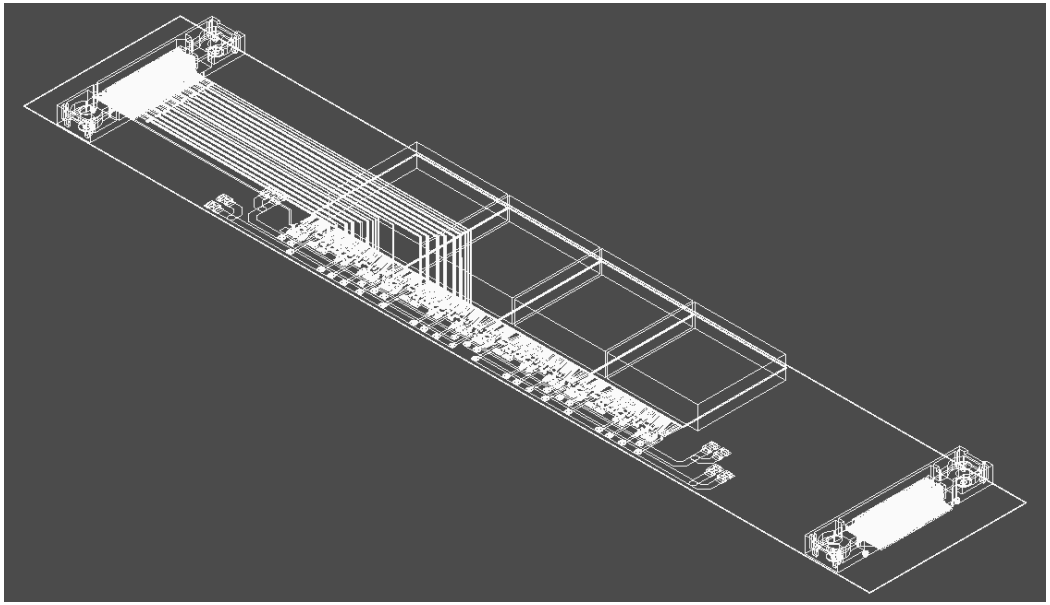
# Status Inner tracker

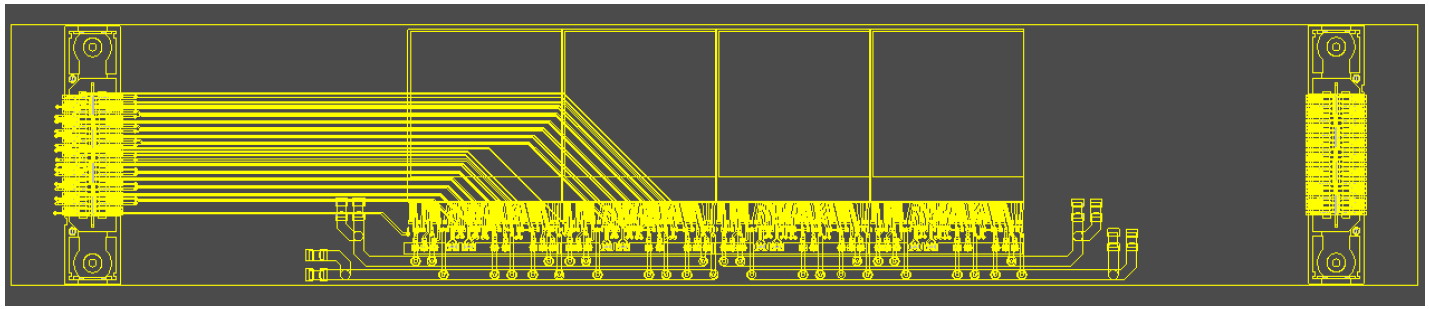
First **draft** of the **PlumeM28 module**:

- 4 M28 sensors
- 2 connectors (one per side)
- Horizontal sensor position un-centered!

Still many open questions:

- Kapton thickness
- Design for heat removal?
- Mechanical fixed on both side?
- What kind of adapter board?
- Copper or aluminum?





**Design by SEA (Servizio Elettronica ed Automazione) LNF**

# M28 sensors test

PADME will use a Mimosa28 pixel sensor vertex detector (4 planes) thinned to 50 µm to monitor the beam profile and multiplicity ➔ FOOT twin system

- The test of the MIMOSA thermal dissipation in vacuum performed
  - After the necessary and very important preparatory work
- The internal diode, if properly calibrated, is extremely useful for the knowledge of the operating conditions
- The thermal dissipation through the chip → 3 mm wide thermal contact with PCB → PCB metal strips → copper bar → Peltier is more than adequate solution for MIMOSA
- Wonderful work on the MIMOSA support and the PCB design and manufacturing

**Venelin Kozhuharov** may 25th PADME meeting

**MIMOSA works in vacuum and it works very very well :) for the first time**

**MIMOSA tested in air too:**

- Reaching stable running condition (thermal equilibrium) @ 37°
- Diode voltage: 854 mV
- Temperature in the room (and of the copper bar) ~24° C

# Attività 2019

**Attività 2019 sul tracciatore a pixel di FOOT**

- Costruzione e test dell'FPC (Flexible Printed Circuit) per il Tracciatore intermedio ( SEA )
- Gara per l'acquisto dei magneti permanenti del tracciatore (indizione entro fine 2018)
- Sviluppo di sistemi di assemblaggio dei sensori dell'Inner Tracker (Jigs, incollaggio, bonding) in collaborazione con G&A Engineering
- Costruzione (G&A) e test dell'Inner Tracker ( SEA )
- Sviluppo di un sistema di readout integrato per il tracciatore intermedio ( SEA - sviluppo di una scheda con FPGA per lettura integrata di 8 sensori tipo Ultimate )
- Progettazione del sistema di supporto integrato con le readout board del tracciatore intermedio ( SPAS )
- Disegno e realizzazione della meccanica di supporto del sistema di tracciamento composto da: start counter, beam monitor, rivelatore di vertice, tracciatore intermedio, magneti, MSD ( SPAS )
- Primo RUN di presa dati a novembre 2018 al GSI con il solo rivelatore di vertice (emulsion setup)
- Studio di possibili nuovi sensori a pixel "analogici" (progetto PEGASUS Strasburgo)

**Richieste finanziarie:**

| | |
|---|---|
| Missioni | 10k (riunioni collaborazioni, presa dati) |
| Apparato | 45.5k (meccanica + costruzione IT) |
| Consumo | 14.5k (realizzazione FPC in Alluminio, progettazione IT) |
| Trasporto | 1 k (per test LNS) |

**Richieste (indicative) servizi:**

| | |
|---|---|
| SEA | 5 mu |
| SPAS | 3 mu |
| Off. Mecc. | 1 mu |

# LNF activities

Ricercatori/Tecnologi

1. Lucherini 0.9
2. **M. Mirazita 0.9**
3. P. Rossi 0.2
4. S. Tomassini 0.3

Tecnici

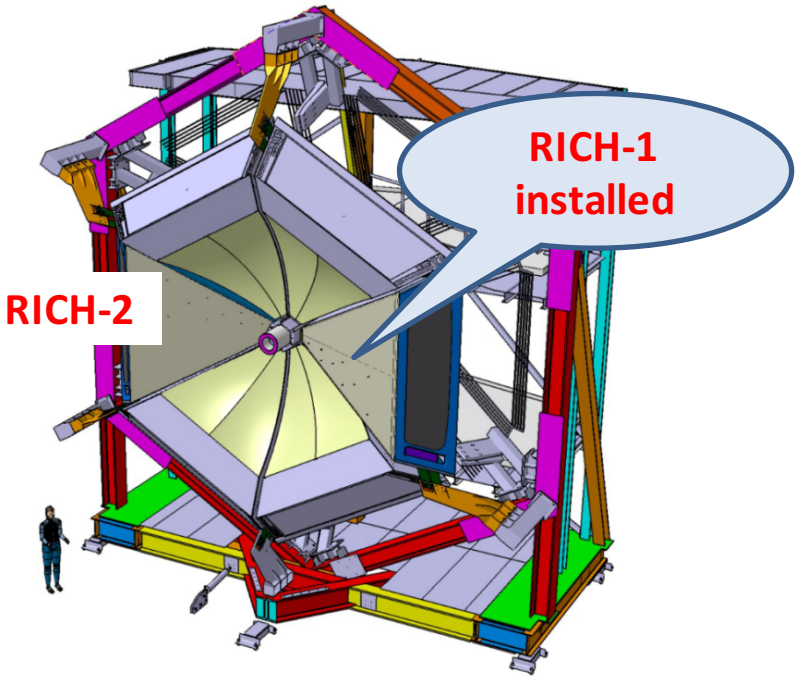
A. Orlandi
D. Orecchini
A. Viticchié

4 Physicists for 2.3 FTE
Average participation of 68%

**Physics activity at JLab in Hall-B**:
study of the nucleon structure though eN and eA fixed target experiments

LNF group involved in **RICH for CLAS12**:
Improvement of PID needed to extend TMD measurements to kaons
Goal: ID of kaons vs $\pi$ and p with p=3-8 GeV/c

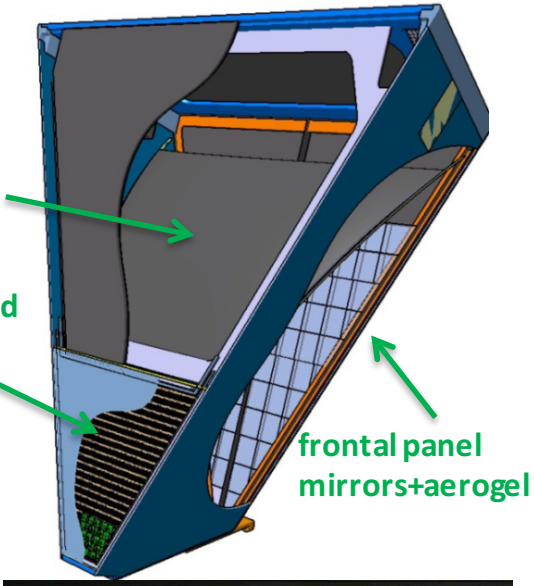
- Will replace 2 sectors of the thr. Cherenkov counters
- RICH-1 installed in January 2018
  - first run January-May 2018
- RICH-2 after 2019

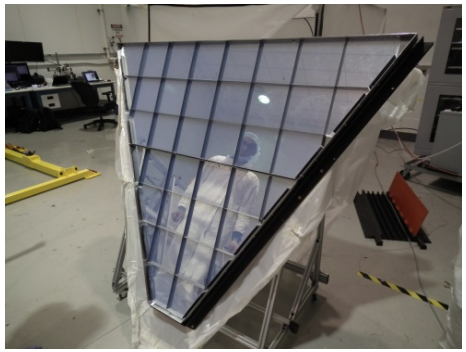


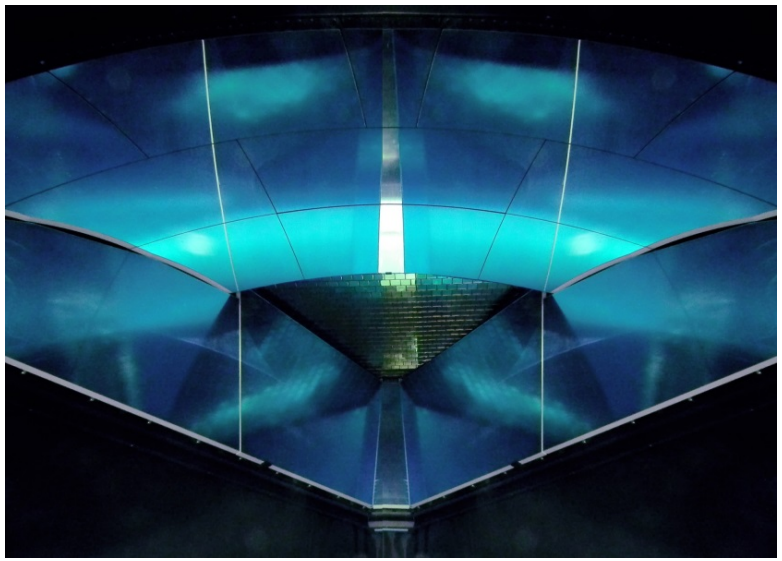

**LNF responsibilities**:
Design and construction of the mechanical structure
Design of mirrors, support and alignment system

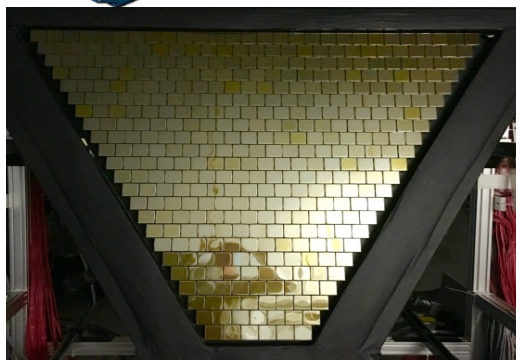
# The RICH for CLAS12

- **Aerogel radiator**
  - about 102 tiles, 20x20 $cm^2$
- **Spherical mirrors**
  - 10 carbon fiber mirrors, total area 3.6 $m^2$
- **Planar mirrors**
  - 7 glass mirrors, total area 3.7 $m^2$, very light
- **Readout**
  - 391 MultiAnode PMT, 2500 channels
  - FE based on the MAROC chip, binary readout

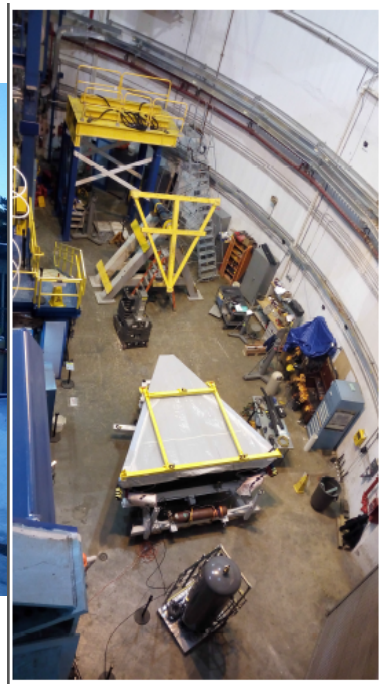


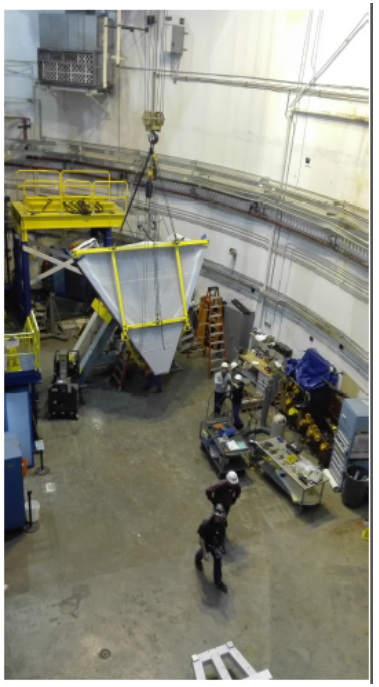



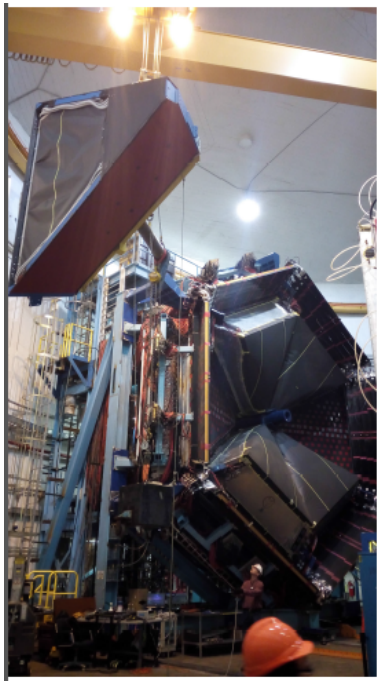


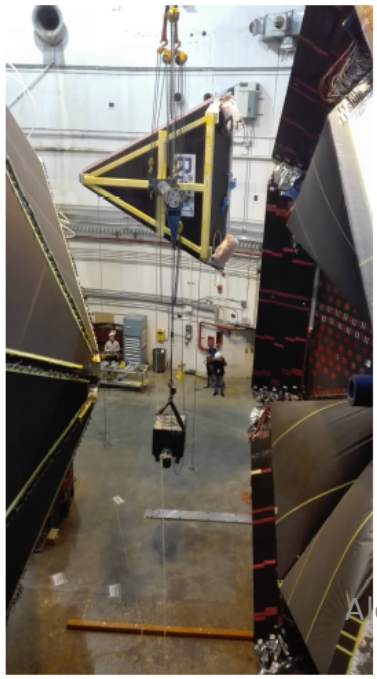


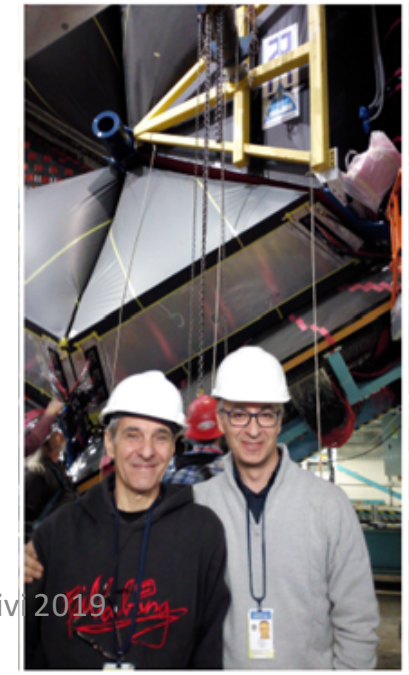
# The RICH installation

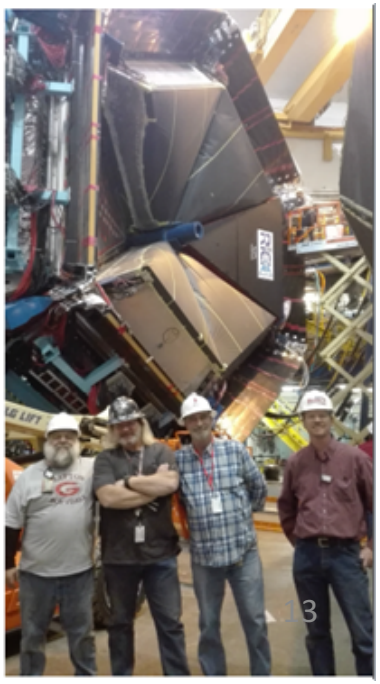




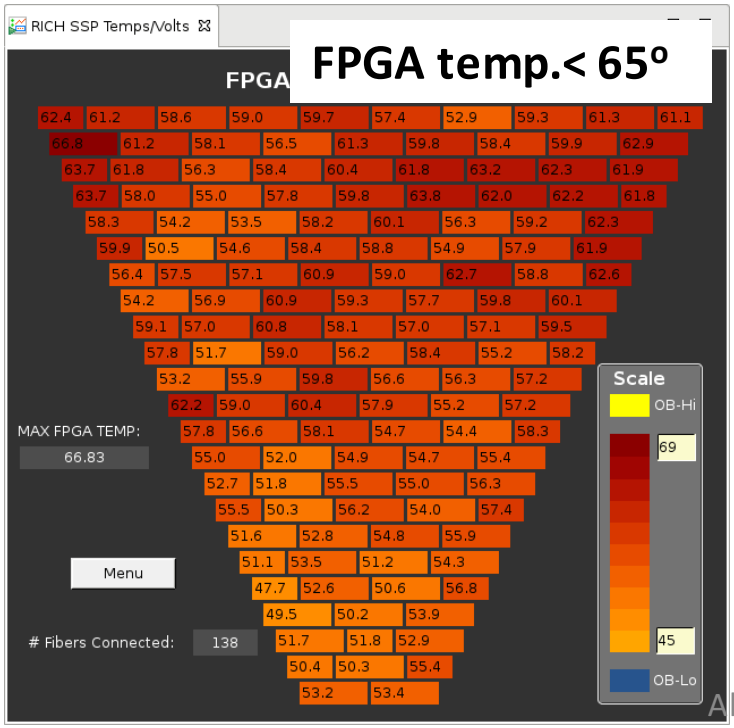


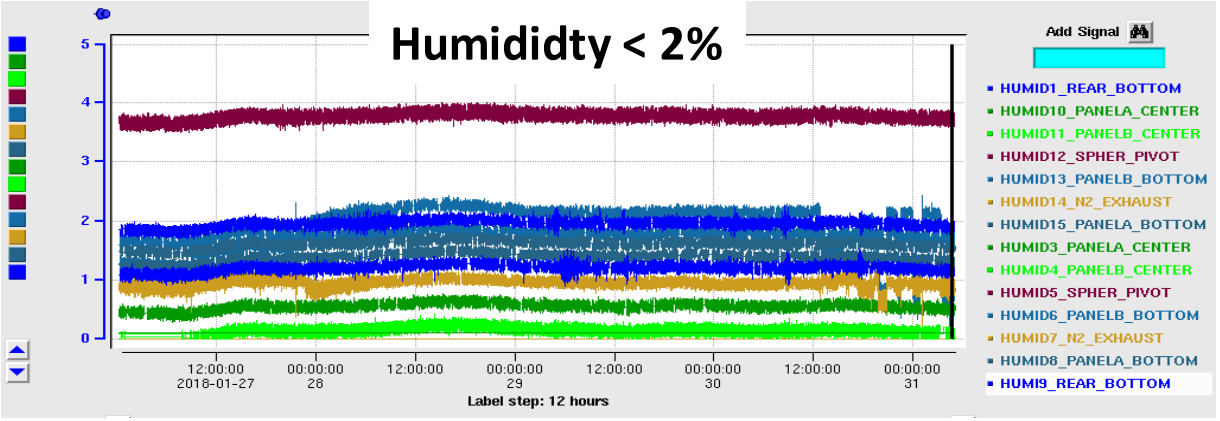


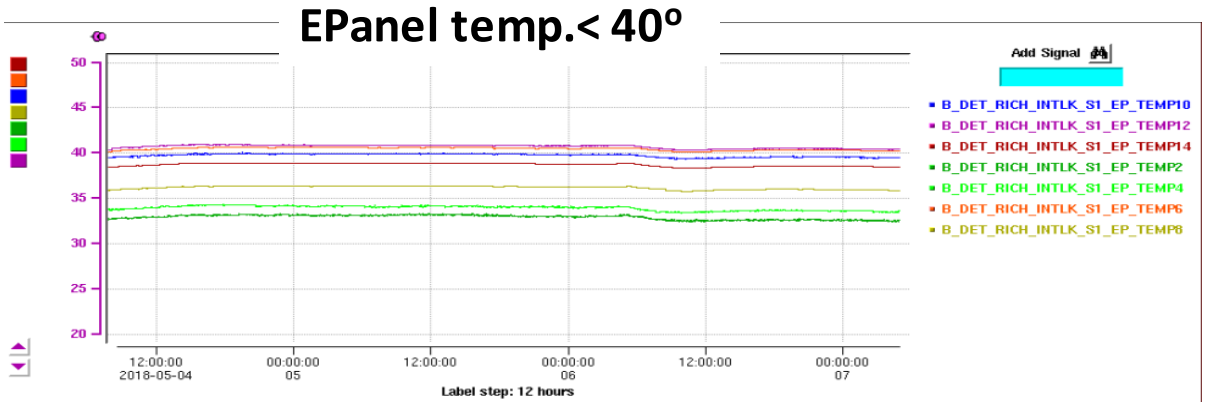


# Slow controls

- Several parameters are monitored and sent to interlocks and alarms
  - FPGA chip temperature
  - Electronic panel internal temperatures
  - Cooling air flow
  - RICH internal humidity
  - Nitrogen flow



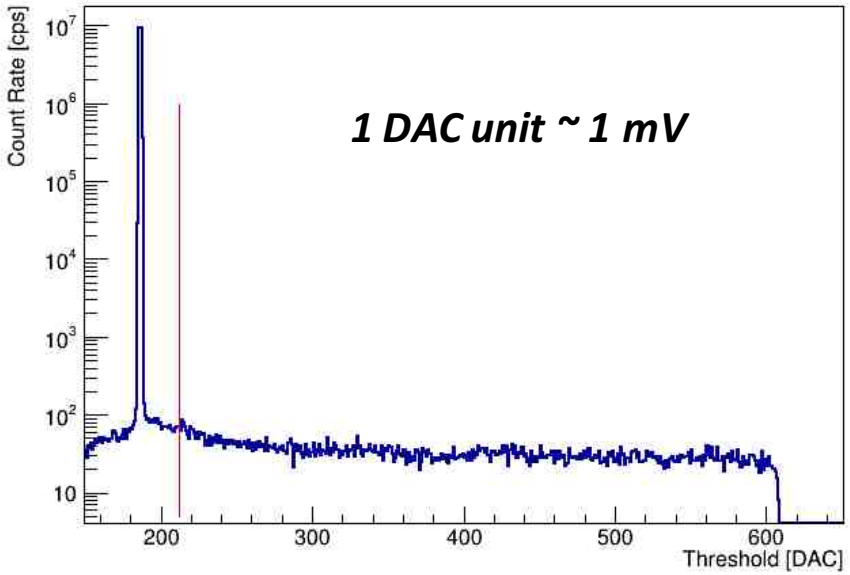



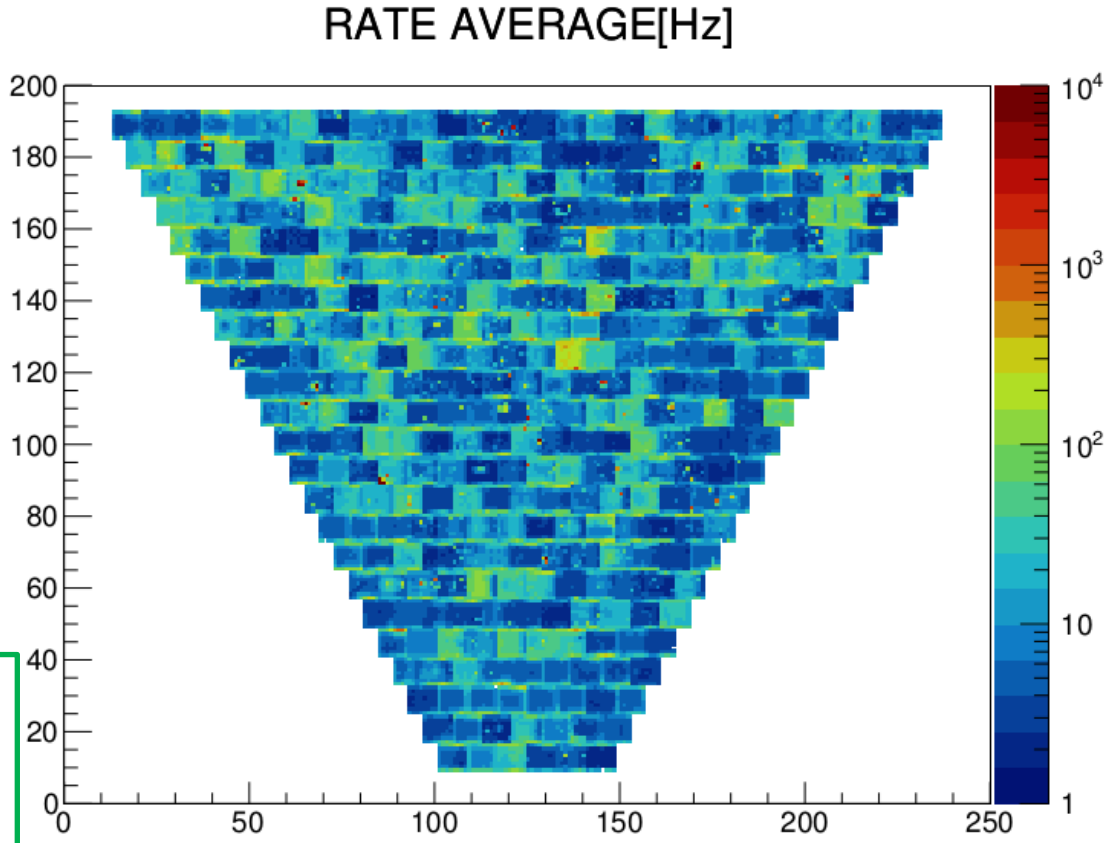
# Readout calibration

**The RICH readout is based on the 64 channel MAROC front end chip**

- **binary output with adjustable preamp and threshold**
- **leading and trailing edge time**

**Calibration performed using the dark noise and varying the threshold value**



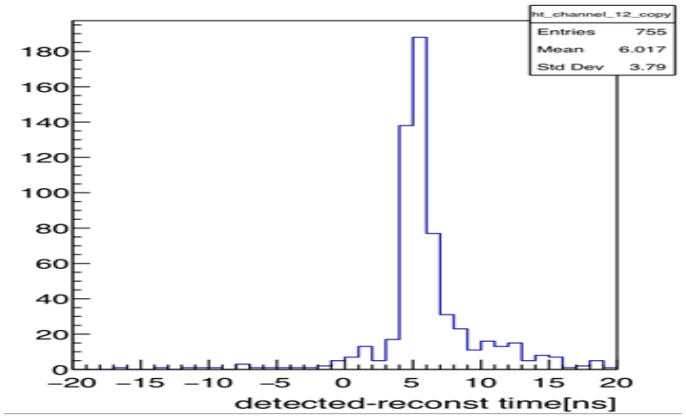

- **Pedestal stability better than 0.5 %**
- **Average dark rate around 30 Hz/channel**
- **<10 hot channels (R>100 kHz)**
- **5 dead channels**

**Measured dark rate per channel → simulation and reconstruction**

# Event reconstruction

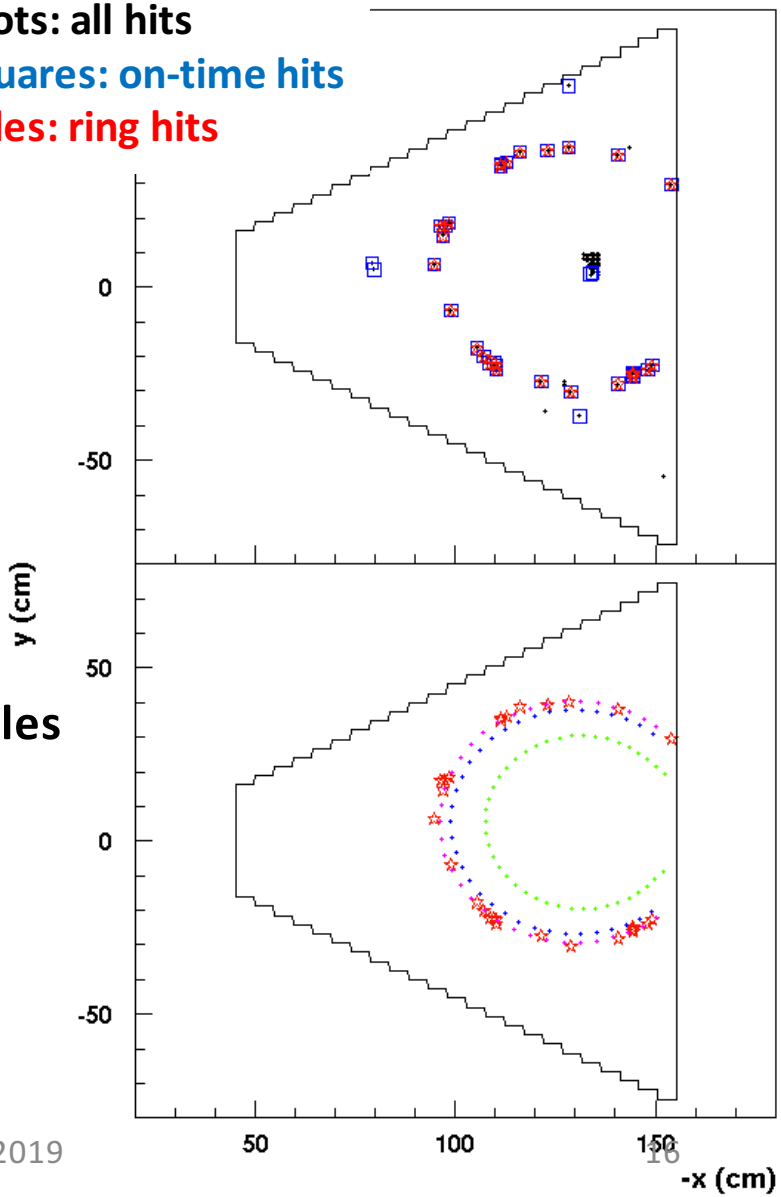
**Typical time resolution for 1 channel**
- **resolution ~1 ns**

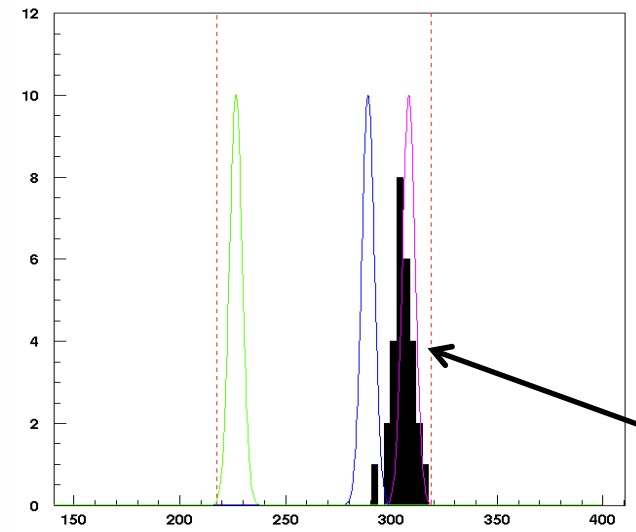
**Used to:**
- **select in-time hits**
- **"count" number of reflections**




**Example of event reconstruction**

**black dots: all hits**
**blue squares: on-time hits**
**red circles: ring hits**



**Expected Cherenkov angles and photon hits for:**
- **pions (purple)**
- **kaons (blue)**
- **protons (green)**

**measured hits**

# 2018-19 activity

- **CLAS12 restarted physics operation**
  - first data taking January-May 2018, data reconstruction in progress
  - next run scheduled for August 2018 to March 2019
  - start physics analysis of the 2018 data
- **First RICH module**
  - monitor of the performances, prepare for the next runs
  - complete the reconstruction software
- **Second RICH module**
  - Test of new photodetectors: possible replacement of MAPMT with SiPM
  - Construction in progress: aerogel production, mechanical structure, mirrors, photodetectors

## Richieste finanziarie

| | |
|---|---|
| **missioni** | **25k** |
| **consumo** | **10k** |
| **apparati** | **150k** |
| **trasporti** | **10k** |
| **manutenzioni** | **8k** |

## Richieste ai servizi

Progettazione: 1 mese/uomo (costruzioni meccaniche secondo settore RICH)

Off. meccanica: prototipazione rapida 3D

1 mese/uomo (prototipo studi fotorivelatori)

**RICHIESTE DA DISCUTERE NELLA PROSSIMA RIUNIONE NAZIONALE DI JLAB12**

# LNF activities

2 researchers for 1 FTE
Average participation of 50%
Total INFN ~10 FTE

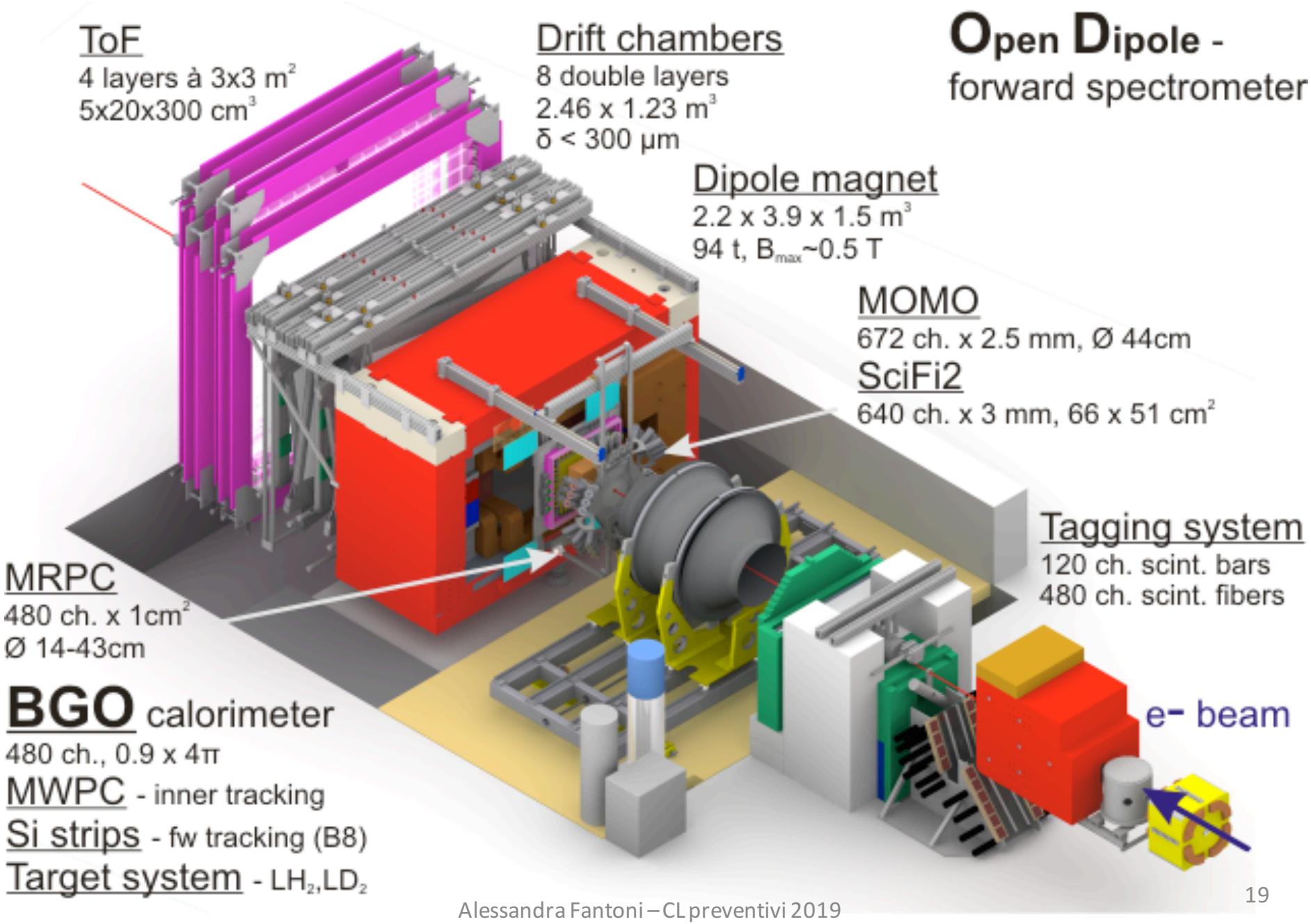
| | |
|---|---|
| **1. P. Levi Sandri** | **0.8** |
| 2. A. Spallone | 0.2 |

- Nucleon excited states via meson photoproduction at MAMIc (Mainz) and ELSA (Bonn)
- Transition form factor
- $\eta'$ threshold anomaly
- International collaboration: Bonn PI, Bonn HISKP, (Gießen), ISS, LNF, Messina (not INFN), Pavia, Roma2, Torino, Glasgow, Basel, PNPI Gatchina, INR Mosca, IHENP Kharkov, Lamar U. (Texas)

**Collaboration Responsibilities**:
- Co-spokesperson BGO-OD
- Responsabile Nazionale INFN
- MC coordinator
- Spokesperson $\eta'$ beam asymmetry and x-sect

**Hardware responsibilites**:
- BGO (+ Roma2)
- Barrel (+ ISS)
- MRPC (+ Roma2)

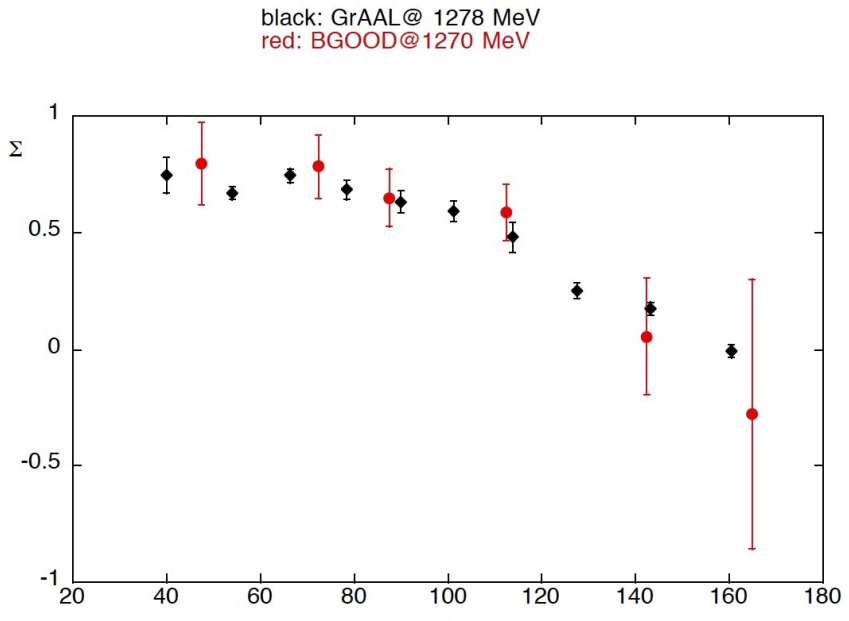
# Open Dipole + BGO calorimeter @ Bonn



# ELSA (Bonn) beamline S - Status

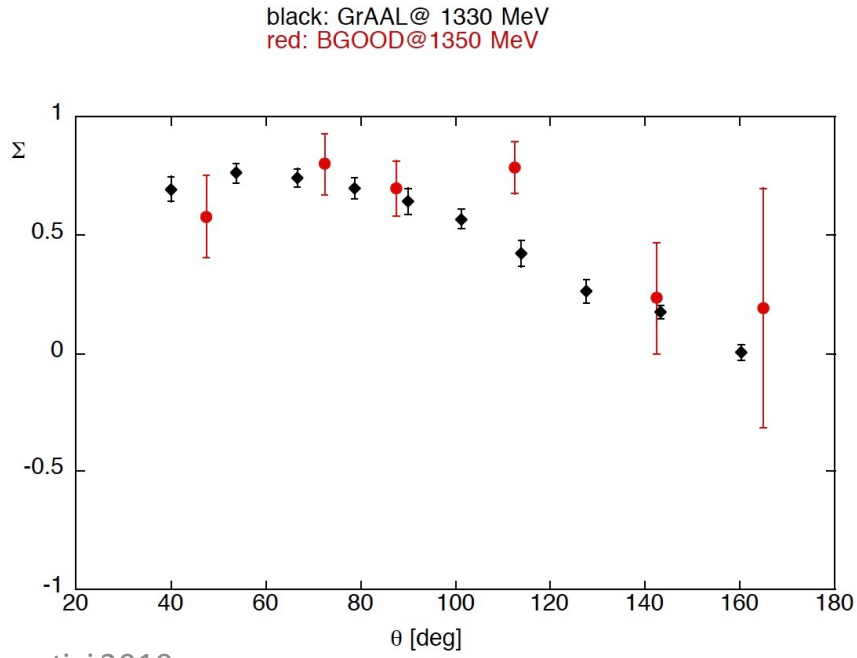
**Rivelatori & Software:**

- MWPC: Commissioned
- MRPC: Final commissioning (summer 2018)
- Calorimetro e barrel in funzione
- MonteCarlo in continuo sviluppo, generatore di eventi (LNF, Messina, Roma2) – coordinamento LNF




**Raccolta dati 2017-2018:**

- Un run di presa dati con bersaglio H nel 2017
- Due run presa dati 2018
  run 1 ongoing con bersaglio D2
  + possibile run in autunno
- Analisi in corso
- Primi risultati preliminari:
  Beam Asimmetry $\eta$



# ELSA beamline S – Attività/Richieste 2019

**Attività 2018 – 2019 e oltre:**

- PI e Università di Bonn garantiscono il funzionamento di ELSA per esperimenti fino a tutto il 2020 (Finanziamento DFG approvato)
- Una presa dati in corso con nuovo bersaglio (6 →11cm) e D2 (RUN1)
- RUN2 in autunno
- Analisi in corso, primi risultati preliminari asimmetria di fascio $\pi^0$, $\eta$
- 2019: richieste 1500 h fascio per:
  - completamento misura H
  - completamento misura D
- 2020: $^{6}$Li, $^{12}$C
- 2021: possibile estensione per completamento statistica

## Richieste finanziarie

| | |
|---|---|
| **missioni** | **15k** |
| **consumo** | **10k** |

## Richieste ai servizi

**Nessuna salvo imprevisti**

# LNF activities

20 researchers for 12.4 FTE
Average participation of 62%
Total INFN ~15 FTE

| | |
|---|---|
| 1. M.Cargnelli | 0.5 |
| 2. M. Bazzi | 1 |
| 3. A. Clozza | 0.7 |
| **4. C. Curceanu** | **0.7** |
| 5. S. Dabagov | 0.2 |
| 6. L. De Paolis | 1 |
| 7. D. Hampai | 0.2 |
| 8. M. Iliescu | 1 |
| 9. 7. P. Levi Sandri | 0.2 |
| 10. M. Merafina | 0.6 |
| 11. M. Miliucci | 1 |
| 12. S. Niedzwiecki | 0.5 |
| 13. E. Pace | 0.4 |
| 14. A. Scordo | 0.7 |
| 15. D. Sirghi | 0.5 |
| 16. F. Sirghi | 0.8 |
| 17. M. Skurzok | 1 |
| 18. A. Spallone | 0.4 |
| 19. O. Vazquez D. | 0.5 |
| 20. J. Zmeskal | 0.5 |

+ G. De Iulis (borsista)

+ C. Guaraldo

- KAONNIS= Low energy kaons interaction studies at Daϕne
- Integrated initiative (SIDDHARTA + AMADEUS)
- Precise measurement of kaonic atoms X-ray transitions and of the charged kaons nuclear interaction processes
- International collaboration: INFN; SMI-OAW (Austria); IFIN-HH (Romania); Politecnico MI; TUM, Helmholtz I. (Germany); RIKEN, Tokyo U. (Japan); Jagellonian U. (Poland); Victoria U. (Canada); Zagreb U. (Croatia)

**Spokesperson + ALL Responsabilities in LNF**

**14 Publications (2017)**

Prog. di grande rilevanza MAECI:
"Strangeness in the compact stars?"
Italy-Japan 2017-2019

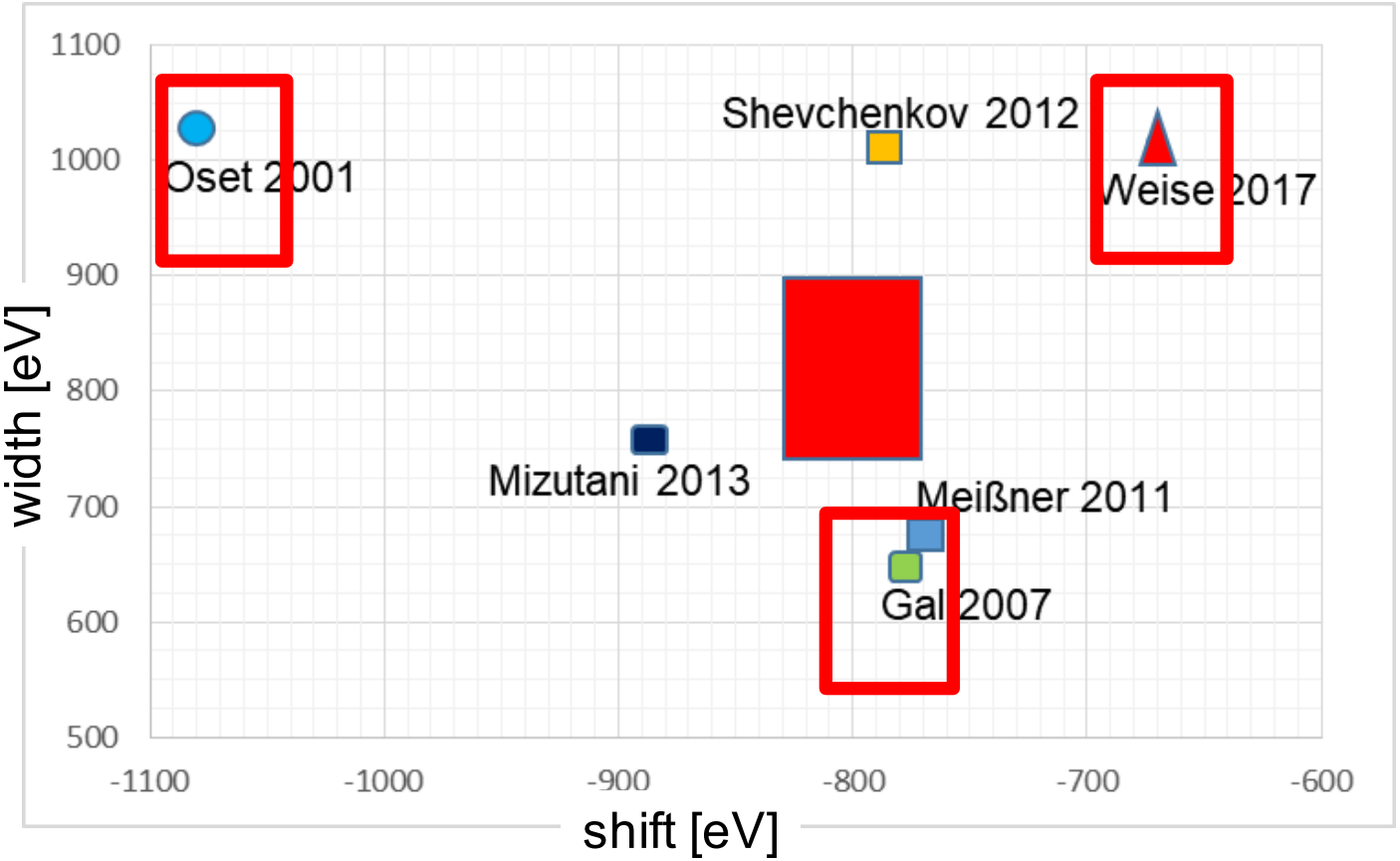
SIDDHARTA: important training for young researchers => 10 PhDs

# SIDDHARTA-2: aim and goal

- To perform precision measurement of kaonic atoms X-ray transitions

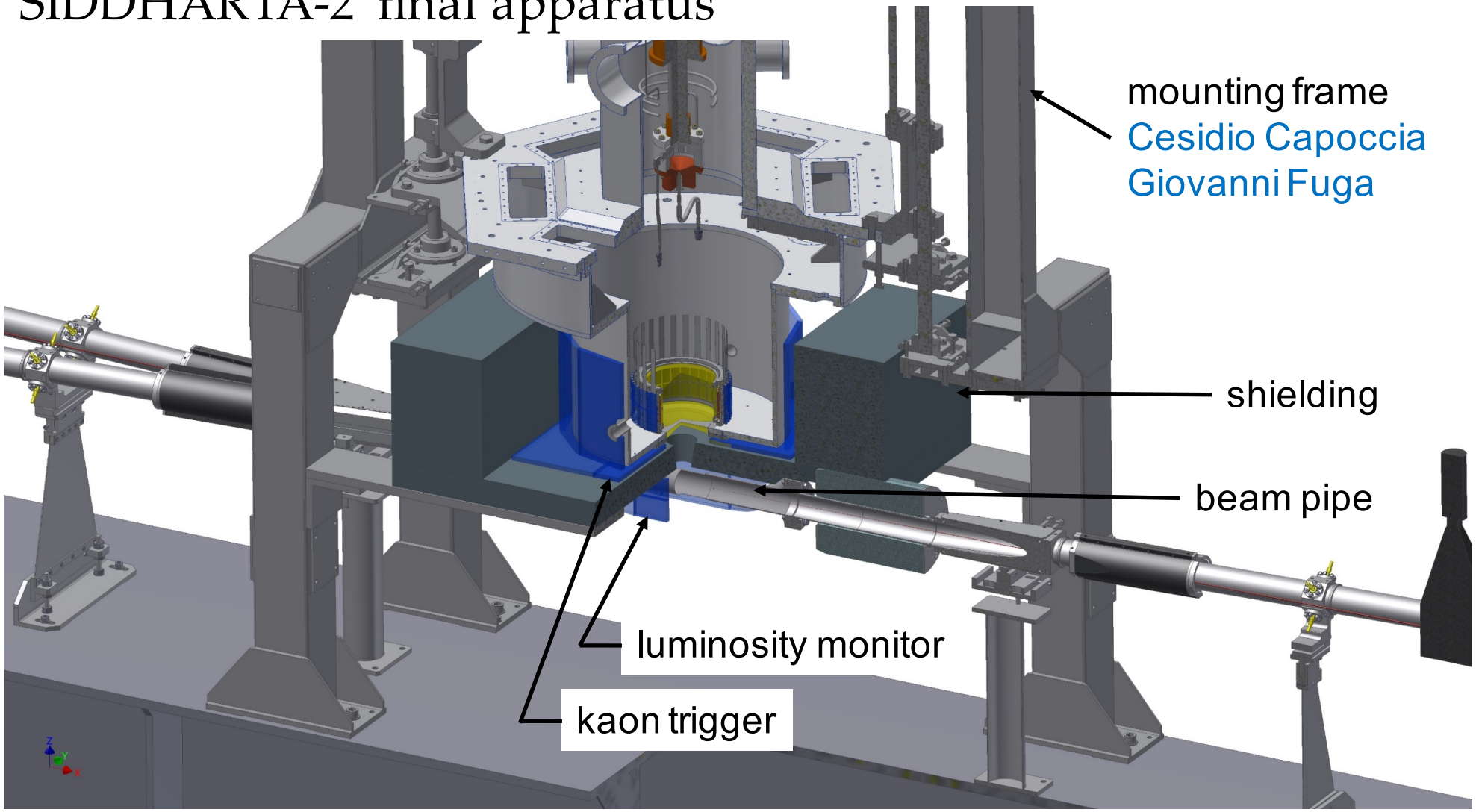
-> unique info about the QCD in non-perturbative regime in the strangeness sector not obtainable otherwise

- Precision *measurement of the shift* and *of the width* of the 1s level of kaonic hydrogen and the of **kaonic deuterium** and of other types of kaonic atoms
- Comparison with many different theory models



# SIDDHARTA-2: the apparatus

SIDDHARTA-2 final apparatus



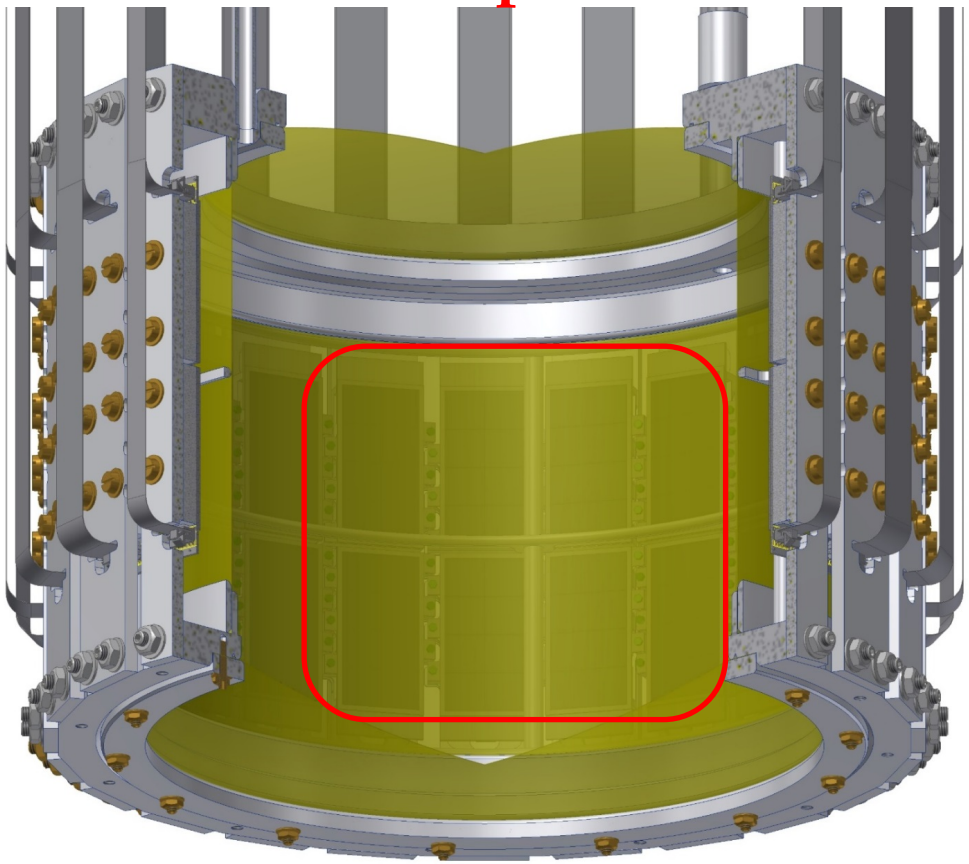
# SIDDHARTA-2: phase 1 = technical run

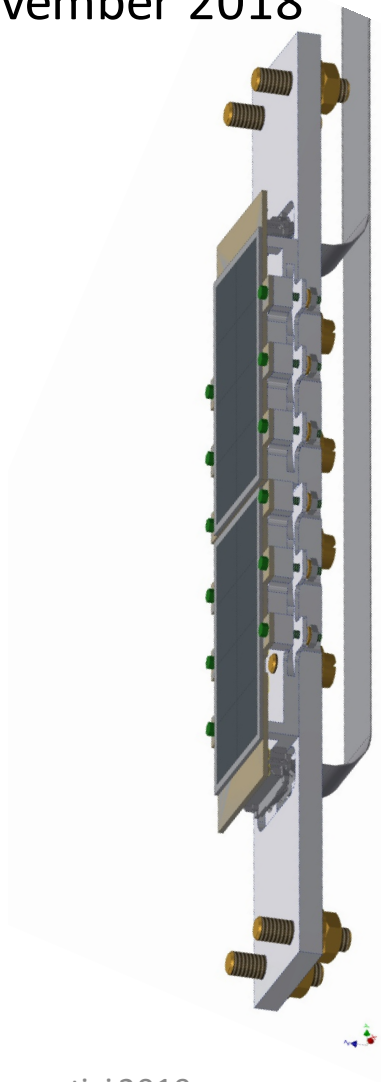
- Assembling plan: test setup

8 unit of SDDs = 4x2 SDD arrays around the cryogenic target assembled and tested in laboratory within October 2018

- Installation at DAΦNE: starting middle November 2018

**Test setup (8 units)**





Final configuration
= 48 SDDs
(= 24 x 2 arrays)

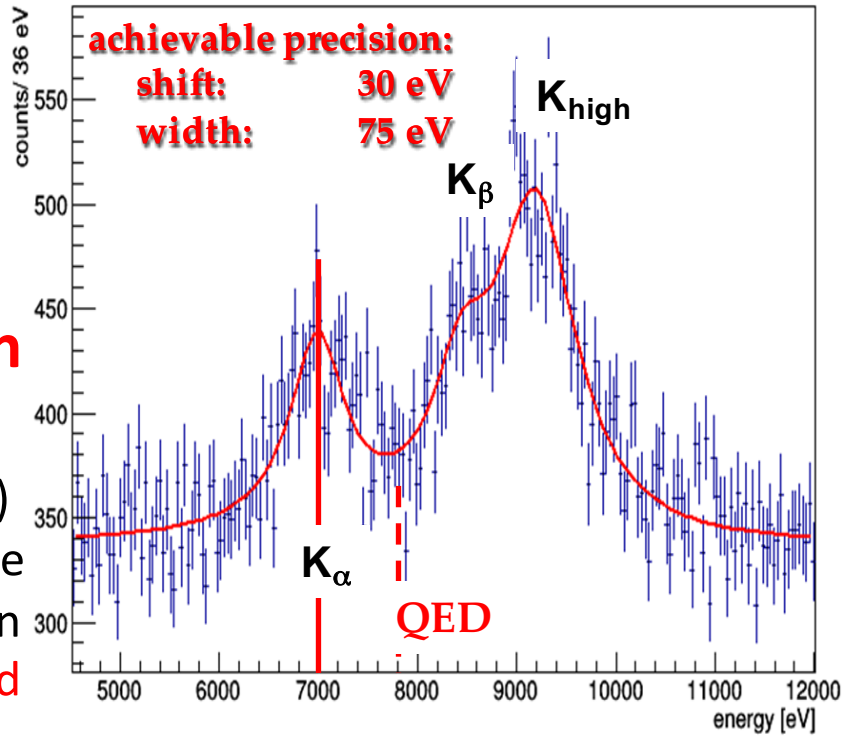
# SIDDHARTA-2: phase 1 + phase 2

## Phase 1

- **Technical run start at end of 2018 (november)**
  - target position 100 mm higher in order to install the DAΦNE luminosity monitor for optimal beam tuning!
  - with 8 SDDs (one DAQ bus subsystem)
  - with complete Veto I + II
  - SIDDHARTA-2 luminosity monitor
- **Technical run (2019):**
  - similar beam/background conditions

  are reached as compared with SIDDHARTA

  -> tested with kaonic helium indicators




## Phase 2

- **Physics run: kaonic deuterium run in 2019 (2020)**

  - final installation in Daϕne on spring 2019 (tbc)

  - request of 800 $pb^{-1}$ on tape to perform the first measurement of the strong interaction induced energy shift and width of the Kd ground state (similar precision as $K^-p$)

# Future program & Perspectives

Feasibility studies in parallel with Siddharta-2 (Ge and VOXES)
Proposal for Extension of the Scientific Program

Kaon mass - precision measurement at a level < 7 keV
Kaonic helium transitions to the 1s level

Other light kaonic atoms ($K^-O$, $K^-C$,…)
Heavier kaonic atoms ($K^-Si$, $K^-Pb$…)

Radiative kaon capture – $\Lambda(1405)$ study

Investigate the possibility of the measurement of other types of hadronic exotic atoms (sigmonic hydrogen ?)

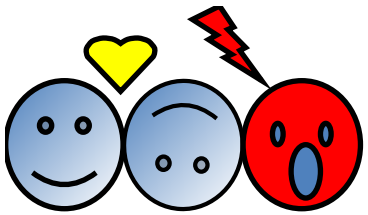
*AMADEUS – nuclear interactions of kaons*

## Richieste finanziarie

| | |
|---|---|
| **missioni** | **15k** |
| **consumo** | **30k** |
| **inventario** | **20k** |
| **altri consumi** | **20k** |
| **manutenzioni** | **10k** |

## Richieste ai servizi

SEA: 2 mesi/uomo (aggiustamenti alimentazioni, readout veto)
SPAS: 6 mesi/uomo (ottimizzazione shielding, supporteria luminometro)
SPCM: 5 mesi/uomo (aggiustamenti supporteria, shielding)



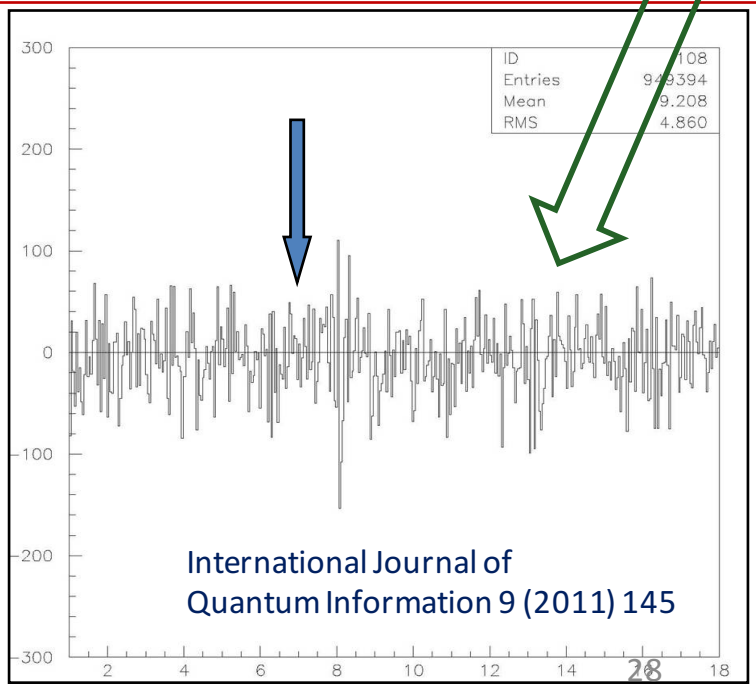

# LNF activities

14 researchers for **7.7 FTE**
**Average participation of 55%**

| | |
|---|---|
| 1. S. Bartalucci | 0.9 |
| 2. M. Benfatto | 0.5 |
| 3. A. Clozza | 0.3 |
| **4. C. Curceanu** | **0.3** |
| 5. J. Marton | 0.5 |
| 6. E. Milotti | 0.2 |
| 7. E. Pace | 0.4 |
| 8. A. Pichler | 0.5 |
| **9. K. Piscicchia** | **1** |
| 10. A. Scordo | 0.3 |
| 11. D. Sirghi | 0.5 |
| 12. L. Sperandio | 0.8 |
| 13. A. Spallone | 0.4 |
| 14. New Vienna PhD | 1 |
| + C. Guaraldo | 0 |

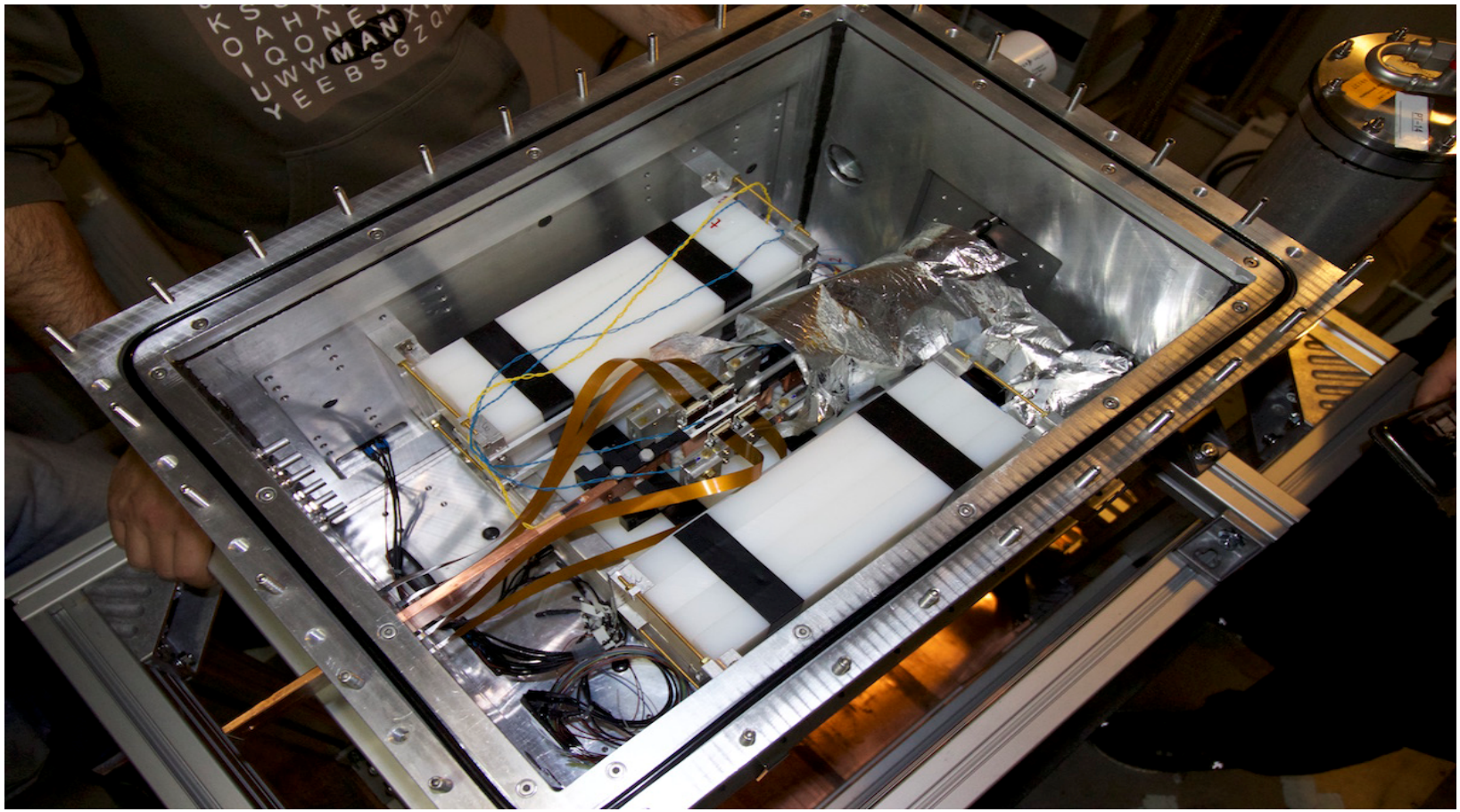
- **VIP**=Violation Pauli Exclusion Principle (PEP)
- Perform experimental test of PEP for $e^-$ with a clean method
- Located at LNGS to reduce X-ray background
- International collaboration: LNF, LNGS, Ts INFN; SMI-OAW (Austria); IFIN-HH (Romania); Neuchatel U. (Switzerland); Rennes U. (France); Uni & INFN BO
- VIP already established a probability of PEP violation $\beta^2/2 < 4 \times 10^{-29}$
  previous limit $< 1.7 \times 10^{-26}$ PLB 328 (1990) 438 => improvement 3 orders magnitude
- **VIP upgrade (CCD detectors replaced by SDD) : VIP-2 in data taking at LNGS**
- **Other tests of Quantum Mechanics (collapse models)**

**ALL Responsabilities @ LNF**




***VIP-2 =>*** *new detectors SDD:*
- *higher resolution: 190eV (fwhm)*
- *faster (triggerable)=> VETO system*
- *higher acceptance*
- *higher current => low background*
- *higher efficiency*

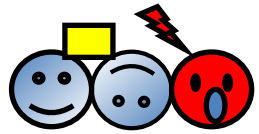
# VIP-2 final setup



**VIP-2 installed at LNGS in Nov 2015:** data taking: summer 2016 – 30 Nov 2017
with old SIDDHARTA SSDs 2 arrays (1x3 SDDs each)

**Final setup installed at LNGS in Apr 2018:** new copper target and SDDs
4 arrays (2 x 4 SDDs each)

# VIP-related recent results (2017-2018)



**Organized conferences :**

1) Workshop Quantum Foundations. The physics of "what happens" and the measurement problem, LNF, LNF (INFN), Frascati, Italy, 24-26 May 2017
https://agenda.infn.it/conferenceDisplay.py?confId=13169
2) Workshop Quantum Foundations New frontiers in Testing Quantum Mechanics from Underground to Space, LNF (INFN), Frascati, Italy, 29 Nov-1 Dec 2017,
https://agenda.infn.it/conferenceDisplay.py?ovw=True&confId=14361
3) Is quantum theory exact? The quest for the spin-statistics connection violation and related items, LNF, LNF (INFN), Frascati, Italy, 2-5 July 2018
http://w3.lnf.infn.it/event/is-quantum-theory-exact-the-quest-the-spin-statistics-connection-violation-and-related-items/

**External funds (Awards & Prizes):**

**Emmy Noether, EPS prize**

**Awards from: John Templeton foundation and Foundational Questions Institute (FQXi)**

**New funding of the VIP2 experiment at LNGS by Austrian Science Fund (project P30635-N36 started by March 1st , 2018)**

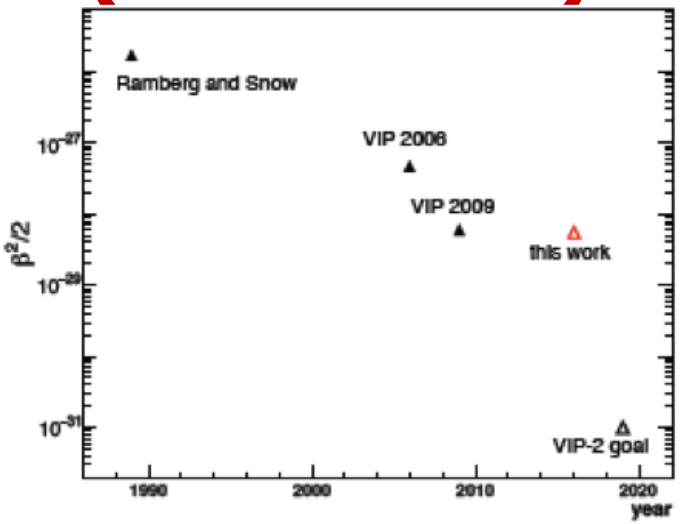
**EU projects**: COST Action CA15220, Quantum Technologies in Space (2016 – 2020)

**FET – prog TEQ (EU) 2018-2021**

# VIP-2 preliminary results (2017-2018)

- **ENTROPY-SWITZ, 19-7, 330 (2017)**

  All past results for PEP violation + preliminary results for VIP-2 → VIP2 with 2 months data taking already reached VIP limit (4y data taking)

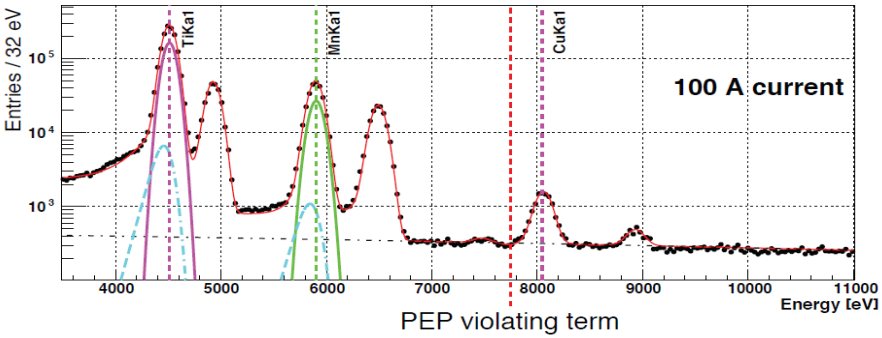



- **ENTROPY-SWITZ, 19-7, 319 (2017)**

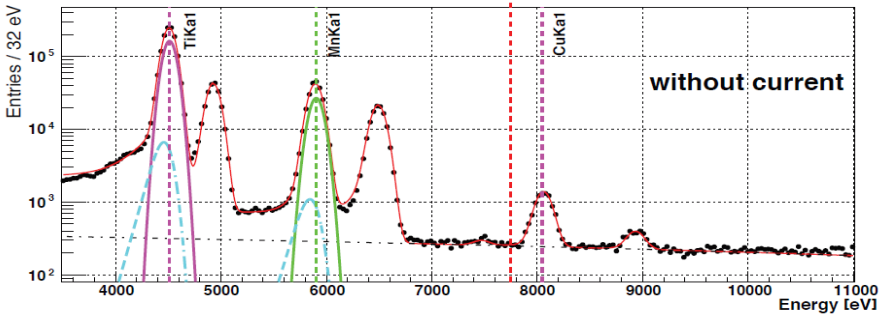
  *CSL Collapse Model Mapped with the Spontaneous Radiation*

- **European Physics Journal C, (2018) 78: 319**

$$\frac{\beta^2}{2} \leq \frac{3 \times 67}{6.0 \times 10^{30}} = 3.4 \times 10^{-29}$$




PEP violating term




- ***On the importance of electron diffusion in a bulk-matter test of the PEP***

  paper accepted by ENTROPY

- ***Putting the Pauli exclusion principle on trial***

  CERN Courier review article, March 2018 issue:
  http://cerncourier.com/cws/article/cern/71089

# VIP-2 plans


- New SDDs tests, final configuration => 3 years data taking at LNGS
- Expectation either to find a small violation or to be able to bound the probability that PEP is violated by electrons pushing it from about $4 \cdot 10^{-29}$ to $10^{-31}$ (2 orders of magnitude improvement)
- *Alternative experimental methods:*
  - *lead target + Ge detectors under investigation*
  - *optimization of experimental setups for testing quantum collapse model predictions*
- *Quantum technologies in space*

## Richieste

### Richieste finanziarie

| | |
|---|---|
| **missioni** | **30k** |
| **consumo** | **38k** |
| **inventario** | **15k** |
| **manutenzioni** | **15k** |
| **trasporti** | **1k** |

### Richieste ai servizi LNF

SEA: 2 m.u. (setup studi con Ge e modelli collasso)
SPAS: 2 m.u. (setup studi collasso, ottimizzazione shielding)
SPCM: 2 m.u. (aggiustamenti, supporteria, shielding, setup con Ge)
2 tecnici al 10%

# Proposta Nuova Sigla: EIC

Presentazione S. Dalla Torre in CSN3@LNF giugno 2018
https://agenda.infn.it/getFile.py/access?contribId=3&resId=0&materialId=slides&confId=14450

## INFN & EIC – UN PO' DI STORIA

- 3/12/2015 - EIC presentato in CSN1, Relazione R. De Vita
- 22/6/2016 - EIC presentato in CSN3, Relazione A. Bressan
- Ottobre 2016, ottobre 2017 – la partecipazione INFN al programma EIC è discussa nell'ambito del periodico bilaterale INFN-DOE
- 17/1/2017 – Giornata informativa a Genova, organizzata da M. Battaglieri, M. Contalbrigo, G. Urciuoli
  - Iniziativa bottom up con partecipazione del management (E. Nappi, N. Pastrone, M. Taiuti)
  - Ampia partecipazione di colleghi impegnati nella fisica a ALICE, COMPASS, JLAB12 e altri (ex HERA, per esempio), teorici
- 11/5/2017 – visita delegazione BNL in presidenza INFN: EIC piatto forte dell'agenda
- 19-22/7/2018 – EICUG a Trieste
  - anche un'opportunita' di incontro degli INFN
  - E. Nappi: INFN consider EIC an important opportunity for the hadronic physics community and encourage partnerships and collaborations with the other Institutions involved in the project
- 22/2/2018 – meeting della comunità per preparare la riunione del 1/3/2018
  - 25 partecipanti da 10 sedi
- 1/3/2018 – incontro management-comunità in vista della istituzionalizzazione dell'interesse espresso dalla comunità (per il management : E. Nappi, N. Pastrone, M. Taiuti)
- 18/4/2018 – rispondendo alla richiesta della comunità di formalizzare l'interesse, il management indica di considerare come afferenza la CSN 3
- 10/5/2018 – formazione di una collaborazione INFN per EIC

Ricercatori LNF:

1. V. Lucherini 0.1
2. M. Mirazita 0.1
3. P. Rossi 0.1

CSN3: apertura sigla 2019 come EIC_net sotto DTZ (5 FTE)
Responsabile Nazionale S. Dalla Torre (TS)

# Summary

- Nuclear physics group involved in 6 international collaborations, inside LNF and outside + 1 new project recently approved in CSN3 (as network)




**+ EIC_net**

- Big LNF contributions in all collaborations
- Several national and/or international responsibilities
- LNF Support for design and construction
- Relevant contribution of LNF technicians for construction and for upgrades

## Ringraziamenti (2017/2018):

- *Servizi LNF*
- *Tecnici* *DTZ 31/18, Alice 19/12, Jlab 16/3, FOOT 11/3, KAONNIS 40/16, VIP 22/7*
- *Segreteria:*

*6/4 Seminari gruppo 3* *3 Workshop 2017* *(Quantum Foundation, quantum mechanics, Transversity)*

*139/59 ordini* *1 APW* *ALICE Phys Week* *+ 1 Workshop* *Quantum Theory* *2018*

*Assenza di segreteria dedicata nel 2017* ☹

*Assunzione Alessandra Tamborrino Orsini da ottobre 2017* ☺