

A post-doc position in **CATANIA**

Where is Catania?

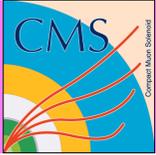
Our activities

Our Group

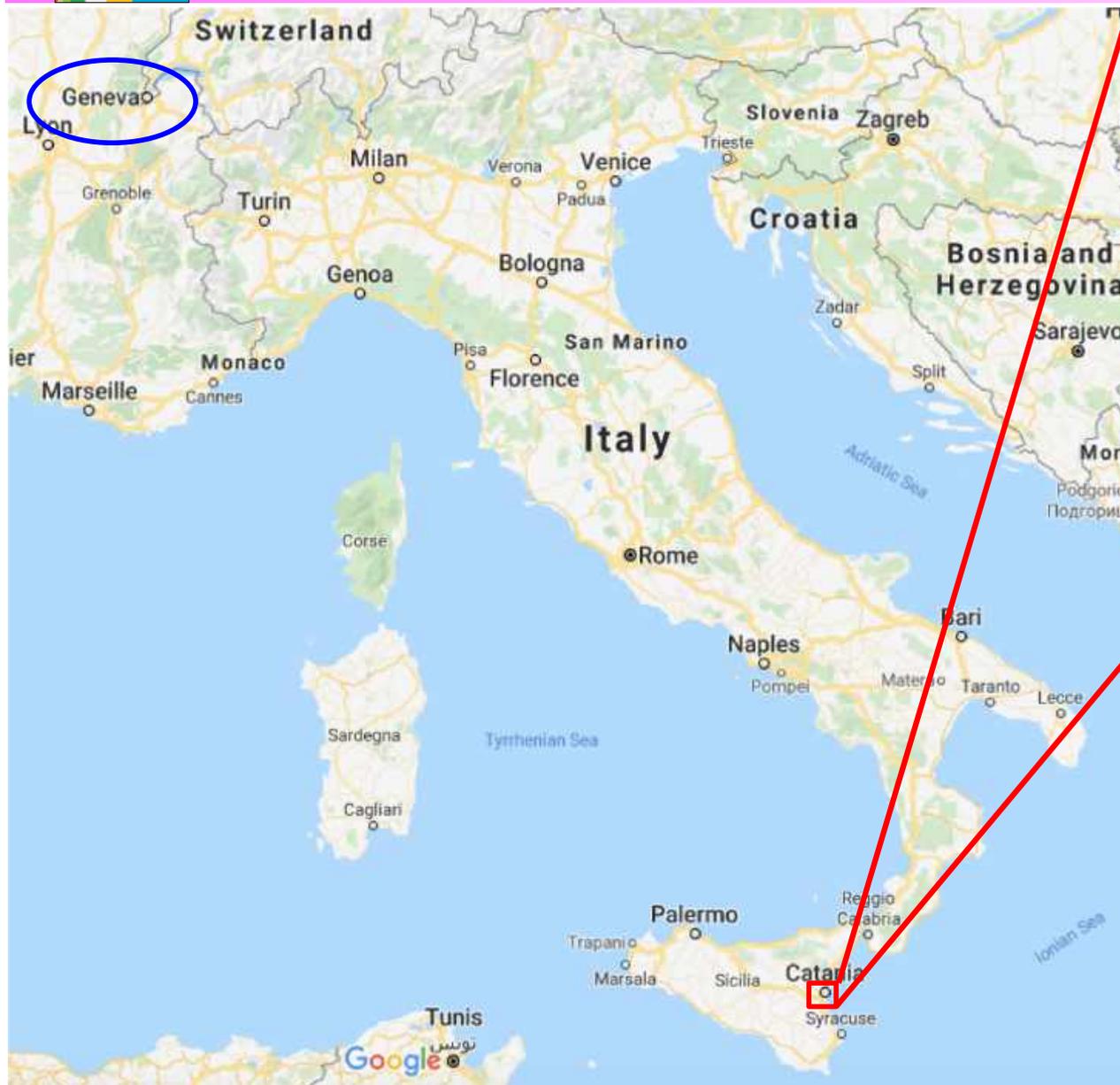
Your task(s)

Contract formalities

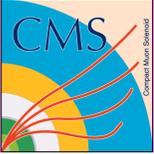
Living in Catania



Where is Catania?



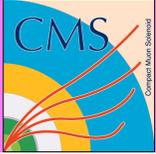
**Flight duration
Geneva-Catania: 2 h**



Current Groups activities in CMS



- Main commitment is **Tracker Ph-2 Upgrade construction**:
 - Production test of the Front End Hybrids (FEH) – on-detector electronics components of the Pixel-Strips (PS) modules of the Outer Tracker (OT)
(**in short: OT PS-FEH test**)
 - Responsible for the Tracker Ph2 construction DB
 - Ph-2 construction Logistics Manager
- Present- Tracker Power Supply System maintenance
- Tracker Institution Board Chair



Historical Groups activities in CMS



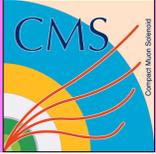
- **Present strip-Tracker construction**
- Dev of GUIs to TK Construction DB
- Reception and qualification tests of the Strip Tracker power supply system components
- Maintenance and development of TK DCS
- Commissioning of present strip-TK at CERN
- **Pixel Ph-1 construction**
- Shifts (TK, TK SL [now DOC], Pixel DOC, c-DCS)
- **Convenerships & Managerial Roles:**
 - Tracker Resources Manager
 - Wirebonding WG
 - Strip offline calibration WG
 - Upgrade Simulation WGs
- Development the CMS computing model
- Design of EPR tool and the CADI interface
- **Physics: SUSY - important activity for a while**
 - **a leading institution within CMS at some point, but all post-docs involved moved to industry**



Physicists			Technicians	
				
Salvatore Costa	Alessia Tricomi	Alessandro Di Mattia	Nunzio Guardone	Nunzio Giudice

Undergraduate student

- Master thesis on DB for TK Ph2 construction
- INFN fellowship for 3 months at CERN (late 2020) for development of test setup for PS FEH
- Plans to continue working with us during his PhD



Your task(s) in our Group



Hiring a New Post-Doc

- Position is funded to be dedicated to our main task, the Ph2 construction
 - ❖ More precisely, to the Catania Group task: **test of OT PS-FEH**
 - ❖ **Initial period: contribute to development of the test setup itself (hw and sw-wise)**
 - ❖ **Later: perform the routine test of 4000 FEH over ~3 years**
- After the **initial period**, the daily workload is expected to drop to 3-4 hours/day, so the applicant will have **time for other research interests**, such as **physics analysis**



Test system conceptually designed:

- Hybrids mounted on cards, cards inserted in crate, firmware...

BUT: As PS-FEH not yet available, exercised so far only on 2S Hybrid prototypes

Design of Cards and specific firmware for PS Hybrids still to be optimized → you may be involved

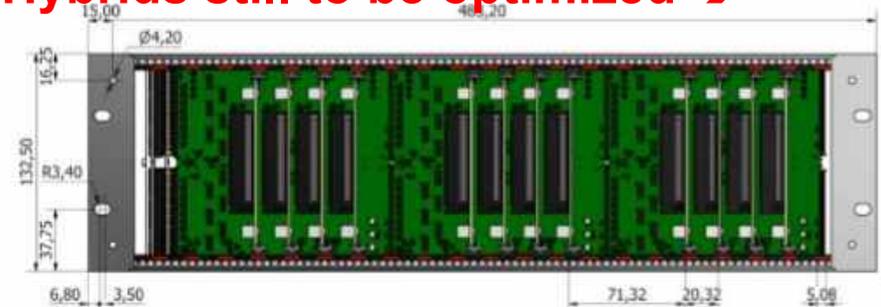
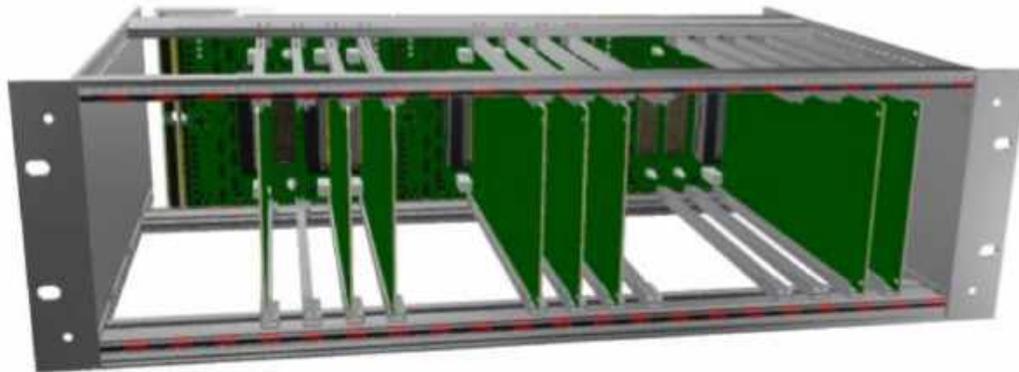
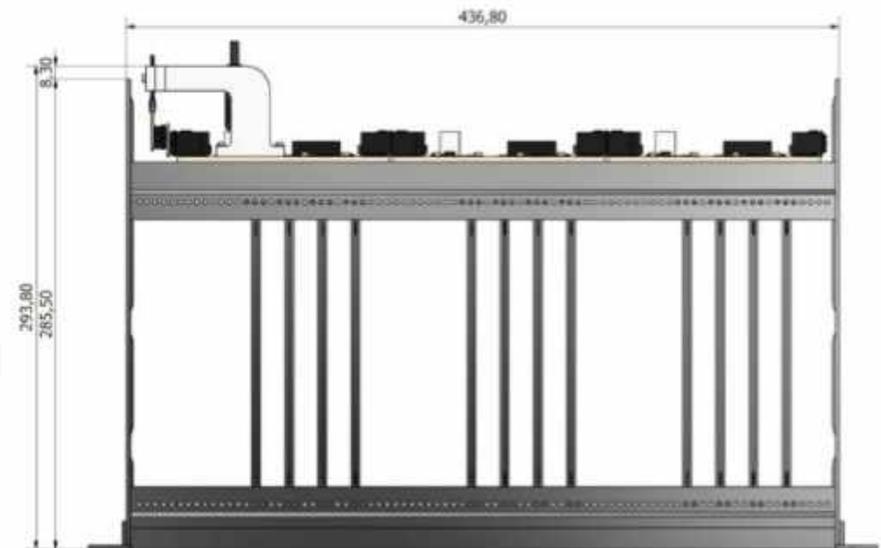


Figure 2: Front view and basic dimensions of the crate-based FEH production test system.



Hardware for one crate:

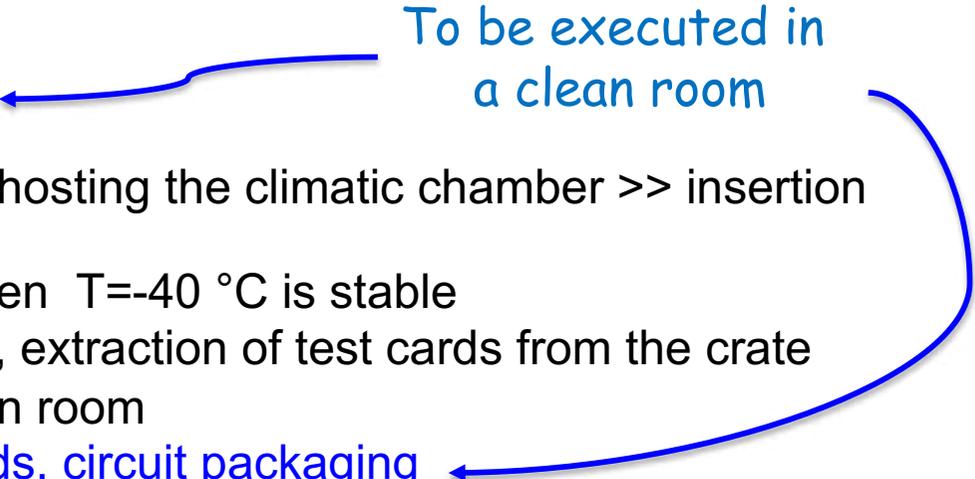
- 1 power supply for the Backplane;
- 12 test cards where to mount the FE-Hybrids;
- 2 Samtec flat cables to connect with the DAQ Backend
- 1 FC7 board + PC running the DAQ software:
 - Two options:
 - FC7 + Interface Card + nano crate;
 - FC7 + uTCA crate + control module and PS module



Equipment and logistics for the Test:

- a climatic chamber for cold testing is required;
 - one thermal cycle (+65 ÷ -40 °C) then sequential test at -40 °C on the FE Hybrids in the climatic chamber;
- the operation before and after the cold test have to be executed in a clean room (class 10000);
 - if the climatic chamber is not in a clean room, either it must be placed in an adjacent space communicating with the clean room or hybrid transport must be provided with a sealed container;

Full sequence of operations for a test (**estimate: 3-4 h/day**):

1. Hybrids Unpacking
 2. Visual inspection
 3. Mounting the circuit on the test cards
 4. Transportation of test cards to the room hosting the climatic chamber >> insertion in crates
 5. Thermal cycle and start the FEH test when $T=-40\text{ °C}$ is stable
 6. FEH Test stop, data recording in the DB, extraction of test cards from the crate
 7. Transportation of test cards back to clean room
 8. Unmounting of FE Hybrids from test cards, circuit packaging
- To be executed in a clean room
- 



Department's Clean Room plus a dedicated CMS Lab

- Clean room is ready, equipped and available
- We're in the process of purchasing a large **Climatic Chamber for PS-FEH testing**: 100 k€ investment
- Refurbishing CMS Lab to host Climatic Chamber plus ancillary test equipment – ready **mid fall 2020**

Strip TK module prod



Visual inspection

Pre-bonding electric
(ARC) Test station

Bonding

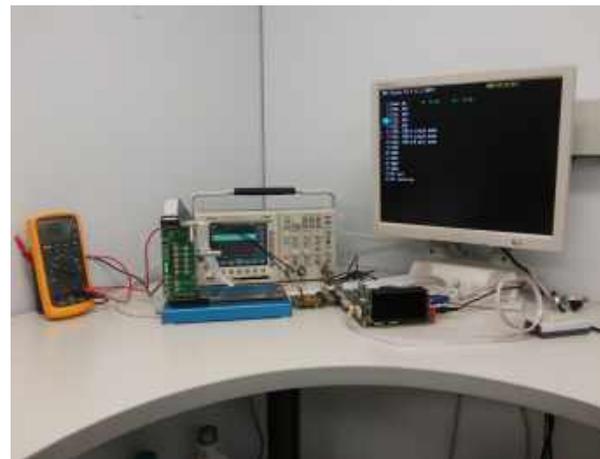


Bonding (detail)

Loop measurement

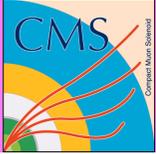
Pull test

Climatic Chamber →



Ph-1 production





Desirable skills for test operator



Test are managed by a python GUI that executes the DAQ sw on FEHs to:

- verify that the readout chips on the Flex circuit are accessible;
 - write a minimal configuration to operate the FEH;
 - calibrate the pedestal and the noise level of every read-out channel;
 - exploit the chip pulsator and the circuit antenna to
 - find the short between neighbor channel path;
 - find opens between connection pads and read-out chip channels;
 - Grade the circuit and write all the result in the database
- Although the operator intervention is minimal during the execution of the tests, it is necessary to perform troubleshooting in case of error situations

It is desirable that the candidate possesses the following skills:

1. Knowledge of python coding;
2. Knowledge of C++ coding;
3. Experience with root;
4. Experience with basic SQL syntax;
5. Experience with DAQ systems/software

Desirable interest for applicant

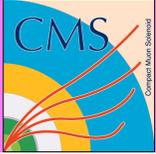


- We would like to resume **physics analysis activities**
- In selecting a candidate, we will prefer candidates who, besides committing to the hardware task just described, are interested in pursuing Physics analysis

I guarantee they will find **SUSY!**

Well, if not in the data, in our vending machines...



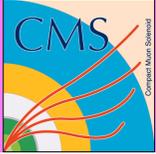


The job: 2 Institutions involved



- Our Group operates at the **Physics & Astronomy Department of University of Catania**
- University of Catania [**unict.it**] is one of the oldest Universities in Europe
 - established in 1434!
 - 40,000 students, 3,000 faculty staff
- The **Physics and Astronomy Department** [**www.dfa.unict.it**] was established around 1950
 - ~80 faculty members, 300 students, ~200 employees
- Experimental activities range from nuclear and particle physics, to astroparticles, astrophysics, solid state, applied physics (medical, cultural heritage, environment), electronics
- Strong theory group

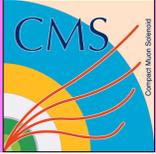




The job: 2 Institutions involved



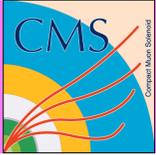
- Research at the Physics and Astronomy Dept. funded mostly by independent Research Agencies: CMS funded by **INFN** (“**National Institute for Nuclear Physics**”) [infn.it]
- INFN organized in 5 national labs + 20 branches hosted within Univ. Physics Depts.
- The position I’m advertising is funded by INFN-Catania branch [www.ct.infn.it]
 - Post-doc will be an **INFN employee**
- Work will take place at the **University Physics and Astronomy Department**
- **Position is expected to open in Fall 2020 and is funded for 3 years**



Contract formalities



- A **formal public call** will be published by INFN on its website in fall 2020:
 - I will personally inform prospective candidates with whom we will remain in touch as a result of this Event process
- Official name of the contract type: “Assegno di Ricerca”
- Applications will have to be submitted through a dedicated INFN web site, within a specified deadline, along with required documents
- Selection of the candidate will be made by a designated Selection Committee at INFN-Catania through evaluation of CVs and and interview.
 - The date of the interview will be communicated to candidates
- **Please note that as the call is public, nothing will prevent candidates not participating in today’s event from applying**
- The contract will be awarded for an initial period of 1 year.
- It can be renewed up to two times to the same person (funding is granted for 3 years) subject to approval by me – that is, if the hired person will have worked effectively and behaved correctly, otherwise a new call will be issued for the remaining two years. The same at the end of the second year.
- **Net Salary will be ~1,500 €/month.**
- You may be required to open a bank account and get an Italian tax code in order to be paid.
- Health care is free of charge in Italy for all EU citizens and will be one of the benefits of the contract for non-EU citizen.



Lifestyle in Catania



Catania is a typical sea-side Mediterranean city

It shares the typical lifestyle you will also find, for instance, in Greece or in the Spanish islands:

- Very lively nightlife
- Lots of cafes, pubs, bars outdoor sitting - music, beer, entertainment
- Everything's open 'till late – have pizza at midnight, go to the disco *after* midnight
- Beaches, both sandy and rocky



Unique to Catania:

- A 3300 m high volcano (Etna) just 20 km from downtown: mountain hiking, adventurous trips to the craters, ski facilities – or watch an eruption from your bedroom...



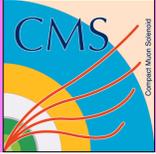
Salvatore Costa - Catania



JMEv



21 Sep 2020

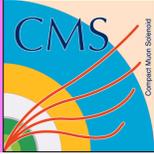


Flying in and out of town



Catania is on an island (Sicily), yet has easy connections to the World:

- The Catania International Airport is 7 km from downtown, linked by a bus running every 20 min (4 €)
- Direct flight to most Italian and all major European cities by most regular and low-cost airlines
 - To Geneva by easyJet and, in summer, Swiss
- Connections to the Americas via Roma or Milano
- Connections to Asia, Africa and Oceania via Roma or Milano as well, but often more convenient via Istanbul or Dubai.
 - Example: fly to Bangkok in 2 ~equal legs: ~6 h Catania → Dubai + ~6 h Dubai → Bangkok



Cost of living in Catania



So, can you get away with 1500 €/month ?

Please note that this salary is standard nationwide for the concerned type of contract, but cost of living in the South is cheaper than in the wealthier Northern Regions of Italy.

Some landmark costs:

- Rent:
 - 1-bedroom apartment: 400-500 €/month
 - studio apartment: 300-400 €/month
 - room in a shared apartment: 150-200 €/month
 - Utilities: in the uncertainty of the above
- Groceries:
 - Milk: 2€/liter
 - Bread: 2 €/kg
 - Pasta: 1 €/kg
 - Meat: 5-10 €/kg
 - Fish: 10-30€/kg
 - Fruits, vegetables: 1-3 €/kg
 - Vegetables 2€/kg
- Phone:
 - SIM with unlimited calls, SMSs, 2-5 GB data with an Italian cell phone operator (TIM< Vodafone, Wind3): 10-15 €/month
- Going out:
 - Beer, drinks: 3-6 €
 - Take out pizza: 5-10€
 - Pizza&Beer sitting in Pizzeria: 20 €
 - Casual dining: 20-25€
 - Fine dining: 35-50€
 - Movie: 6 €
- Travel:
 - Gasoline: 1.6 €/liter
 - Public transportation (bus, metro): 1€ (90 min tkt)
 - Train to Taormina, Bus to Etna: 5€ one-way
 - Low-cost flight to Italian destination 50€ one-way