

CTA+ PNRR outreach

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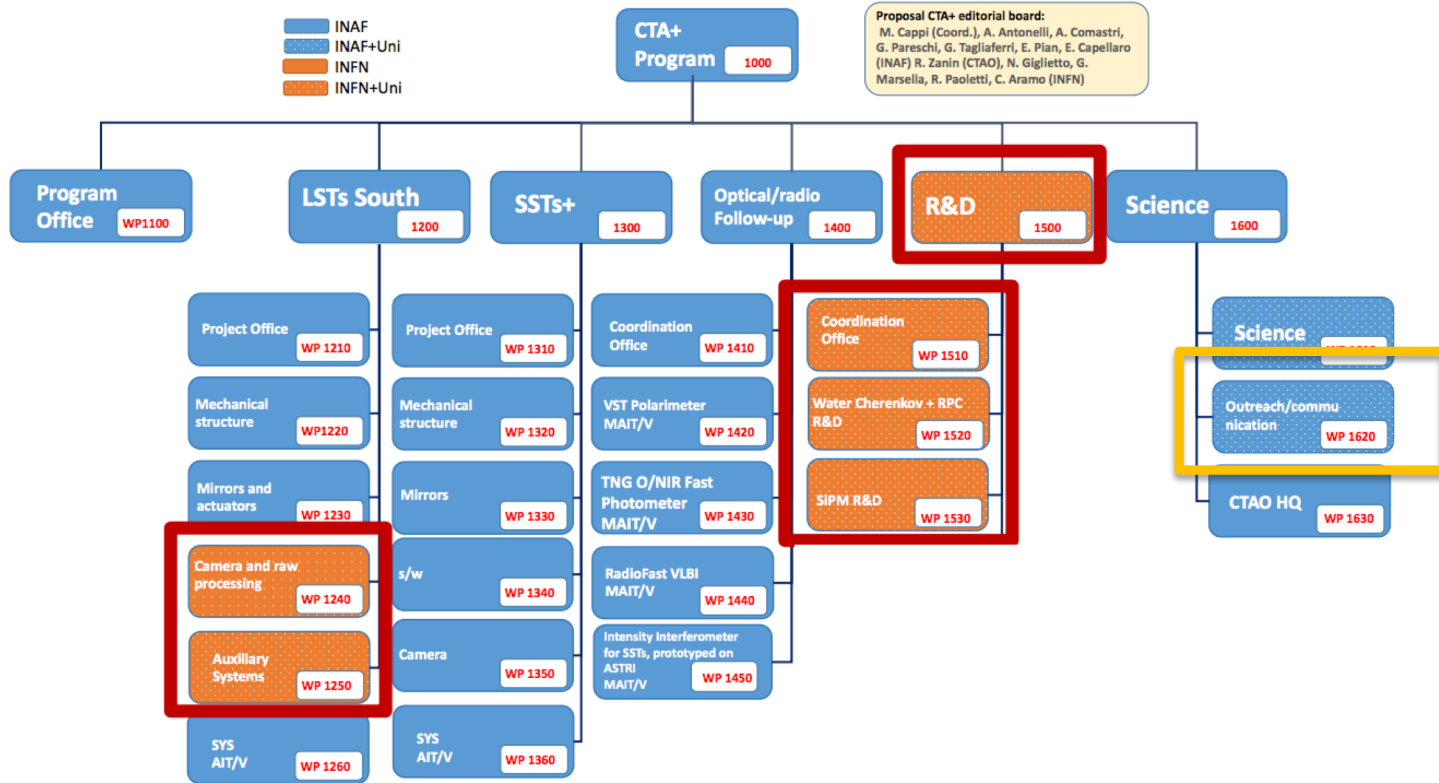


Enhancing the Cherenkov Telescope Array Observatory with CTA+



- INAF, INFN and some Italian Universities, involved in the CTA collaboration, have proposed a program, inside the European “Piano Nazionale di Ripresa e Resilienza (PNRR)» entitled "CTA+" **aimed at providing additional telescopes, specifically 2 LSTs and 5 SSTs to be placed at the CTA-S site.**
- To further maximize the scientific return enabled by CTA+, we propose additional improvements such as:
 - ✓ the enhancement of INAF-led IRs, namely the VST, TNG and the three Italian VLBI radio antennas, for their optimization to perform electromagnetic (Optical/IR/radio) follow-ups of CTA sources;
 - ✓ the enhancement of research and development for future detectors for CTA;
 - ✓ the realization of an end-to-end prototype for optical intensity interferometry;
 - ✓ the enhancement of training, scientific and **outreach support** to the CTA+ program and Headquarters in Bologna.

CTA+ Work Breakdown Structure



The CTA+ working group proposes a very complete set of activities in the context of education and outreach.

The education proposal targets three different audiences: **general public, high-school and master students.**

- **Master students program** is aimed to create a nursery of gamma-ray scientists that will be able to exploit the CTAO data in the upcoming 30 years,
- **The high-school targeted activities** aim to train the teachers more than the students themselves with the main argument that in this way knowledge can be spread in a more capillary way and with a huge multiplication factor.

The high-school education program is twofold:

- it foresees the organization of **two training courses for teachers** to be uploaded to the MUR platform S.O.F.I.A. In charge to the INFN
- it proposes to produce **audiovisual and multimedia material** and virtual reality to be used in different national and international events – In charge to the INAF

The two courses present two highly technological laboratories that can be adopted by the teachers in their classes by using a portable detector of cosmic rays, the **Cosmic Ray Cube (CRC)**.

Specifically, we propose the production of 9 CRC to be distributed to 9 operative units located in different towns. These devices may end up being hosted in local science exhibitions/museum.

The use of CRC for CTA+



- For public events like European Research Night, science festivals like Futuro Remoto in Naples, and many others;
- in the local exhibitions and museum;
- for the students in the schools like seminars, PCTO activities, International Cosmic Day, ecc;
- for the teacher's courses to design and construct a muon detector.



INFN - Istituto Nazionale di Fisica Nucleare è con Ocra Infn e Laboratori Nazionali Del Gran Sasso - INFN.

The two teacher's courses

- ❖ The objective of this activity is the production of **two training courses for high-school teachers** to be inserted in the MUR S.O.F.I.A. platform to develop high-level technological and scientific paths for the teachers that, once formed, can re-propose the activities to their students.
- ❖ We plan to provide the teachers with the technical information needed to operate the different parts of CRC and eventually build one of them. **This first course will be organized in LNGS in December 2023.**
- ❖ The second course is focused on the data analysis, and, in particular, on the analysis of the data collected by one of CRC through the usage of a specific application that can be downloaded to the mobile phone. **This second course will be organized in Padova in September 2024.**
- ❖ Each course can host up to 20/40 high-school teachers coming from any Italian region and will last for 3 days.