Outreach activity in Astroparticle Physics at UniSalento

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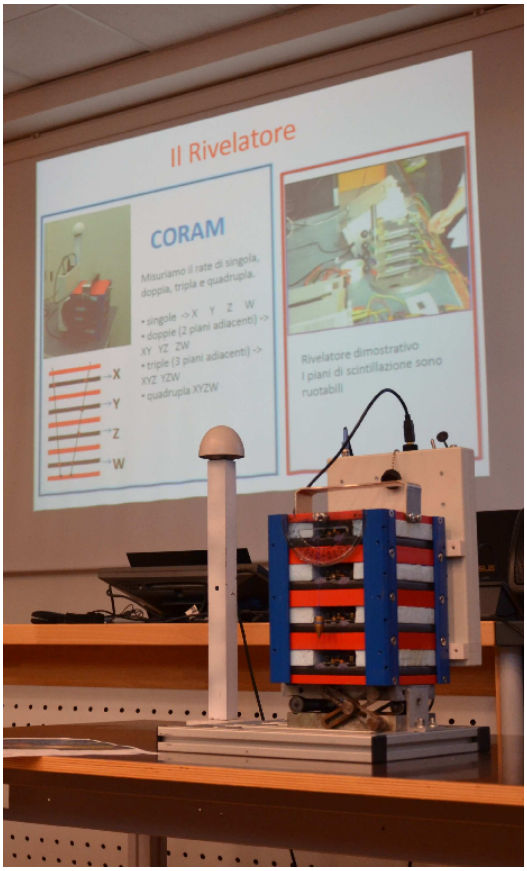

Figure 1. Detector used for the outreach activities.

The Astroparticle Physics group of the Salento University and INFN-Lecce is involved in several outreach activities. These activities take various forms, such us "hands-on" experiments, scientific demonstrations, simulations and debates. Moreover, every year, national and international events are orgnized by the group such as "Notte della Ricerca", open to everybody interested to scientific topics, and the International Cosmic Day (ICD) intended for high school students of Lecce, Brindisi and Taranto districts. The main goal is to disseminate the scientific method and the most advanced technology.
ICD is an international event organized every year by CERN-Geneva, DESY-Hamburg and FERMILAB-Chicago. Students from all over the world are connected remotely for a day to perform an experiments on cosmic rays, the discuss and publish their results. This event enables a big number of students to get in contact with astroparticle physicists, and to get a first insight into their research, experimental methods and every day work as scientist. Some questions which are addressed are:

- what are cosmic particles ?
- where do they come from ?
- how can they be measured ?

The main purpose is to allow high school students to perform their own experiments with cosmic rays and discuss the results with other students across the world. Our group partecipates to this international event since the first edition in 2012. An increasing number of students from different high schools was interested to partecipate every year. During the last edition, on November 2nd 2016, we hosted 90 students from 13 high schools. The organizers suggest two questions which can be addressed with a simple experiment: coincident air shower measurements and the zenith angle distribution of air shower particles. We choose to perform the zenith angle distribution measurements. To measure the rate of air shower particles as a function of the zenith angle we used a detector developed by our group for outreach purpose. Fig.1 shows the detector used during the ICD. This is a compact, cheap and user friendly device made of four tiles of plastic scintillator interposed with iron absorbers. Each tile has dimensions of $14.3 \times 14.3 \times 1.0$ cm^3 and density of 1.032 g/cm^3 (BC-412); iron absorbers have the same size but a 2 cm thickness. Scintillation light is detected by two APDs (Avalanche Photo-

Figure 2. ICD 2016 edition: students during the introduction seminar on cosmic rays.

Figure 3. ICD 2016 edition: students during data taking.

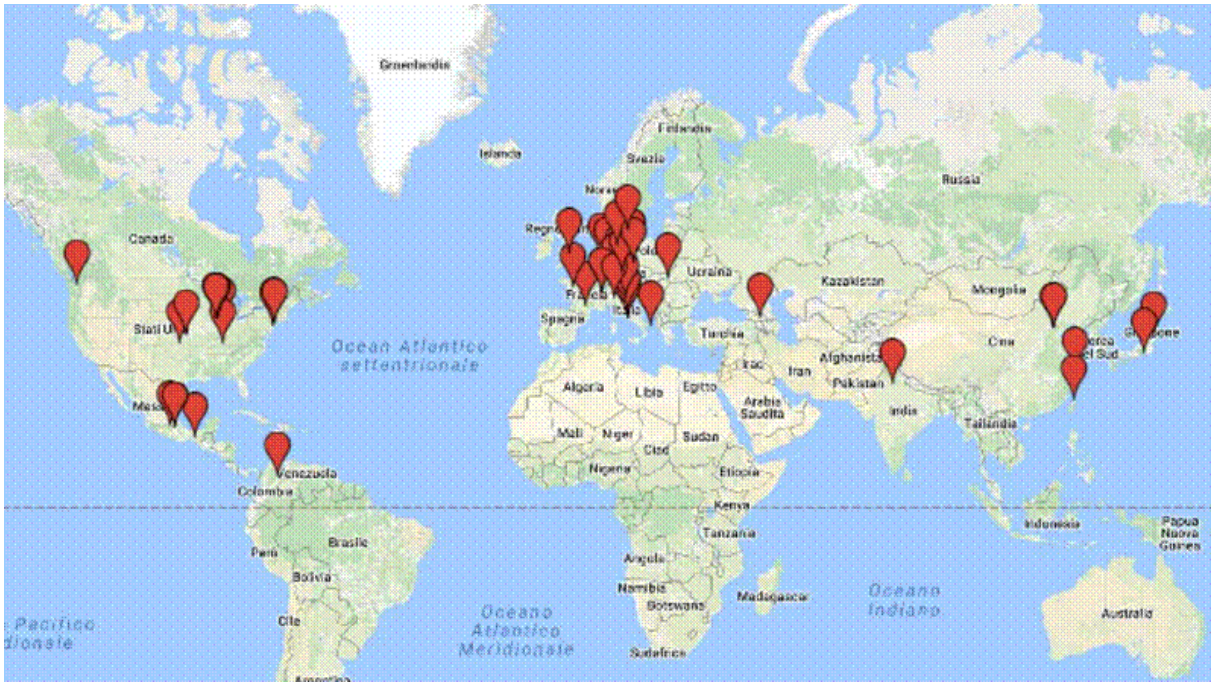

Figure 4. Map showing the Institutions all over the world participating the ICD 2016 edition.

Diodes) with 1 mm^2 sensitive area and it is collected through a wavelength-shifting (WLS) optical fiber of 1 mm diameter [2]. The flexibility of the fiber allows packing them in circular coils thus increasing the light collection efficiency over the plastic volume.
Each detector is provided by an electronics front-end board on top of the detector which processes the signals from the two APDs and generates a coincidence signal.
Fig.2-3 show two pictures of the ICD 2016 edition. In Fig.5 the results elaborated by one of the schools that shows the cosmic rays rate as a function of the zenith angle. The two, three and four-fold coincidence rates are shown. In Fig.4 the map of the partecipating institutes all over the world can be seen.

REFERENCES

1. International Cosmic Day, ippog.we.cern.ch/resources/2014/international-cosmic-ray-2014.
2. A. Akindinov, et al., Nucl. Instr. and Meth. A, 539:172, 2005.

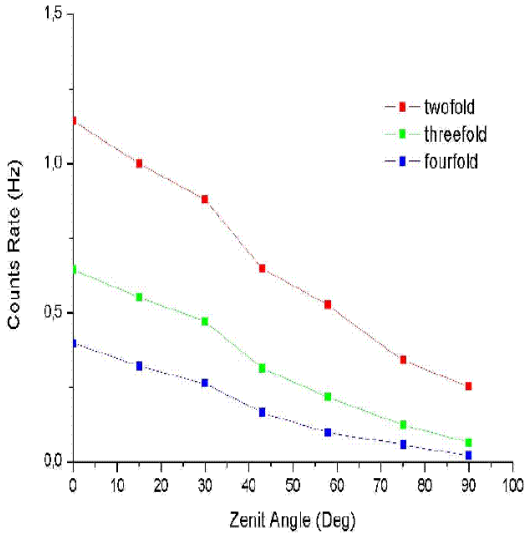

Figure 5. Results of the measurements performed by one of the 13 schools participating to the ICD 2016.