

Discover Cosmic Rays

INTERNATIONAL COSMIC DAY

November 22 | 2022

Cosmic particles, these unnoticed particles that surround us all the time, are the focus of this day. Students, teachers and scientists get together to talk and learn about Cosmic Rays and answer questions like:

What are cosmic particles?
Where do they come from?
How can they be measured?
And what can we learn from them?

Become a Scientist for a Day

Discover the world of cosmic rays like an astroparticle physicist.

Organizer:

INFN – Laboratori Nazionali di Legnaro e Sezione di Padova e Dipartimento di Fisica e Astronomia,
Università di Padova

Image Credit: DESY, Science Communication Lab



In cooperation with
many networks and partners:



Benvenuti all'International Cosmic Day 2022

INFN Sezione di Padova e Laboratori Nazionali di Legnaro
e Dipartimento di Fisica e Astronomia dell'Università di Padova



Dipartimento
di Fisica
e Astronomia
Galileo Galilei

La giornata di oggi

9.00-10.30 seminario introduttivo + kahoot

10.30-11.00 pausa

11.00-11.30 collegamento con MAGIC

11.30-12.00 introduzione allo strumento per la misura

12.00-12.15 presentazione esperienza di PCTO

12.15-13.30 pausa pranzo

13.30-14.00 introduzione alle misure e analisi dati

14.00-14.45 primo gruppo: misure / secondo gruppo: visita laboratori

14.45-15.30 secondo gruppo: misure / primo gruppo: visita laboratori

15.30-16.00 finalizzazione analisi dati e preparazione videochiamata

16.00-16.15 videochiamata

16.15-16.30 chiusura

Videoconferenza in inglese

Dalle 16.00 alle 16.15 ci collegheremo in videoconferenza con altri gruppi di tutto il mondo (nel nostro caso Francia e un altro gruppo italiano) per scambiarci sull'esperienza dell'ICD



Prepareremo una diapositiva riassuntiva tutti insieme che qualcuno di voi potrà poi presentare in inglese agli altri gruppi (max 5 minuti di presentazione)

Vinci i quiz sui raggi cosmici

- Scarica l'app **Kahoot** sul tuo cellulare o gioca direttamente da browser
 - Non serve creare un account; basta cliccare «maybe later» per andare avanti
- Faremo un quiz locale dopo il seminario introduttivo
- C'è anche la possibilità di partecipare al quiz di DESY: *Let's see who will be the world's best expert on cosmic rays!*

<https://icd.desy.de/activities/>

Fatti un Cosmic Selfie

#InternationalCosmicDay

- **Selfie Contest**

Take a selfie of you with your detector or your favorite Cosmic Ray plot. Post it on Facebook or Instagram and use the hashtag **#InternationalCosmicDay**. The best one will get a prize!

For inspiration, the photo that won in 2019: a group from INFN Gran Sasso:

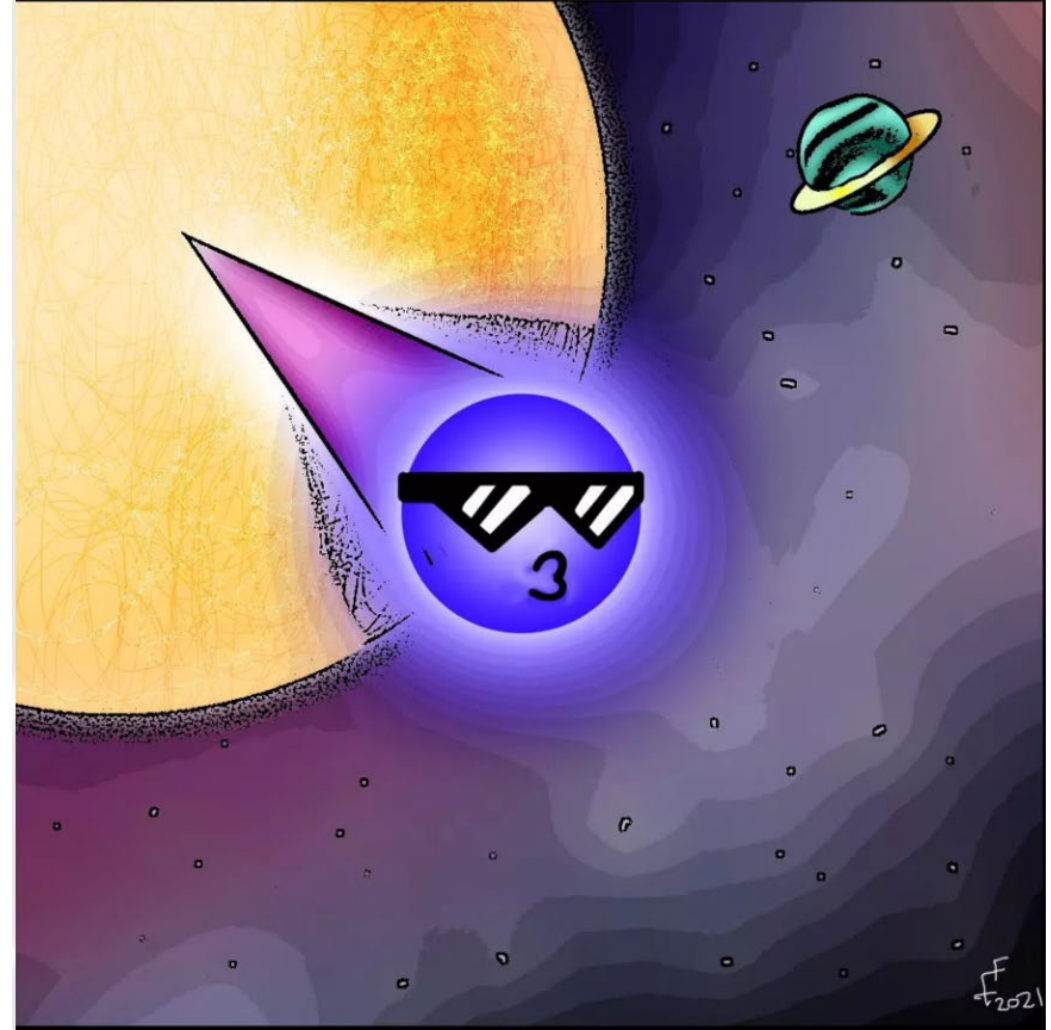


DESY Drawing contest

#InternationalCosmicDay

Draw your favorite cosmic particle. Post it on Facebook or Instagram and use the hashtag #InternationalCosmicDay. The best one will get a prize!

2021 Farbod from Iran created this picture and won:



Per sapere di
più

Trovate le informazioni su selfie contest,
drawing contest, kahoot e tanto altro su:

<https://icd.desy.de/activities/>

The image features a white background with two large, solid pink geometric shapes. On the left, a pink triangle points towards the center. On the right, a pink trapezoid is positioned, partially overlapping the white space. The text 'E non finisce ancora qui...' is centered in the white area between these shapes.

E non finisce ancora
qui...

Pagina per booklet DESY

Ogni anno DESY raccoglie i contributi sull'esperienza da parte di tutti i partecipanti che hanno partecipato all'ICD per pubblicarli in un booklet

Barbato Boaretto-ICD2021-BOOKLET.pdf - Adobe Acrobat Pro (32-bit)

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ANGLE-BASED COSMIC RAYS MEASUREMENTS

INFN and University of Padova, Italy

Who are you?

We are two students from Padova that joined Padova's INFN team to conduct angle-dependent cosmic rays measurements. We measured the muon rate with the zenith angle: from 0° to 90° with increments of 10°.

What have you done?

After a theoretical introduction to the topic, we analysed the structure and the operation of the muons detector. As shown in Fig. 1, it is made of two scintillators paired with a SiPM each, all mounted on a pivoting extruded aluminum structure, in this way only the rays that cross both of the scintillators are evaluated. It reports a measurement every minute.

Then, to obtain 4 measures for each of the 10 different zenith angles, we adjusted the angle of the scintillator every 4 minutes. The angle gauge detail is shown in Fig. 2. All these data were recorded on a computer that kept track of the measurement of the scintillator, which will be used in the data analysis process.

What did you find out?

During the analysis of the data that we collected, we calculated the mean of the number of muons for every angle and the relative uncertainty, using the square root rule for stochastic systems. After that, we plotted the result using Python, as shown in Fig. 3, and we checked the compatibility of the results with the cosine-square dependence: we can assert that our results are compatible with the ones expected.

What's your take-home message?

Thanks to the data-analysis process we can appreciate how from this experiment, we understood not only how muon real-life applications like Muon tomography, which is a test images of volumes.

Fig 1: Measuring device.

Fig 2: angle gauge detail.

Fig 3: Graph showing the muon rate (Counts per hour) versus the zenith angle (degrees). The data points show a clear cosine-square dependence, decreasing from approximately 75 counts per hour at 0 degrees to about 15 counts per hour at 90 degrees.

INTERNATIONAL COSMIC DAY

International Cosmic Day

Liceo E. Fermi, Padova

Who are you?

We are Giovanni Favaron and Sofia Malerman. We are students from the institute above-mentioned, and we thought it would be a great learning opportunity, as a later project to be. Spending time at the laboratory also helped us to increase our knowledge in this field.

What have you done?

On November 10th we took part in the International Cosmic Day. We spent the morning with the experiment set-up and we spent about the whole day. The first part was the theoretical introduction of the detector, which was done by the INFN team. Then, we started the experiment. We used a detector that was brought from Padova, and we measured the muon rate with the zenith angle: from 0° to 90° with increments of 10°.

What did you find out?

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International Cosmic Day

Liceo E. Fermi, Padova

Picture 1: Introduction of the day's plan (source: INFN's agenda)

Picture 2: the detector we used to collect data (source: Sofia Malerman)

Picture 3: Introduction of the detector (source: INFN's agenda)

Picture 4: the rustic room (source: Sofia Malerman)

Picture 5: the videocall with other students (source: Sofia Malerman)

Sources

- News and pictures from the day
- https://www.infocscs.it/2021/11/10/
- https://www.infocscs.it/2021/11/10/
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Prima di
iniziare...



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<https://l.infn.it/qc>

Aiutateci a
migliorare
l'International
Cosmic Day



<https://l.infn.it/qb>



Compilatelo adesso con il vostro
cellulare!

Contributi per booklet: entro lunedì 12 dicembre

Spedire a comunicazione@pd.infn.it

Vi manderemo tutto via email nei prossimi giorni.

Veniteci anche a trovare sul nostro sito: <https://web.infn.it/OCRA/>