Finanziato dall'Unione europea NextGenerationEU
Ministero dell'Università e della Ricerca
Italiadomani PIANO NAZIONALE DI RIPRESA E RESILIENZA
INFN

Discovering cosmic rays:

a link between education and research in a high school physics teachers' course

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Introduction

- **What**: a cosmic rays course for high school physics teachers
- **Who**: 17 teachers of physics from all Italy
- **When**: 11-13 December 2023
- **Where**: INFN Gran Sasso National Laboratories
- **How**: Lectures, Laboratory Activities, Real Data Analysis, Preparation of Teaching Pathways
- **CTA+ PNRR** Project (IR0000012; CUP C53C22000430006)

Lectures

Covered Topics

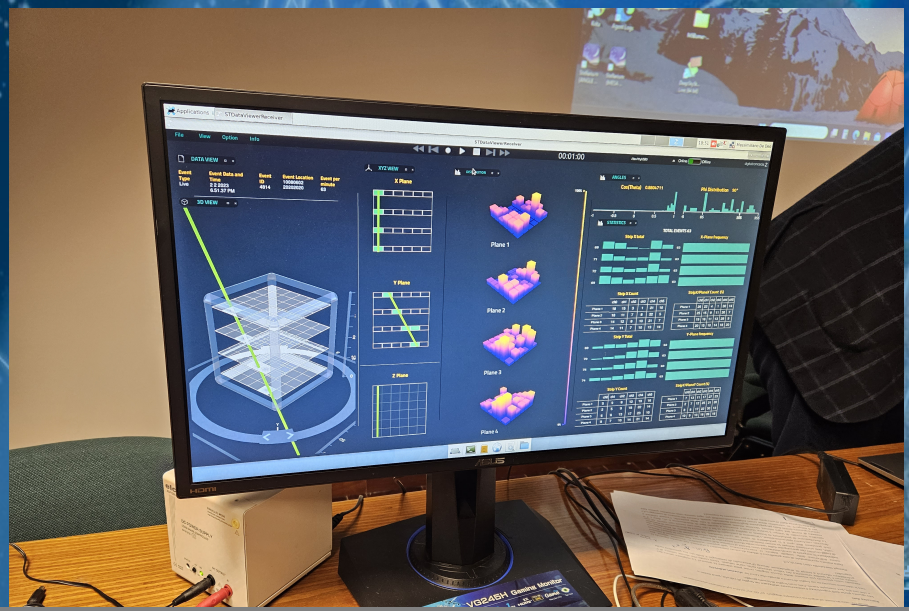
- Brief review of origin and physics of cosmic rays
- Layout and operation of the Cosmic Ray Cube
- Introduction to the laboratory activities

Construction of the **Cosmic Ray Cube**

- Plastic scintillator: 4 modules, 2 layers for XZ and YZ views
- Each layer is made of $24 \times 4 \times 1$ cm^3 bars
- Receive kit of materials provided by the INFN
- Assembly of the detector bars of each plane
- Connection to the front-end electronic layout

Data Analysis

- Real-time access with the app **"Cosmic Ray Live"**
- Measurement of the muon intensity as a function of the angle formed with the local zenith
- Discussion of the results and comparison with the expected $\cos^2\theta$ function



Teaching Pathways

- Divided into groups of two or three teachers
- Set up education activities with technology, laboratory work, experimentation, and teamwork
- Planning for the realization of the proposals

After the course:

- Cosmic Month in the classrooms
- Meeting for feedback from teachers
- Next edition: Padova, September 2024