Contribution ID: **56** Type: **not specified**

Revisiting Bruno Rossi's experiment on cosmic rays showers: comparison with the original results

Wednesday 18 September 2024 15:20 (21 minutes)

In this study, we revisit Bruno Rossi's pioneering experiment on cosmic ray showers, a milestone in understanding high-energy astrophysical phenomena. Rossi's original technique, developed around 1930, utilized Geiger-Müller (GM) tubes arranged in a coincidence setup, provided with an original coincidence circuit. Among other configurations, Rossi wanted to detect showers produced by primary cosmic rays interacting with various absorbing materials of different thickness placed above the counters. Our experiment consists of a replica of the original Rossi's coincidence setup, including the circuit based on vacuum triodes coupled to three G-M tubes, complemented with a modern acquisition system digitizing the same signals processed by the Rossi's circuit. Our re-experimentation aims to rerun and extend Rossi's findings, by using contemporary technology, specifically employing some cheap, though very accurate, technology today available in the world of home computers. Our methodology tries to reproduce the geometric configuration of Rossi's counters while incorporating modern computational tools for data analysis, providing a multifaceted interpretation of the phenomenon. Special attention is dedicated to study the combined effect of coincidence resolving time, detector shielding and rate of chance coincidences provided by the original Rossi's approach. The relevant performances are compared with the ones obtained with the now available digital acquisition techniques and associated data analysis. The comparison underscores the enduring relevance of Rossi's contributions to cosmic ray physics. This re-experimentation not only honors historical scientific milestones but also demonstrates the potential for new evaluations with upgraded methodologies, thereby enriching our understanding from a historical and educational point of view.

Primary authors: CARLÀ, Marcello (Università di Firenze); POGGI, Giacomo (Università di Firenze); RIGHI, Tommaso (Università di Firenze); STRAULINO, Samuele (Università di Firenze)

Presenter: RIGHI, Tommaso (Università di Firenze)

Session Classification: History of Physics and Astronomy (20th century)

Track Classification: SISFA 2024