

7 DEPARTMENT OF COSMIC RAY PHYSICS

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Overview

The Department of Cosmic Ray Physics in Łódź is involved in basic research in the area of high-energy physics and cosmic ray physics related to:

Experimental and phenomenological studies of Extensive Air Showers induced by cosmic ray particles.

Studies of ultra-high energy (above 10^{19} eV) cosmic rays: determination of energy and primary particle mass composition.

Studies of asymptotic properties of hadronic interactions based on the analysis of cosmic ray propagation through the atmosphere.

Studies of mass composition of cosmic rays in the energy range 10^{15} - 10^{17} eV.

Registration of cosmic ray intensity variation correlated with solar activity.

Theoretical and experimental studies of Extensive Air Shower properties are performed mostly based on the results obtained by the Łódź Extensive Air Shower Array. We have noticed unexplainable delayed signals registered about 500-900 microseconds after the main EAS pulse. We prepared hardware for further experimental study of this effect.

In September we have started registration of 5GeV muon flux with the underground muon telescope. We registered 3 decreases of muon intensity correlated with Forbush decreases registered at lower energies. Variations of primary cosmic ray of energies up to about 100GeV were responsible for our registrations. These set the upper limits for geometrical size of geomagnetic disturbances in interplanetary space.

In construction and data interpretation of cosmic ray experiments, the Łódź group collaborates with many foreign institutes and laboratories: Forschungszentrum in Karlsruhe (Germany), Collège de France, Institute for Nuclear Studies of the Russian Academy of Sciences and Uppsala University (Sweden).

We have organised (together with the Physics Department of the University of Łódź) the 17th European Cosmic Ray Symposium (24-28 July 2000) in which about 150 physicists participated (about 100 from abroad).

Jacek Szabelski