

Name of research institute or organization:

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**Dipartimento di Fisica Nucleare e Teorica and INFN,  
Pavia University**

Title of project:

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Measuring the flux of cosmic rays arriving nearly horizontally

Project leader and team

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Prof. Gianluigi Boca

Project description:

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My activity at the Jungfraujoch in 2005 was concentrated in two periods of time spent at the end of May and in June, for an approximate length of 2 weeks total.

I worked with a group of 2 people from Dipartimento di Fisica of University 'La Sapienza' in Rome, Italy, Maurizio Iori and Antonino Sergi, on a project of experiment on cosmic rays.

The experiment aims at measuring the flux of cosmic rays arriving nearly horizontally, at about 92 degrees azimuthal angle, from an observation point high (a mountain) from sea level. In this way one can detect particle showers caused by very high energy tau neutrinos scraping the crust of earth for approximately 200-300 Km and producing a tau lepton that escapes the earth crust and induces a high energy shower in air. This shower will be detected by towers placed almost horizontally at about 92 degrees of azimuthal angle (~ 500 towers). Each tower is made by two square tiles (20cm x 20cm) of scintillator material, read out by a fast phototube. The two tiles are approximately 1.5m far apart and this will allow to measure the direction of arrival of the particles crossing the tower.

During my stay at the Jungfraujoch I tested three prototypes of towers placed inside the scientific station, read out by standard NIM and Camac electronics. The three towers were placed at approximately 95 degrees azimuthal angle and they were put in coincidence. Data were taken to check if the towers and electronics were working and to assess the amount of background existing, caused both by electronic noise and by regular vertical cosmic rays at such high level above sea.

The tests were satisfactory and gave us a preliminary sense on the feasibility of the full experiment with 500 towers.

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