Earth-skimming tau neutrinos, produced through flavour mixing, will also lead to a highly inclined air shower. Hence, radio antennas with sensitivity towards the horizon would also be ideal tau neutrino detectors and provide clues about flavour mixing.

All the above mentioned possibilities encouraged the AUGER Collaboration to study the feasibility of introducing the radio antennas into the Southern Laboratory in Argentina and to plan this detection method for the Northern Laboratory, being built in Colorado after 2008.

[1] H.Falcke et al., Nature, 435 (2005) 313
[2] D.Ardouin et al., Proc. 29th ICRC, Pune, India (2005); arXiv:astro-ph/0504240

7.4 Methods of energy estimation for Giant Air Showers

by K.Jędrzejczak, B.Szabelska, J.Szabelski and T.Wibig

Estimation of energy of an Extensive Air Shower, i.e. the total energy of the primary cosmic ray particle is still a very important and studied topic. The problem becomes very distinct in the area of the highest registered energies (Giant Air Showers). The difference between results of experiments HiRes and AGASA is not only quantitative, but also qualitative, i.e. HiRes measurements confirm the existence of GZK cut-off, while AGASA results contradict this effect. One can expect that the problem at the highest energy cosmic ray spectrum will be soon resolved by the growing statistics of observation from the Auger experiment.

In collaboration with Prof. J.N. Capdevielle from College de France we performed model studies of shower development in the atmosphere. Results of our calculations indicate that there might be a significant systematic error in energy estimation in the AGASA experiment. The method of energy determination used in this experiment is not correct for inclined showers registered at zenith angles 20–50 degrees and significantly overestimates shower energy for showers generated by cosmic rays of energies above 10^{19}eV. We have shown in our calculations that incorrect AGASA method applied to the primary spectrum consistent with GZK cut-off leads to the spectrum presented by AGASA group.

7.5 Cosmic Rays and the Microwave Background Measurements

by T.Wibig

In collaboration with Prof. A.W. Wolfendale from Durham, UK, we presented results of our analysis of data gathered in the first year of work by experiment WMAP. It appeared that considered as „free from any Galactic noise" maps of microwave background temperature contain quite substantial „additions" generated by cosmic rays or by other Galactic mechanisms distributed in space similarly to cosmic rays. The work has been published in MNRAS, and some results have been presented by Prof. A.W. Wolfendale at the 29th ICRC in Pune, India.

The work on the highest energy cosmic rays have been summarised in the paper published in J. Phys. G. In this work we present arguments in favour of the hypothesis about extragalactic component domination only at energies above 10^{19} eV, against recently presented by other authors suggestions that the domination starts at a decade lower energy.

7.6 The Roland Maze Project – Cosmic Ray Registrations at Schools

by J.Feder, K.Jędrzejczak, J.Karczmarczyk, R.Lewandowski, J.Swarzyński, B.Szabelska, J.Szabelski, P.Tokarski and T.Wibig

Realisation of the Roland Maze Project is the most important task of our Department. The idea of the Project is to build the network of cosmic ray detectors deployed on the roofs of Łódź high schools. Every school taking part in the Project will be equipped with 4 scintillator detectors of 1 m area, GPS receiver and PC-class computer. In actually carried out 1 stage of the Project we plan to equip with such systems10 schools in Łódź. The funds for this task have been obtained from the City of Łódź budget in 2004.

The state of Project realisation:

- We have constructed 2 prototype scintillator detectors, their performance is now being tested. In the coincidence system the signal from a single muon is clearly visible. Without coincidence we observe registrations from natural radioactivity.