

Project Title:

Generation & Reconstruction of Neutrino induced Airshowers

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1. JEM-EUSO - the Extreme Universe Space Observatory onboard the Japanese Experiment module aims at measuring the ultra high energetic component of cosmic rays (UHECR). The detector will be mounted on the International Space Station to monitor the earth's atmosphere from above in order to observe UHECR induced air showers. Our group is carrying out computer simulations to evaluate the expected performance of the instrument. My special task in this context is the simulation and reconstruction of ultra high energy Neutrinos.
2. The RIKEN Supercluster serves to achieve a high statistics of generated simulated and reconstructed Neutrino events. Every event includes simulation of hadronic and electromagnetic interactions in atmosphere, production of fluorescence and Cherenkov light, transmission of photons in atmosphere, detector response and eventually reconstruction of the properties of the primary UHECR. Intermediate calculations are performed partly by parametrized and/or Montecarlo approach with the Software CONEX and ESAF.
3. Only very recently we managed to compile our Simulationcode ESAF on the RICC. CONEX is about to follow shortly. Therefore no scientific results could be achieved up to now.
4. Now, since our simulation framework is running on the RIKEN Supercluster we will be able to carry out extensive simulations. My emphasis will mainly be placed upon the production of Neutrinos and reconstruction of these UHE events.
5. Since the JEM-EUSO project is a long term mission with launch maybe in 2015, and the simulation studies, especially for Neutrinos, are still at the beginning, we expect to need at least two more years of RICC access. The roadmap of the planned simulations is still subject to change due to many open parameters, in hardware and software, still to be decided. Thus, we are unable to provide a precise schedule for the middle- or long-term perspective. However, in the next few months our concern will be the simulation of background, the implementation of clouds in our atmospheric simulations as well as the generation of a large database of UHECRs and Neutrino events in order to set discrimination thresholds between these particles. Also solid trigger thresholds are going to be set once there is a good statistics. This is especially interesting to see if the scientific requirements for Neutrino detection will be satisfied.
6. As described above, our simulation code could only recently be installed, so up to the present, no significant amount of CPU time has been used. However, we are confident, that after about two weeks of testing, we will be able to use a large amount of the granted CPU time.
7. Because no simulations have been run so far, no research achievements have been made.

