RICC Usage Report for Fiscal Year 2012

Project Title:

Neutrino Simulation for the JEM-EUSO Mission

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1. JEM-EUSO (Extreme Universe Space Observatory onboard the Japanese Experiment Module) is a space borne ultra high energy cosmic ray (UHECR) detector. It will be launched in 2017 and attached to the Japanese module of the international space station (ISS). ESAF (EUSO Simulation and Analysis Framework) is a software designed to simulate the JEM-EUSO instrument. With ESAF we simulate the entire chain of events during the measurement of UHECR with the JEM-EUSO detector. In 2012 first neutrino showers were simulated with ESAF to be able to estimate the trigger efficiency of the telescope's system on neutrinos.

2. The ESAF software is an object oriented c++ code which is based on ROOT (root.cern.ch). The physics and hardware simulations include several analytical and numerical techniques.

3. The software is still under development. During the fiscal year 2012, a few percent of the granted computing time were used to simulate neutrino showers. After these simulations mistakes in the main configuration file were found which unfortunately made the results of no avail. This configuration file is under constant development and after every change needs some proper testing.

4. ESAF is an important tool to estimate the expected performance of the JEM-EUSO mission. It is still under development, however we believe that in 2013 we are ready to use much more of the computation time granted to perform large-scale simulations.

5. During the fiscal year 2013 we will carry out some more neutrino simulations for the JEM-EUSO mission and will investigate the neutrino trigger efficiency more extensively.