

Project Title:

Simulations 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. This is important to estimate the expected performance of the instrument and to check its design and technological components.
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, the granted computing time could not appropriately been used.
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 extensively use the computation time granted to perform large-scale simulations.
5. During the year 2013 we will carry out massive simulations for the JEM-EUSO mission.
6. Due to technical issues with the code, so far the provided computing time has not been used. After an extensive debugging phase we are now confident start a large number of simulations. In the next usage term simulation will cover the entire event reconstruction in terms of air shower resolution. A focus will be the angular reconstruction capability of the JEM-EUSO instrument as well as the energy and Xmax resolution. Therefore extensive computing time for the Montecarlo simulations in atmosphere will be required.