Contribution ID: **167** Type: **Poster**

Cosmological applications in the GRID environment: detection of compact sources and non-gaussian signatures in data from the ESA Planck satellite mission

Describe the scientific/technical community and the scientific/technical activity using (planning to use) the EGEE infrastructure. A high-level description is needed (neither a detailed specialist report nor a list of references).

In 2008 ESA's Planck satellite will be launch. The main objective of this mission is to produce a map of the cosmic microwave background radiation (CMB), a relic radiation from the Big Bang. To study this map, the compact source emission from distant galaxies and clusters of galaxies must be detected and extracted. Similarly, the study of non-gaussian signatures provides additional information about the underlying sistematic effects or even a primordial departure from gaussianity of the data.

Report on the experience (or the proposed activity). It would be very important to mention key services which are essential for the success of your activity on the EGEE infrastructure.

We have been using part of Astronomy & Astrophysics cluster to run this kind of tests. We are testing the performance of two different filters, the Matched Filter and the Mexican Hat Wavelet 2, both operating on flat patches. The input images to analyse are aprox. 200 MB and are stored in the local storage element. Then in every test we modify one of the parameters and run the application for the nine input simulated maps, corresponding to the nine frequencies of Planck. The process takes about 90 minutes to run in a 3.5 GHz intel Xeon processor. The output is a catalogue of detected objects. This catalogue of objects is also converted into a map in sperical coordinates and displayed to compare it with the input map. Depending on the output, the input parameters may be modified and then the application is run again. A paralelization of this application will help decrease the time it needs to run from 90 minutes to just a few minutes. This will increase the interactivity of the proces

Describe the added value of the Grid for the scientific/technical activity you (plan to) do on the Grid. This should include the scale of the activity and of the potential user community and the relevance for other scientific or business applications

There are several techniques used to detect point sources and non-gaussian signatures in maps of the CMB. In particular, for the case of point sources, most of these techniques are based on linear filters, matched filter, wavelets, etc. Within the Planck satellite collaboration a set of realistic simulations of the sky at microwave frequencies has been produced. This sky model can be used to test our detection techniques extensively. The techniques that we use operate on flat patches of the sky, whereas the output maps of Planck will be

in spherical coordinates. Therefore, each map has to be proyected into several hundreds of patches, each of which needs to be filtered to increase the signal-to-noise ratio of the point sources, which in turn increases the number of detected objects. There are several parameters that may be modified such as the image size, pixel size, overlapping, etc, and only using a GRID infrastructure these techniques can be thoroughly tested in a reasonable time

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