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# The Grid for Astronomy and Astrophysics in Italy and Europe

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The Astronomical and Astrophysical (A&A) community is extremely active concerning the use of the EGEE Grid infrastructure in Italy as well as in Europe. We briefly provide a summary of current AA Grid activities and we present selected compute and data intensive applications, which have been recently ported to Grid. Those applications are related either to large international key projects (as Planck ESA satellite) or to small-scale regional scientific activities. In particular, the AA community efforts toward the set up of the Italian NGI will be also presented.

## Detailed analysis

Italian Astronomers are facing different kind of problems that involves data reduction and analysis, modeling of physical observations, theoretical simulations and comparison of theoretical and observed data. The EGEE production Grid provides the computational frame for compute-intensive tasks, such as the transformation of raw instrument data into calibrated and catalogued data, or to produce theoretical simulations. There are some important examples of the use of Grid computing by Italian Astronomers, that we mention here: the pre-launch numerical simulations of ESA Planck Satellite, the simulations used to populate the Bag of Stellar Tracks and Isochrones astrophysical catalogue, and the numerical simulations for galaxy formation.
AA research activities are also focused on the need to integrate AA databases in the Grid and to create proper science gateways to bridge the EGEE e-Infrastructure with the European Virtual Observatory (EuroVO) "data-grid".
Italian Astronomers also participated in a number of initiatives related to the use and development of e-Infrastructure for science and research (for EGEE, EuroVO, Grid.IT, DRACO, Cometa, TriGrid), giving them the possibility to develop a well-established and successful Grid community.

## Conclusions and Future Work

The A&A is a mature community concerning the knowledge and use of the Grid. This expertise is documented by means of the applications that are using the infrastructure, the participation in Grid related projects and the large number of Grid related publications. In the future we aim at increasing the number of researchers making use of the Grid infrastructure, and to support them. To reach this goal, in Italy we will actively participate in the organization of the Italian NGI and, more generally, at European level, in coordinating the national A&A Communities with their respective NGIs. We will also collaborate with the EuroVO projects.

## Impact

During the last few years, the A&A community has grown both in terms of astronomical research groups and related applications. A&A activities involve more than 1000 researchers in Europe distributed in several VOs (ASTRO, MAGIC, PLANCK, DCA and others) and they have an impact on the research of a number of Astronomers in EU countries (for instance, in the case of Planck simulations, Grid activities affect more that 1000 astronomers involved in Planck consortium). Many Astronomers are involved in the EuroVO projects.

EuroVO is an example of an operational data and service grid. A crucial research activity is the interoperability between EuroVO and EGEE grid infrastructure. This produces a ”cyber-infrastructure”that will support Astronomers in any aspect of their research activity, from data discovery and query to computation, from data storage to sharing resources and files. The use of HPC resources in the Grid infrastructure is crucial to fulfil the needs of theoretical astronomers that use numerical simulations for their research activity. In Italy this problem has been successfully faced in the framework of the Cometa and TriGrid projects.

## Keywords

Astronomy, Astrophysics, Italy, Europe, NGI, Grid

## URL for further information

wwwas.oats.inaf.it

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