EGEE AA cluster

The Italian participation

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Overview

- **Italian partners of the AA cluster**
- **Proposed Applications**
- **Evolution**

People:

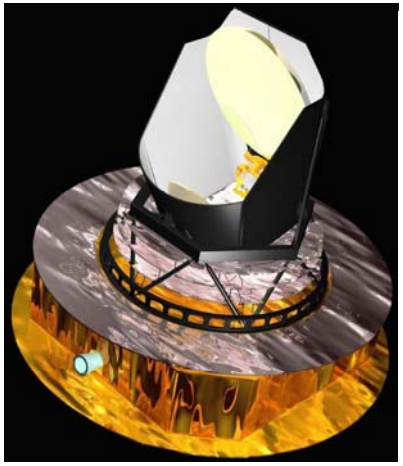
- ✓ Claudio Vuerli
- ✓ Giuliano Taffoni
- ✓ Andrea Barisani
- ✓ Massimo Sponza
- ✓ Ugo Becciani
- ✓ Santi Cassisi

The Italian Participation

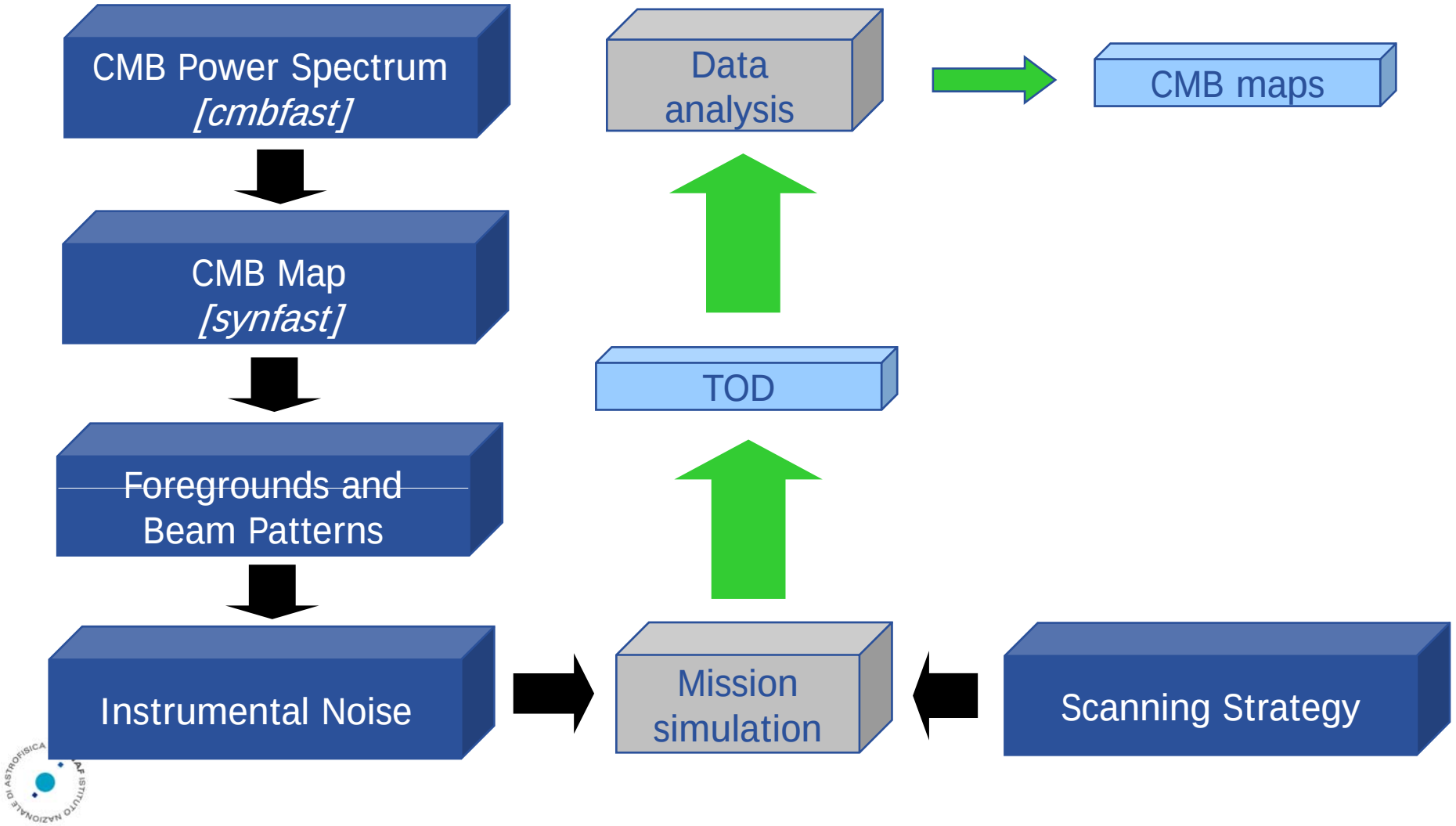
- **INAF is the Italian partner of the AA cluster in EGEE**
- **INAF is the national Institute that collects 21 Astronomical Observatories and two Observing Facilities (TNG and LBT)**
- **INAF and the Grid:**
  - Past Projects:
    - GRID.IT
    - DRACO
    - Planck simulations in EGEE and EGEE-II
  - Current Projects:
    - Set up of a stable INAF Grid Infrastructure (led by INAF-SI Unit)
    - Databases and the Grid: a project funded by INAF-UIT
    - Grid and the Virtual Observatory: VO-DCA WP5

Planck : the Mission

- **Measure cosmic microwave background (CMB)**
  - Successor to COBE, Boomerang & WMAP missions
  - aims at even higher resolution (as high as 5 arcmin)
- **Timeline**
  - launch August 2008
  - start of observations: early 2009
  - duration >1 year
- **Characteristics**
  - continuous data stream (TOD)
  - large datasets
  - changing calibration (re-configuration of the parameter space)
  - high-performance computing for data analysis



Planck : Simulations



Planck : Future Developments

- Integration of the Planck simulations (as well as of other astronomical applications) in Grid portals (Genius, EnginFrame, etc.)
- More effort to train people (Grid site maintainers and final users) fostering in this way the adoption of the EGEE infrastructure within the astronomical community

The BaSTI Database

- An important and quite suitable application of Grid computing resources is provided by Stellar Astrophysics and, in particular, by stellar evolutionary computations. The availability of extended set of stellar models is a fundamental requirement for a wealth of astrophysical problems as, just for quoting an example, the possibility of retrieving the Star Formation History (SFH) of galaxies.
- The BaSTI database is a suite of stellar evolution tracks, isochrones and codes to study the properties of resolved and unresolved stellar populations with an arbitrary Star Formation History (SFH). It can be accessed on the web at the official site: http://www.oa-teramo.inaf.it/BASTI.

BaSTI : Coverage

- **11 metallicities:** from Very Metal-poor Stars to Very metal-rich ones
- **Heavy elements mixture:** scaled solar & α-enhanced
- **Helium abundance:** Y_{pr}=0.245 - $\Delta Y/\Delta Z$~1.4
- **Core convection: canonical & overshooting**
- **Mass loss:** Reimers' law with η=0.2 and 0.4
- **Extremely fine mass grid for all evolutionary stages**
- **From the Pre-Main Sequence to the end of the Asymptotic Giant Branch or C-ignition**
- **Updated Color – T_{eff} transformations + BC scale**

Basti & GRID

- Finalising the 'gridification' of the code to allow the calculation of new models using the Grid infrastructure

State-of-the-art:

Our evolutionary code is now efficiently running within LINUX platform and we start the preliminary tests needed before a massive use of the Grid infrastructure.

Mid-term projects:

We plan to compute in the next few months an extended set of stellar models for chemical compositions and masses not yet included in the BaSTI archive. We'll also compute a large set of integrated spectra for stellar populations with complex Star Formation Histories

Long-term project:

We wish to allow an "on-line" access to our evolutionary code so that users can compute their own evolutionary models: the computational work should be performed within a Grid infrastructure

Galaxy Formation at High-redshift

- **Goal: quantifying Black Holes' feedback on the evolution of the visible Universe.**
- **First Target**
  - The most recent galaxy surveys conducted within projects like the SDSS, FUSE, GALEX, SPITZER, have brought up a convincing evidence concerning the importance of feedback from relativistic jets, produced by Black Holes buried within the bulges of galaxies, on the global evolution of the galaxies themselves.
  - We have a qualitative evidence of this feedback from the rapid metal enrichment of massive ellipticals at z ~ 2, but simple analytical models are unable to provide a quantitative understanding of this feedback.
  - Numerical simulations are then needed, in order to provide the physical framework to allow quantitative predictions of the evolution of the galaxy population.

Galaxy Formation at High-redshift

- **Second Target**
  - Build a software layer that can easily allow to handle data from simulations.
  - The challenge is to develop and to make available to the community a complete set of services for the data handling by providing a user friendly access to huge amount of heterogeneous data and by providing as well an optimised way to process and analyse them in a distributed environment.
  - A proper solution to achieve this task is to make available the computational power of the grid infrastructure through web services.

Galaxy Formation at High-redshift

- **Grid Infrastructures that will be made available to this project:**
  - The Trinacria Grid Virtual Laboratory (Trigrid VL) project infrastructure (http://www.trigrid.it) funded by the Regional Government of Sicily. INAF Catania is one of the main grid site of the TriGrid project.
  - The Cometa consortium infrastructure (http://www.consorzio-cometa.it), that will be integrated with the TriGrid infrastructure with the following computing systems: 300 rack-mounted computing nodes, with two 64 bit dual core CPUs and 2 GByte RAMs for each core, totally 150 TB raw configured EIDE-to-SCSI and RAID capacity of 0,1,5. The infrastructure will be completed at the beginning of 2008.

INAF and the Grid

- **Future Projects:**
  - Participation to the EGEE-III AA cluster (and its coordinations in this first phase) with:
    - More work and development on Planck simulations
    - New applications proposed by INAF Institutes
  - Go on with the set up of a stable INAF Grid Infrastructure, led by INAF-SI Unit and supported through funds allocated by the National Institute. We need to make the INAF Grid stable both in terms of physical infrastructure as well as of users who use the Grid for their everyday work.
  - Go on with the project “Databases and the Grid”, also thorugh the activation of national/international collaborations (e.g. with INFN: PRIN project, DB test campaign). Our main target is to make Databases an embedded resource of the EGEE Grid infrastructure.

INAF and the Grid

- **Future Projects:**
  - Grid and the Virtual Observatory. Through our participation to projects like VO-Tech and VO-DCA, we want to make the Grid and the VO tightly interoperable. Users don't want two decoupled tools to carry out their tasks.
  - Grid and remote monitoring/control of astronomical instrumentation. A project has been proposed to INAF-UIT whose target is to use the Grid to remotely control a network of sensors. The technology proposed is based on G-ICS and IE. The main application of this extended Grid will be in the astronomical field but other fields of application have already been identified like applications aiming at monitoring the environmental quality (atmospheric pollution) and medical applications.

End of Presentation

Thank you for your attention