

PROJECT: Studi di Cosmologia		WP REF.: 4-6X2
WP TITLE: HW/SW infrastructure for future CMB experiments		Sheet: 1 of 1
CONTRACTOR: INAF-OATS / Trieste		
START EVENT: KO		Issue Ref: 1
END EVENT: RF		Issue Date: 01/09/2016
WP MANAGER: Andrea Zacchei		

1. OBJECTIVE

- Provide to the whole Italian CMB community a software infrastructures
- Assure the availability of the software infrastructure
- Allow to the whole Italian CMB community the access to the Planck data to be used as cross check
- Provide support to the LSPE data analysis

2. INPUTS

- Planck Data
- Planck Software
- Simulation SRD and URD
- Simulations request

3. TASKS

The target of this WP is to provide to the whole Italian CMB community a software infrastructure where deploy and develop algorithms needed to simulation or data analysis. Based on the experience acquired during the Planck project, where the centralization of the code development, execution and products was crucial, we decide to include this WP that can be intended as transversal vs all the more scientific aimed WPs. Two software environment will be made available, one dedicated to the development and run of simulations that are critical in any CMB observation from ground, balloon and Space; and the other for optimization, development and running of algorithms necessary to exploit existing data and prepare study for future mission. The first step will be to support the LSPE data analysis that will heavily rely on the use of synthetic data, produced by an instrument simulator, taking into account a sky model as well as instrument characteristics, performance, calibration, uncertainties and systematic effects. This tool requires significant computational resources to run, roughly estimated at 10^{20} Flop. Maps will need to be created out of time-ordered flight information for both real and simulated data. To this purpose, highly efficient algorithms must be used, capable of optimally minimizing the impact of instrumental noise in the final maps. The computational cost of the data reduction is dominated by the processing of simulations, and its impact is comparable to the cost required to generate synthetic data.

To create a software infrastructure able to satisfy those requirements INAF-OATs will made available a cluster (HotCat) with 400 Cores HP DL560 G9), Infiniband 40 Gbps, RAM 16 GB/core as main computation queue and a small queue for test and developping composed by 240 cores (Xeon SixCore E5645 2,40Ghz), Infiniband 40 Gbps, RAM 6 GB/core. Together with the HPC an estimated storage of about 200 TB will be made available with all the necessary facilities to allow share code



development and information flow (SVN, GitHub and Wiki page). Through the HotCat system will be possible to access all the Planck data release (principally all the maps and auxiliary products with raw and calibrated timelines offline) allowing quick cross check and validation of the new algorithms.

4. OUTPUTS

- LSPE SRD and SDD
- Simulated fields with different valid instrumental effects
- Simulation code and related documentation

5. SCHEDULE

- Requirement definition (verify what is required by different WPs): T0+6months
- Environment set-up: T0+8 months
- Dedicated storage acquisition: T0+4 months
- Code development / integration / run: T0+6 months (start of the activity)
- Code development / integration / run: T0+36 months (end of the activity)
- Simulation runs respect the requirements: T0+12 months (first Run), then one run every 6 month (linked to code development)

