

THE AGILE ARCHIVE AND DATA PROCESSING AT THE ASI SCIENCE DATA CENTER

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Abstract

AGILE (Astro-rivelatore Gamma ad Immagini LEggero) is a Small Scientific Mission of the Italian Space Agency (ASI) with a Science Program open to the national and international community. Its main goal is to develop and operate a scientific satellite devoted to Gamma-ray (30 MeV–50 GeV) and hard X-ray (10–40 keV) Astrophysics during the years 2005–2007. ASI plans to handle AGILE data through the ASI Science Data Center in collaboration with the AGILE Team.

1 AGILE and the ASI Science Data Center

AGILE, the 4th Gamma-ray satellite, is a bridge between the Compton Gamma Ray Observatory (CGRO), switched off in 2000, and the Gamma Ray Large Area Space Telescope (GLAST) to be launched at the end of 2006.

The AGILE instrument is designed to detect and image Gamma-ray and hard X-ray photons by means of the Gamma Ray Imaging Detector (GRID) and the hard X-ray imager Super-AGILE (SA).

GRID, sensitive in the energy range 30 MeV–50 GeV, is made of 12 Si-W planes and the Mini Calorimeter, sensitive in the energy range 0.3–100 MeV and positioned at the bottom of the instrument.

SA, sensitive in the energy range 10–40 keV, with its 4 Si-detectors and the ultra-light coded mask system is positioned on top of the first GRID tray.

The ASI Science Data Center (ASDC) will host the AGILE Data Center (ADC). The ADC includes the AGILE Team Processing Group and the AGILE Science Support Group. AGILE data from the Malindi Ground Station will be received by the Operational and Control Center (AOCC) in Italy and then they will be transferred to ADC.

The ADC@ASDC will be in charge of the following tasks [1]:

- Running the Quick Look Analysis
- Running the Standard data reduction Analysis

- Performing, when necessary, the Interactive data Analysis
- Managing Announcement of Opportunities
- Contributing to the AGILE management of the Pointing Program
- Archiving the data (raw, cleaned and calibrated, scientific)
- Distributing the data to the scientific community
- Providing scientific support to the users community
- Interfacing the project for both data and proposals via dedicated web pages
- Providing the standard software support for data analysis

The pipeline that will be running at ASDC will drive the automated data analysis for both GRID and SA data.

Figure 1 shows a preliminary flow chart concerning the GRID data analysis. The software modules needed to process the data are under development by the AGILE Team, while the pipeline itself will be built by professional programmers of the AGILE Science Support Group at ASDC, in collaboration with the AGILE Team. The GRID telemetry packets will be pre-processed in order to get files in the standard fits format. The event list undergoes a complex process of background subtraction and track reconstruction analysis in order to get a cleaned γ -photon list. Then, standard products as spectra, light curves and images will be made available to the scientific community via a set of dedicated web pages. AGILE data will be part of the permanent multi-mission interactive archive at ASDC.

2 AGILE and blazars

The scientific goals of the AGILE mission include the detailed study of Active Galactic Nuclei.

Figure 2 (*top*) shows the simulated all-sky intensity map above 100 MeV [3] as well as the Spectral Energy Distributions (SEDs) of the blazars Mkn 501 (*bottom, left*) and 3C 273 (*bottom, right*). The multi-frequency data have been retrieved from the NASA/IPAC Extragalactic Database (NED), the second version of the Guide Star Catalog (GSC-II) and from *BeppoSAX*. By accounting for AGILE-GRID and Super-AGILE limiting sensitivity we plan to select the blazars currently known that might be suitable candidates for AGILE observations. According to the predictions of a Synchrotron-Self Compton (SSC) spectral model (*dashed, dashed-dotted lines*), Mkn 501 and 3C 273 would be visible to both AGILE-GRID and Super-AGILE. The SEDs of all the blazars observed by *BeppoSAX* during its first five years of operations [2] and the corresponding SSC predictions together with the plotted AGILE-GRID and Super-AGILE limiting sensitivity can be found at the following web address: <http://www.asdc.asi.it/blazars/>

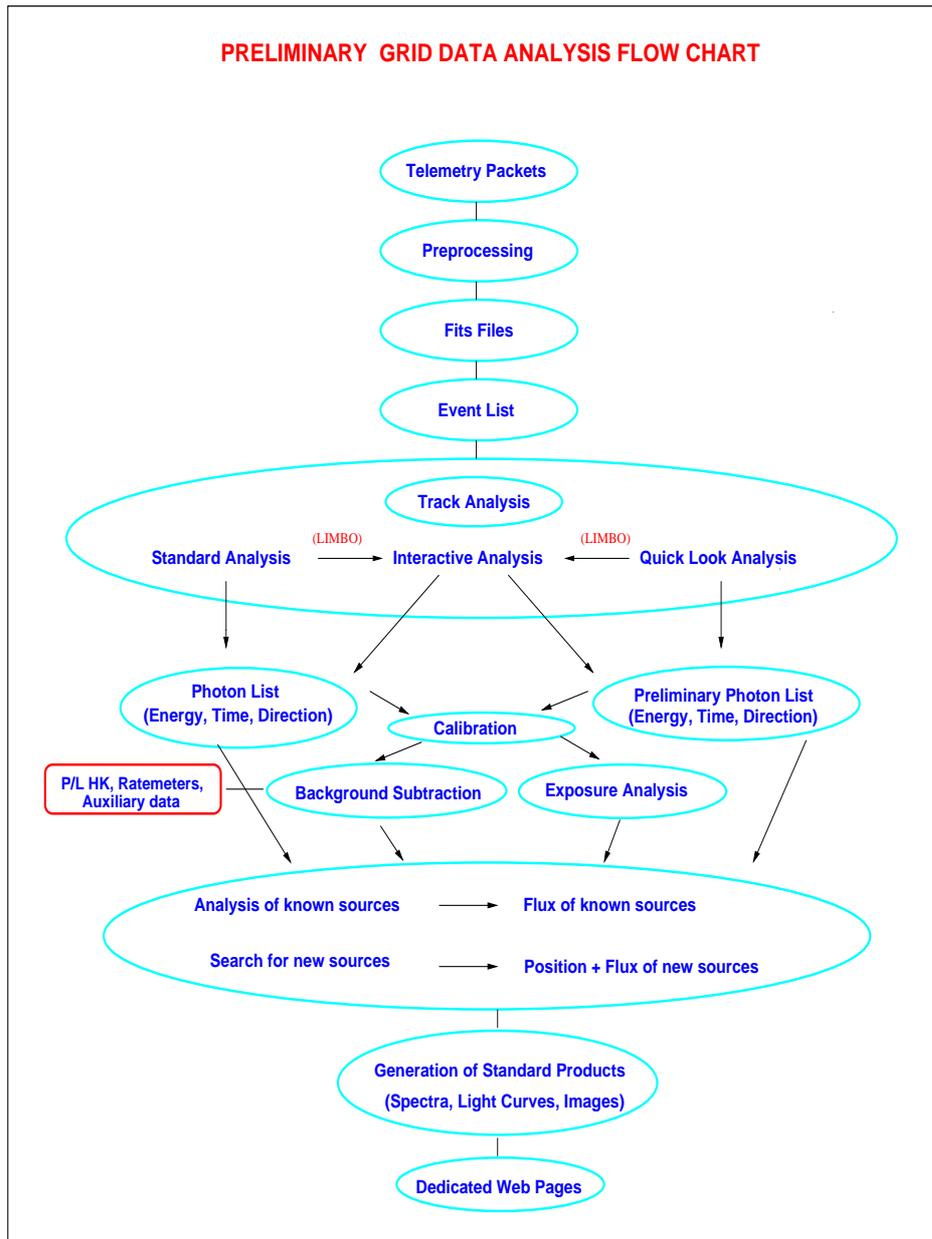


Figure 1: Preliminary flow chart describing the pipeline that will drive the automated data reduction and analysis system for GRID data at ASDC.

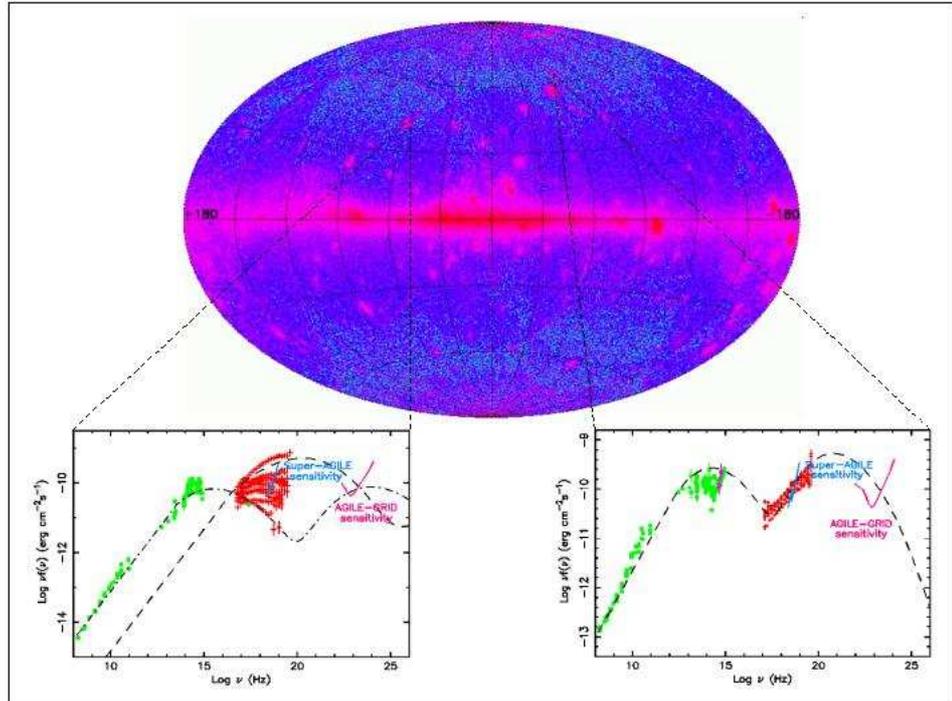


Figure 2: *Top*: AGILE simulated all-sky intensity map above 100 MeV assuming the complete sky coverage with 6 pointings lasting 4 weeks each [3]. *Bottom*: Spectral Energy Distributions of the blazars Mkn 501 (*left*) and 3C 273 (*right*) – (for more details see § 2 and <http://www.asdc.asi.it/blazars/>).

References

- [1] AGILE Science Management Plan, ASI Document, 2002
- [2] Giommi P., Capalbi M., Fiocchi M., Memola E., et al., 2002, in *Blazar Astrophysics with BeppoSAX and other Observatories*, Frascati, Italy, December 2001, P. Giommi, E. Massaro, G. Palumbo eds., ASI Special Publication p.63
- [3] Science with AGILE, AGILE Document AP, Issue 25, March 6, 2003: <http://agile.mi.iasf.cnr.it/Homepage/index.shtml>