Prot. ASDC-CE-5/2011

AGILE Mission

Announcement of Opportunity Cycle-4

May 31, 2011

Proposals due
Starting **June 1, 2011**
Ending **June 30, 2011, 18:00 CET**

Data taking period
December 1, 2010 – November 30, 2011

Prepared by
C. Pittori, P. Santolamazza,
P. Giommi, M. Tavani
On behalf of the AGILE Mission Board

Agenzia Spaziale Italiana
Unità Esplorazione ed Osservazione dell'Universo

Table of contents

Introduction

This document provides information about the fourth Announcement of Opportunity (**AO4**) for participating in the Guest Observer Program for the Gamma Ray Imaging Detector (GRID) on board of the AGILE satellite. AGILE (Astro-rivelatore Gamma a Immagini LEggero) is a Scientific Mission of the Italian Space Agency (ASI) dedicated to high-energy astrophysics. This document has been prepared on behalf of the AGILE Mission Board that oversees all the scientific matters related to the AGILE mission. The AGILE Mission Board (AMB) is supported by an AGILE Users Committee (AUC) which represents the whole user community.

All proposals submitted in response to this AO will be subject to an independent peer review by the AGILE Data Allocation Committee (ADAC). The ADAC is composed by: the Project Scientist (Chair), the PI (or his delegate) and three scientists (belonging to the international astrophysical community and appointed by the Director of the ASI Exploration and Observation of the Universe). The ADAC will assign data rights for investigations of sources selected within the framework of the AGILE Guest Observer Program. The successful proponent will have exclusive access to the data for a period of one year.

On November 4, 2009, toward the end of Cycle-2, AGILE scientific operations were reconfigured following a malfunction of the reaction wheel. The satellite is currently operating in a "**spinning observing mode"**, i.e., with the solar panels pointing at the Sun and the instrument axis sweeping the sky with an angular speed just under 1 degree/sec. The instrument and all detectors are operating nominally producing data with quality similar to that obtained when operating in pointing mode. AGILE is now surveying a large fraction of the sky every day and during Cycle-4, as in Cycle-3, it will not follow a predefined Baseline Pointing Plan.

Target of Opportunity (ToO) observation cannot be requested through this AO.

X-ray data from the Super-AGILE instrument cannot be requested through this AO. Results from this instrument will be posted regularly on the AGILE Web pages at ASDC. This document provides general background information about AGILE, describes the data policy, as defined in the AGILE Science Management Plan, and the mechanisms of this fourth Announcement of Opportunity.

1 Mission Overview

The AGILE satellite is designed to detect and image photons in the 30 MeV - 30 GeV and 20-60 keV energy bands, with excellent spatial resolution, timing capability, and a very large field of view covering ≃ 3 sr (~ 60 degrees radius) of sky at energies above 30 MeV. Primary scientific goals include the study of AGNs, gamma-ray bursts, Galactic sources, unidentified gamma-ray sources and diffuse Galactic gamma-ray emissions (M. Tavani et al. , *"The AGILE Mission"*, A&A 502, 2009, arXiv:0807.4254).

In June 1997, the AGILE space program was proposed to ASI (for the Program for Small Scientific Missions) by a Team of scientists from INAF (former CNR) institutes[1], INFN laboratories[2], and several Italian Universities[3] (hereafter, the AGILE Team). The mission was selected in December 1997 for a Phase A study that ended in October 1998. Subsequently, ASI selected AGILE in June 1999. The Mission is part of the ASI Piano *Aero-Spaziale Nazionale* formulated in mid-2002 and approved by the Italian Ministry of Research. The satellite was successfully launched on April 23rd, 2007 from the Indian Space Center in Sriharikota ISRO (Chennai-Madras) by the PSLV-C8 rocket.

The AGILE scientific instrument is very compact and consists of a combination of two imaging detectors and other subsystems. The Gamma-Ray Imaging Detector (GRID, composed of a Silicon Tracker and a Calorimeter) covers the 30 MeV - 30 GeV energy range with a large field of view (~3 sr). A hard X-ray imaging detector (Super-AGILE) is coaxial with the GRID and operates in the hard X-ray range (20-60 keV) with a ~1 sr field of view. The instrument is completed by the Anticoincidence system, the Data Handling system and power supply. AGILE has been injected in a low-inclination (2.5 degree), quasi-equatorial and nearly circular orbit at 540 km altitude. A brief summary of the AGILE scientific performance is given in section 1 and Table 1. A more detailed description is given in the AGILE User's Manual.

AGILE has been operated in the nominal pointing mode until October 18th, 2009

[1] INAF/IASF-Milano, INAF/IASF-Bologna, INAF/IASF-Roma.

[2] INFN-Trieste, INFN-Roma 1, INFN-Roma 2.

[3] Università di Trieste, Università di Roma La Sapienza, Università di Roma Tor Vergata, Consorzio Interuniversitario per la Fisica Spaziale.

when the spacecraft reaction wheel failed, making pointed observations no longer possible. Science operations were resumed on November 4th, 2009 with AGILE operating in "spinning mode". The payload is operating nominally producing scientific data of quality equivalent to that obtained before October 2009, and it will continue to operate in spinning observing mode for the rest of the mission, surveying a large fraction (~70%) of the whole sky each day. AGILE Science Program is primarily focused on a systematic observation of the gamma-ray sky also providing a prompt response to gamma-ray transients and alerts for follow-up multi-wavelength observations. AGILE is providing crucial information complementary to the many space missions that are currently operational (INTEGRAL, XMM-*Newton*, *Chandra*, RXTE, *Swift*, *Suzaku* and *Fermi*). Furthermore, it can support ground-based investigations in the radio, optical, and TeV bands. Quicklook data analysis and fast communication of new transients are implemented as an essential part of the AGILE Science Program and is carried out by a dedicated AGILE Data Center located at the ASI Science Data Center (ASDC) within the European Space Agency's establishment of ESRIN in Frascati (Italy). Part of the AGILE Science Program is open to Guest Investigators on a competitive basis as described in this AO4.

1.2 Scientific Performance

The AGILE-GRID has been designed, developed and calibrated to obtain:

- **a very large field-of-view**, allowing simultaneous coverage of about 1⁄4 of the entire sky for each pointing (see Figure 1);
- **excellent imaging capability in the energy range 100 MeV-30 GeV**, improving the EGRET angular resolution by a factor of 2 at 400 MeV;
- **a flux sensitivity for point sources**, comparable to that of EGRET, taking into account the large total exposure that AGILE reaches because of its large field of view;
- **excellent timing capability**, with absolute time tagging of uncertainty near 2 μs and very small deadtimes ~ 200 μs).

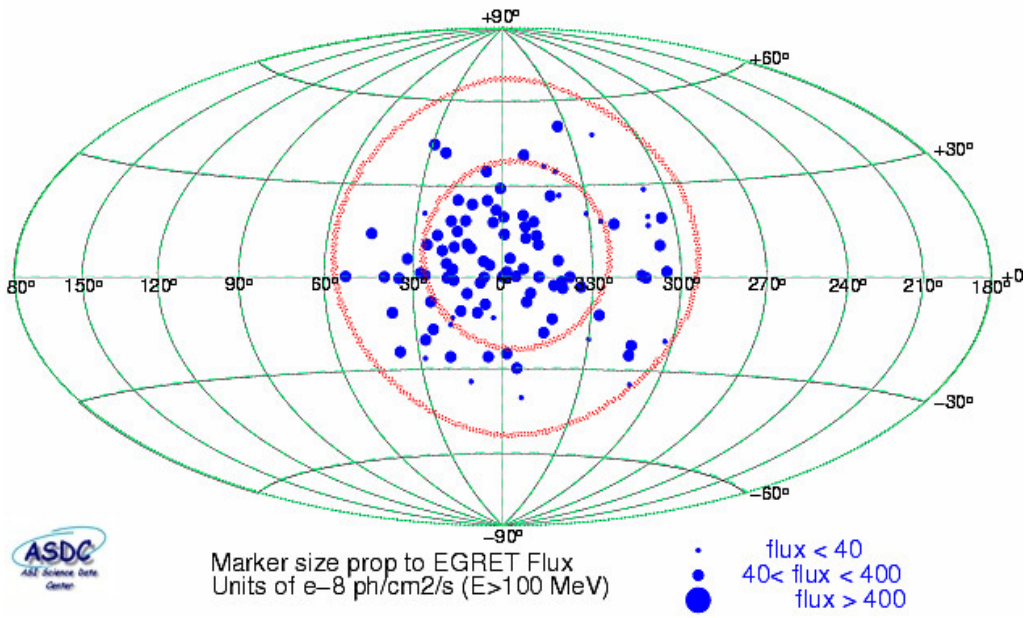

Figure 1: An example of the <u>instantaneous</u> Field of View of the AGILE-GRID instrument. The larger red circle represents the entire field of view of about 60° radius, while the smaller red circle shows the inner 30 degrees where the sensitivity is higher. Blue dots represent gamma-ray sources listed in the 3rd EGRET catalog .

In addition to the GRID, an imaging coded mask detector system (Super-AGILE) provides a tool for the study of high-energy sources by combining simultaneous hard X-ray and gamma-ray data. Super-AGILE can provide important information including:

- **source detection and spectral information in the energy range 20-60 keV** (15 mCrab sensitivity, 5 σ, for a 50 ksec integration time) to be obtained simultaneously with gamma-ray data;
- **accurate localization (~ 2-3 arcmins) of GRBs and other transient events** (for typical transient fluxes above ~ 1 Crab); the Super-AGILE GRB detection rate in the FoV during the first year in orbit was 1 - 2 per month;
- **excellent timing**, with absolute time tagging uncertainty and dead-time ~ 4 μs

1.3 General Observing Information

The present Announcement of Opportunity (AO4) covers a 12 month observation period starting on December 1st 2010. ASI approved the AGILE mission with an operational life time of 2 years. This initial period has been extended to cover at least the entire AO4 time span.

Table 1: AGILE Scientific Performance

Gamma-ray Imaging Detector (GRID)	
Energy Range	30 MeV – 30 GeV
Field of view	~ 3 sr
Sensitivity F(>100 MeV) (5σ in 10^6 sec at high galactic lat., on axis)	$3x10^{-7}$ ph cm^{-2} s^{-1}
Angular Resolution (68% cont. radius at 400 MeV)	1.2°
Source Location Accuracy (S/N ~ 10; 90% c.l. radius at high gal. lat)	~ 15 arcmin
Energy resolution	ΔE/E ~ 1 (at 400 MeV)
Absolute Time Resolution	~2 μs

Hard X–ray Imaging Detector (Super-AGILE)	
Energy Range	20 – 60 keV
Field of view of each half detector (FW at Zero Sens.)	107°× 68°
Sensitivity (5σ in 50 ks, on-axis)	~15 mCrab
Angular Resolution	~ 6 arcmin
Point Source Location Accuracy (for a source at 10σ)	~ 1-2 arcmin
Energy Resolution	ΔE=8 keV
Absolute Time Resolution	~ 5 μs

1.4 AGILE in Spinning Observing Mode

The AGILE operations require that the fixed solar panels be always oriented within 3° from the Sun direction. The AGILE GRID and Super-AGILE detectors are co-aligned and point along the spacecraft +Y axis, orthogonal to the solar panels normal (+Z axis). The solar panel constraint is somewhat limiting the sky visibility. However, the part of the sky not accessible at a given date is smaller than 3 sr (i.e., 1/4 of the sky). The allowed pointing directions lie on a great circle orthogonal to the Sun direction, whose orientation changes with time, so that the whole sky is accessible during a six months period.

During Cycle-1 and 2 AGILE was operated by performing long observations, called Observation Blocks (OBs), typically of 2-4-weeks duration, during which the pointing direction slowly drifted (at a rate of ~ 1 degree/day) in order to satisfy the solar panel constraints.

On November 4, 2009, toward the end of Cycle-2, AGILE scientific operations were reconfigured following a malfunction of the rotation wheel occurred in mid-October, 2009. In Cycle-3 the satellite started to operate in "**spinning observing mode"**, i.e., with the solar panels pointing at the Sun and the instrument axis sweeping the sky with an angular speed just under 1 degree/sec. AGILE is surveying a large fraction of the sky every day (~70%), and also during Cycle-4 it will not follow a predefined

Baseline Pointing Plan. The instrument and all the detectors are operating nominally producing data with quality equivalent to that obtained when operating in pointing mode. The large field of view and the low altitude orbit imply that, for most pointing directions, the Earth will (partially) occult the field of view. Thus the observing efficiency and exposure for a given source will vary, depending on its coordinates. A "Visibility Tool" giving the expected 1-year exposure for any sky direction with AGILE in spinning is available from the AGILE Data Center Web page http://agile.asdc.asi.it. An example of AGILE-GRID daily view of the sky is shown in Figure 2.

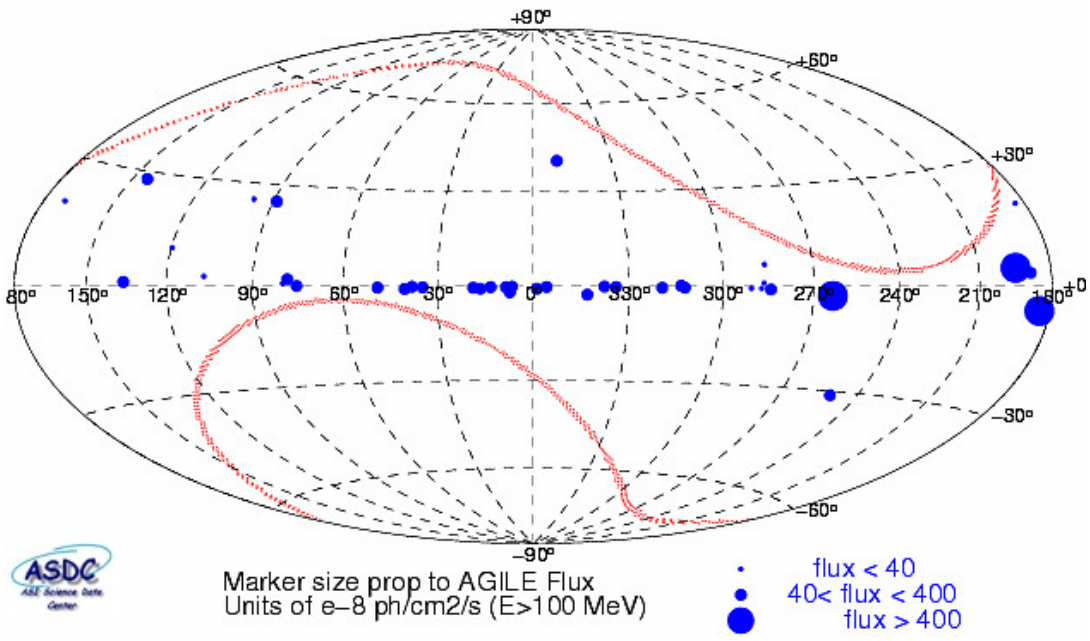

Figure 2: An example of the daily Field of View of the AGILE-GRID instrument in spinning mode. The two red circles of about 50° radius represent the forbidden sky regions around the Sun and anti-Sun positions on the given day (March 1, 2010 in this example), due to solar panel constraints. Blue dots represent visible gamma-ray sources of the 1st AGILE catalog (C. Pittori et al., A&A 506, 2009) on March 1, 2010.

1.5 AGILE Data Flow

AGILE data are downloaded for every pass (about 100 minutes) over the ASI Ground Station of Malindi, (Kenya), and are immediately transfered to the Operational and Control Center (AOCC) located in Fucino (Italy). After pre-screening, the raw telemetry is sent to the AGILE Data Center (ADC) generally within ten minutes and in any case before new data from the subsequent orbit become available in Malindi. The ADC is the scientific component of the AGILE ground segment and is part of the ASI Science Data Center (ASDC). The ADC includes scientific personnel from both the ASDC and the AGILE Team. The ADC is charged with the following tasks:

- quick-look data reduction analysis;
- standard data reduction analysis;
- new source validation;
- complete data archiving;
- management of the AGILE Guest Observer Program;
- data distribution to the scientific community;
- management of the official Web page of the AGILE Mission;
- publication of the official AGILE and Super-AGILE Source Catalogues;
- distribution of standard products (positions, fluxes, light curves) of Super-AGILE sources.

Results of the Quicklook analysis for both the gamma-ray and hard X-ray data (detected sources, light curves) will be made available via the official AGILE Web site at ADC.

AGILE GRID data (in the form of photon lists) and the corresponding calibration and ancillary files will be delivered to the users as standard FITS files. Software tools for the data analysis of GRID instrument will also be available via the ADC.

1.6 Announcement of Opportunity for the AGILE Guest Observer Program

AGILE is a Scientific Mission with a Guest Observer Program (GOP) open to the astronomical community. Proposals led by Principal Investigators from any country worldwide can apply in response to the Announcement of Opportunity concerning data from the AGILE-GRID detector only, as specified in Section 2. Guest Observers will apply for data expected to be collected with the satellite in spinning observing mode from **December 1, 2010, to November 30, 2011**.

Guest Observer Proposal submission will start on June 1, 2011 and will end on June 30, 2011 at 18:00 CET.

Selection of proposals will be made by the AGILE Data Allocation Committee (ADAC), and it will based on scientific merit and other considerations, as specified in Section 4. Successful proposals will be notified to the Principal Investigators by the ADC. Specific tools are provided by the ADC at the *http://agile.asdc.asi.it* Web site to help the GOs in calculating the expected 1-year exposure for any sky direction.

2 Observational Program and Data Rights

2.1 AGILE sky view in spinning mode

The typical daily sky coverage of the AGILE-GRID in spinning mode is ~70-80 % of the entire sky. Fig. 2 shows an example for a 2-day integration obtained from real data.

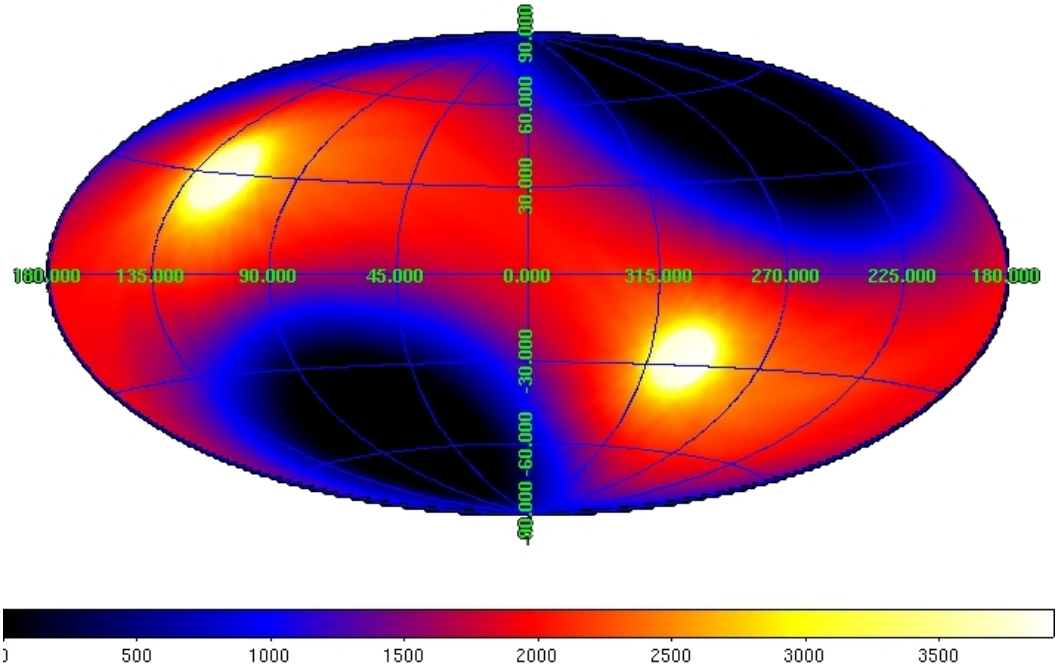

Figure 2: A typical AGILE-GRID 2-day sky exposure map (in Galactic coordinates) above 100 MeV in spinning mode (case of 3-4 March, 2010; units of cm^2 sec sr).

We also show in Fig. 3 and 4 the simulated gamma-ray exposure and flux for the whole sky obtainable after 1 year of integration. This simulated exposure well agrees with the real 1-year integration exposure map from Cycle-3 data. These figures take into account the variation of the GRID effective area as a function of the position in the field of view and the effects of Earth occultation. The sensitivity map (Figure 4) takes into account also the background due to the diffuse gamma-ray emission (both extragalactic and Galactic).

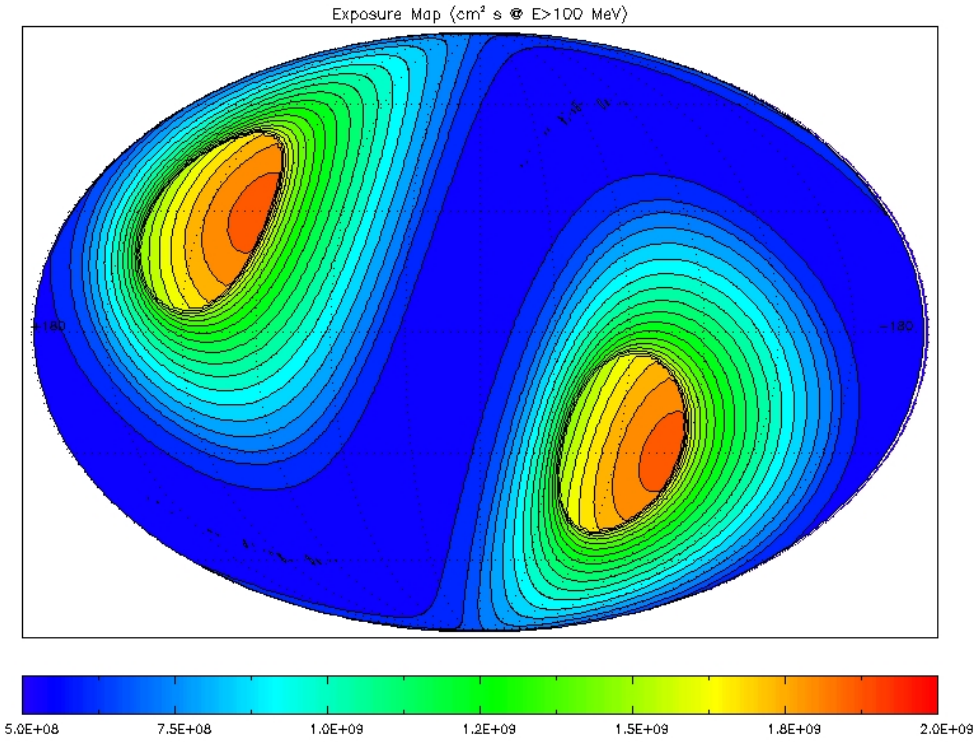

Figure 3: Simulated Cycle-4 AGILE-GRID exposure map above 100 MeV (units in cm^2 sec, dark blue regions correspond to a minimum exposure of $Exp_{min} \sim 5.6 \times 10^8$ cm^2 sec; red regions correspond to a maximum exposure of $Exp_{max} \sim 2 \times 10^9$ cm^2 sec).

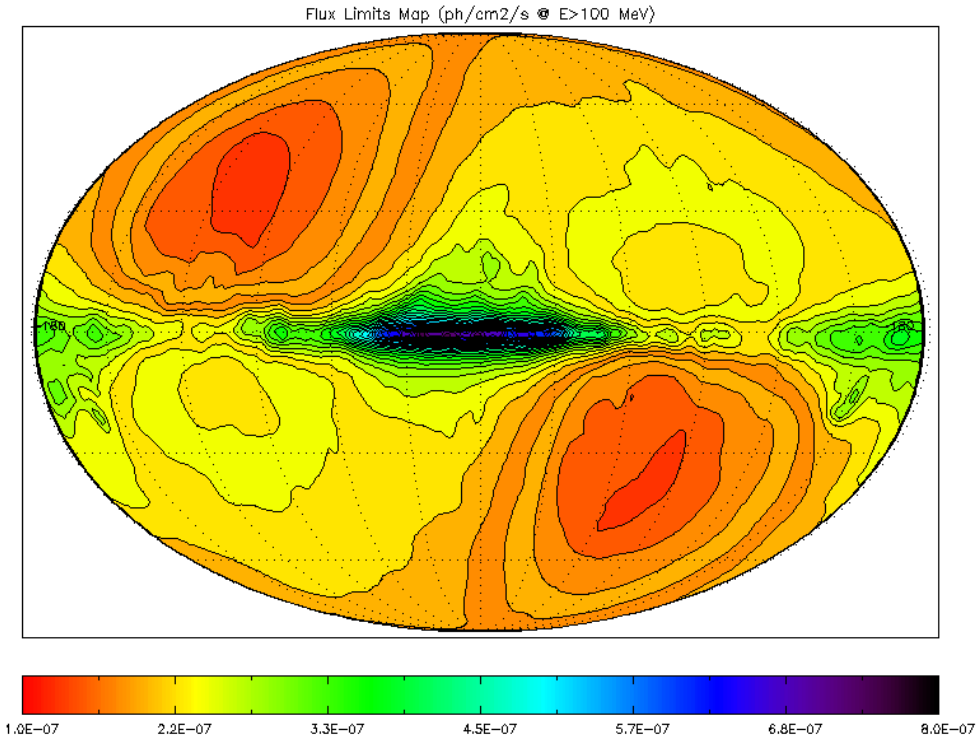

Figure 4: Simulated Cycle-4 AGILE-GRID flux sensitivity map above 100 MeV (black=max sens ~ 8.0×10^{-7} ph/cm^2/s; orange=min sens ~ 1.0×10^{-7} ph/cm^2/s).

2.2 AGILE Scientific Programs and Data Rights Policy

Two types of AGILE scientific programs are foreseen:

1. the AGILE Team Projects;
2. the AGILE Guest Observer Program.

All AGILE data (i.e. both from the AGILE Team Projects and from the Guest Observer Program) are subject to the proprietary rules normally applied to observatory space data: there will be a one year proprietary period after which they will be available via the public AGILE Data Archive at the ASDC. The one-year proprietary period starts from the date when the Guest Observer (or the AGILE Team) receives the data in a format that is suitable for analysis and publication.

2.2.1 The AGILE Team Projects

The AGILE Team Projects consist of the following five items, which are *excluded* from the Guest Observer Program:

1. Diffuse Galactic radiation.

2. Extragalactic background.

3. A selected list of known gamma-ray sources. (see ANNEX 1 of this document).

4. New sources not belonging to any well established class of gamma-ray sources (AGNs & Pulsars).

5. Gamma-ray bursts.

These items, often requiring systematic analysis of large volumes of data and/or the unique instrumental expertise available within the groups directly participating to the program, are awarded to the AGILE Team in recognition of its contribution to the mission.

2.2.2 The AGILE Guest Observer Program

GRID data for sources not reserved to the AGILE Team can be requested within the AGILE Guest Observer Program. Guest Observers can request data for:

- **specific 1AGL, 1FGL and 3EG catalogue sources;**
- **pulsars;**
- **Active Galactic Nuclei;**

where: 1AGL is "The First AGILE Catalog of High Confidence Gamma-ray Sources", C. Pittori et al. 2009, A&A 506, 1563-1574 (2009), 1FGL is the "Fermi Large Area Telescope First Source Catalog", A. A. Abdo et al. 2010, arXiv:1002.2280v1, and 3EG is "The Third EGRET Catalog of High-Energy Gamma-Ray Sources", R. C. Hartman et. al., ApJS 123, Issue 1, 79-202 (1999).

The requested sources must be individually specified by means of their sky coordinates and name and there is a limit of ten (10) targets for each proposal. If several objects, belonging to different accepted proposals, turn out to be within the error circle of a single new source, the GRID data of this source will be assigned to all GOs of the accepted proposals**.**

Proposals for large classes of sources, defined only by their global properties, will not be accepted. Such investigations, typically involving the analysis of a large quantity of data, will be feasible when the GRID data become public after one year.

2.3 Validated new gamma-ray sources in the AGILE GRID data.

A particular policy, described here, applies to newly discovered gamma-ray sources to guarantee that all AGILE results be treated in a uniform way concerning their statistical significance.

All sources which are not included in the latest version of the EGRET, AGILE or *Fermi* catalogues are considered *new gamma-ray sources.*

An updated list of AGILE validated new gamma-ray sources will be maintained on the official AGILE Mission Web pages at ASDC.

2.4 Data distribution policy

Gamma-ray data of the AGILE-GRID will be distributed to successful Guest Observers in response to this Announcement of Opportunity.

Super-AGILE data are not part of this AO.

The GRID data shall be distributed by the ADC at ASDC in form of high level data products, which form the basis for all of the subsequent scientific analysis. In particular, the GRID data will include event lists as well as all the necessary ancillary files and calibration products.

Successful Guest Observers will receive the data centered on the position of the accepted gamma-ray source. The size of the region will be sufficiently large to properly analyze the source of interest and to determine the background. The typical size of the region is fixed but in some cases may vary depending on the instrumental point spread function, off-axis angle, field crowding, local diffuse emission, etc. In this respect, it must be noted that the **GO does not have the right to publish any result concerning gamma-ray sources that may happen to be in the area of sky received but are different from those assigned to the GO by the AGILE Data Allocation Committee.**

In addition to data covering the source position, Guest Observers may receive a statement from ADC concerning the statistical significance of their sources.

3 Proposal Preparation

3.1 Check Feasibility

The typical steps to be followed before responding to this Announcement of Opportunity are the following:

1. The observer should check if the source is included in the list of Team Proprietary Gamma-ray Sources (see ANNEX 1). Objects contained in that list cannot be part of the observing program, as well as sources not belonging to already known classes of gamma ray sources (AGNs, Pulsars, 1AGL, 1FGL and 3EG sources).
2. The observer should check whether the sky region containing the source(s) of interest is covered by AGILE in spinning with an exposure factor (in units of $cm^2\ s$) and expected sensitivity that are sufficient to achieve his/her scientific goals.

3.2 How to fill the Proposal Form

The proposal form must be filled through the AGILE Web site at ASDC:

http://agile.asdc.asi.it/

The proposal Principal Investigator (PI) has to register him/herself through a Web form. The PI provides personal information (Name, Affiliation, Address, Phone number, e-mail). After this registration a user ID and a password are assigned to each PI. The same PI may prepare and submit different proposals using the same user ID and password. After the registration procedure the PI will have access to the Proposal Form Preparation Tool and can start to prepare a new proposal.

Each proposal form must contain:

1. General Information regarding the PI (directly obtained through the registration form).
2. Title of the proposal.
3. Abstract of the proposal.
4. Scientific Category (Pulsars, AGNs, 1AGL, 1FGL and 3EG).
5. Co-Investigators list containing First Name, Last Name, Affiliation and Country of each Co-investigator.

6. Target List (max 10 objects) containing for each target: Source Name, RA, DEC, expected flux and a flag indicating the possibility of simultaneous observations with other instruments.
7. Scientific Justification to be sent in a separate file (pdf format only).

The on-line Proposal Form Preparation Tool allows users to visualize, save and make modifications to each proposal at any time before the final submission. The *"Submit Proposal"* button on the Web form submits the proposal to the proposal queue, ready for the evaluation process. **Once the proposal has been submitted it may no longer be modified.**

Please note that there are no GRID parameters defining the observation mode that the guest observer can choose.

3.3 Scientific Justification

The Scientific Justification must be prepared in a separated file (pdf format) and cannot be longer than 3 pages (with font size not smaller than 11 pts) including figures, tables, references, and any other information that the PI considers useful for the proposal evaluation. The file has to be submitted electronically through the Proposal Form Web page at ASDC.

The Scientific Justification must include:

1. Proposal title
2. PI name
3. Abstract
4. Scientific Motivation and Objectives
5. Target List reporting for each target:

– Feasibility

– Availability of simultaneous observations (if any).

An example file of the Scientific Justification Form is available on-line at the ADC Web site.

Since the maximum 1-year exposure time with AGILE in spinning observational

mode is predefined, there is no need to justify the amount of observing time required for a given target. In the Scientific Motivation and Objective the proponent must describe the expected results to be obtained for a given exposure time, and how this information can be used to study sources, constrain models, etc.. In particular, it is very important that the Scientific Justification form gives details about the use of the AGILE data in connection with a possible multiwavelength observation campaign and/or results of modelling/simulations, etc. Such information will be taken into account by the AGILE Data Allocation Committee.

3.4 Coordinated and time constrained observations

It is not possible to ask for time constrained AGILE observations in response to this Announcement of Opportunity. However, AGILE in spinning is now surveying a large fraction of the sky every day with solar panel constraints known in advance, and this favours the organization of multi-wavelength campaigns (which are strongly encouraged). It is worth noticing that ToO observations are unfeasible with the new satellite configuration and will not be performed during Cycle-4.

3.5 Triggered observations

It is possible to submit proposals asking for GRID data only subject to the occurrence of some particular state of the requested source. For example a GO might request the data only if the source of interest makes a substantial and sudden outbursts in the radio band. These proposals do not involve repointing of the satellite and/or any other change of the pre-planned operations. The proposal must clearly indicate the condition(s) under which the GRID data are requested. If the proposal is approved, it will be responsibility of the GO to inform the ADC at ASDC that the triggering condition has occurred. Please note that also in this case the GO can ask for a maximum of 10 sources.

3.6 How to submit a proposal

Proposals, prepared via Web as described in the previous paragraph, can be submitted electronically via the ASDC Web page **starting from June 1, 2011.**

The deadline for proposal submission is:

June 30, 2011 at 18:00 CET

Submitted proposals are collected and archived at the ADC in ASDC and then sent to the AGILE Data Allocation Committee for evaluation.

4 Proposal evaluation

The Agile Data Allocation Committee (ADAC) is called to evaluate GOs' proposals and to assign data rights for the selected sources. The ADAC is composed of the ASI Project Scientist, the Mission P.I. and three scientists appointed by ASI. They will receive the submitted proposal as soon as the AO4 is closed. The proposal evaluation process will provide a higher score to those proposals which better exploit AGILE's capabilities providing a larger scientific throughput (e.g. proposals involving: multi-wavelength observational campaigns, synergy between AGILE GRID and SuperAGILE, etc.). AGILE data of the requested source(s) will be assigned to the Guest Observer. The same source could be in principle assigned by ADAC to more than one PI if they have different scientific goals.
The ADAC will then provide the list with the assigned sources within GOP to the ADC at ASDC and ADC will notify the PIs of the successful proposal.

5 Helpdesk and AGILE Users Committee Web page

A Helpdesk service is provided to AGILE Users for the entire mission duration. It is located at ASDC and answers all questions regarding the mission, instruments, data, data analysis software, data archive, etc. The AGILE Helpdesk can be contacted by registered users, after registration at the ADC site *http://agile.asdc.asi.it/*, by sending a message through the dedicated form.
From the ADC Web site, it is also possible to reach the AGILE Users Committee (AUC) Web page and post a comment to the AUC through a dedicated form. The AUC represents the whole User Community and advises the AGILE Mission Board about the optimization of the scientific output of the Mission and on the needs and wishes of the Users Community.

ANNEX 1: AGILE Team AO4 reserved sources

The list of known sources that are reserved to the AGILE Team for AO4 is given below.

NAME	GLON	GLAT	RA (J2000)	DEC (J2000)
PULSARS				
PSR J0835-4510	263.55	-2.79	128.83	-45.18
PSR J1709-4429	343.1	-2.69	257.43	-44.49
PSR J1513-5908	320.32	-1.16	228.48	-59.13
PSR J0534+2200	184.56	-5.78	83.64	22.01
PSR J0633+1746	195.13	4.27	98.48	17.78
PSR J0737-3039	245.24	-4.5	114.47	-30.66
PSR J1833-1034	21.5	-0.89	278.39	-10.57
PSR J1744-1134	14.79	9.18	266.12	-11.59
PSR J1524-5625	323	0.35	231.21	-56.42
PSR J1531-5610	323.9	0.03	232.87	-56.18
PSR J1740+1000	34.01	20.27	265.11	10.00
PSR J1105-6107	290.49	-0.85	166.36	-61.13
PSR J1016-5857	284.08	-1.88	154.09	-58.95
PSR J2229+6114	106.65	2.95	337.28	61.24
PSR J1718-3825	348.95	-0.43	259.55	-38.42
PSR J1420-6048	313.54	0.23	215.03	-60.80
PSR J1809-1917	11.09	0.08	272.43	-19.30
PSR J1357-6429	309.92	-2.51	209.25	-64.49
PSR J1617-5055	332.5	-0.27	244.37	-50.92

NAME	GLON	GLAT	RA (J2000)	DEC (J2000)
SPECIAL REGIONS				
Galactic Center Region	-10 to 10	-10 to 10	-	-
Cygnus Region	+68 to +88	-10 to 10	-	-
Large Magellanic Cloud	280.46	-32.88	80.92	-69.75

NAME	GLON	GLAT	RA (J2000)	DEC (J2000)
3EG SOURCES				
3EG J0241+6103	135.87	0.99	40.42	61.06
3EG J0617+2238	189	3.05	94.30	22.63
3EG J1027-5817	284.94	-0.52	156.89	-58.27
3EG J1410-6147	312.18	-0.35	212.73	-61.79
3EG J1420-6038	313.63	0.37	215.11	-60.64
3EG J1639-4702	337.75	-0.15	249.77	-47.04
3EG J1714-3857	348.04	-0.09	258.52	-38.96
3EG J1824-1514	16.37	-1.16	276.20	-15.24
3EG J1826-1302	18.47	-0.44	276.55	-13.05
3EG J1835+5918	88.70	25.10	278.80	59.29
3EG J1856+0114	34.6	-0.54	284.10	1.24

NAME	GLON	GLAT	RA (J2000)	DEC (J2000)
ACTIVE GALACTIC NUCLEI				
1ES 1426+428	77.49	64.90	217.13	42.67
1ES 1959+650	98.00	17.67	300.00	65.15
3C 273	289.95	64.36	187.28	2.05
3C 279	305.10	57.06	194.04	-5.79
3C 454.3	86.11	-38.18	343.49	16.15
BLLac	92.59	-10.44	330.68	42.28
HB89 0716+714	143.98	28.02	110.48	71.34
HB89 1730-130	12.03	10.81	263.26	-13.08
PKS 0528+134	191.37	-11.01	82.74	13.53
PKS 1622-29	348.82	13.32	246.52	-29.85
PKS 1830-211	12.17	-5.71	278.42	-21.06
TXS 1510-089	351.29	40.14	228.21	-9.10
1ES 1921-293	9.34	-19.61	291.21	-29.25
HB89 0836+710	143.54	34.43	130.36	70.89
PKS 2209+236	82.24	-26.09	333.02	23.92
HB89 2230+114	77.44	-38.58	338.15	11.73
HB89 0736+017	216.99	11.38	114.83	1.62
HB89 1739+522	79.56	31.75	265.15	52.19
PKS 1622-253	352.14	16.32	246.44	-25.46
HB89 1127-145	275.28	43.64	172.53	-14.82
HB89 1406-076	333.88	50.28	212.24	-7.88
MRK 421	179.83	65.03	166.11	38.21