

ASDC







The ASI Science Data Center (ASDC), a facility of the Italian Space Agency (ASI), is a multimission science operations, data processing and data archiving facility that provides support to several scientific space missions in the field of astrophysics, cosmology, exploration of the Solar system and astroparticle physics.

At the moment the ASDC has significant responsibilities for a number of high-energy astronomy/astroparticle satellites (e.g. Swift, AGILE, Fermi, NuSTAR and AMS) and supports at different level other missions like, Herschel, Planck and Gaia.

The ASDC was established in 2000 based on the experience built in the 1990's with the management of the BeppoSAX Science Data Center.

The Italian-Dutch X-ray astronomy satellite BeppoSAX was launched on April 30 1996 and operated for 6 years. Main characteristics of BeppoSAX were the wide spectral coverage ranging over more than three decades of energy (0.1- 200 keV,the capability of monitoring large regions of the sky with agood resolution in the range 2-30 keV to detect transient phenomena,the gamma-ray burst monitor.

It is located at the ESA site of ESRIN in Frascati, near Rome (Italy).

Multi-Mission Interactive Archive (MMIA)

Central to the ASDC services is the Multi-Mission Interactive Archive (MMIA). The MMIA is a Web-based service that provides easy access to the data of several space missions (e.g. AGILE, Swift, Fermi, BeppoSAX) and to interactive tools that can generate "science ready" high level products. The data stored in the ASDC archives can be retrieved and analysed in a simple way through a Web-based interface. Additional multi-wavelength information can be obtained and extensively used via dedicated tools such as 'ASDC SED Builder' and the 'Error Circle Explorer'.





MISSIONS

AGILE



AGILE is the first of a new generation of high-energy space missions based on solid-state silicon technology, combining for the first time two sophisticated co-axial instruments: a gamma-ray detector, sensitive to photons with energy in the

range 30 MeV - 50 GeV, and a hard X-ray detector, sensitive in the range 18-60 keV. The instrument is completed by a calorimeter (energy range 250 keV - 100 MeV) and by an anti-coincidence system. Its optimum angular resolution,



0.1-0.2 degrees in gamma-rays and 1-2 arcminutes in X-rays, the very large field of view as well as its very high time resolution (up to 2µs) and small dead time (100 µs), makes AGILE a very good instrument to study persistent and transient gamma-ray sources.

AGILE observations are substantially contributing to improve our knowledge on various known gamma-rays sources, such as supernova remnants, black hole binaries, pulsars, pulsar wind nebulae, blazars and Gamma Ray Bursts. Moreover, AGILE has contributed to the discovery and study of new galactic gamma-ray source classes, of peculiar star systems and of mysterious galactic gamma-ray transients. The Mission is also giving a crucial contribution to the study of the terrestrial gamma-ray flashes originating in the Earth atmosphere during very strong thunderstorms.



Credits: Agile Collaboration





SWIFT



Swift is a fast-reaction high-energy astronomy satellite dedicated to the study of Gamma-Ray Bursts (GRB) and of other transient and steady cosmic sources. Swift, developed by NASA and other institutions in the USA in collaboration with Italy and the United Kingdom, was launched

on 20 November 20 2004, carries onboard three scientific instruments: the Burst Alert Telescope (BAT), the X-Ray Telescope (XRT) and the Ultraviolet/Optical Telescope (UVOT). The italian participation includes the provision of the Malindi ground station (ASI),

the X-ray mirror (INAF-OAB) and the ASI Science Data Center (ASDC) which has the responsibility of the development of the XRT Data Reduction Software (XRTDAS) and hosts an official mirror of the Swift scientific data archive. The Swift mission has radically improved out knowledge on GRBs and is contributing in an impressive way to our understanding of galactic and extragalactic X-Ray sources.



Credit: NASA/Swift/Stefan Immler (GSFC) and Erin Grand (UMCP)





FERMI



The NASA Fermi Gamma-ray Space Telescope is a powerful space observatory operating in the **- ray band.** Gamma-rays are the highest-energy form of light, and the gamma-ray sky is spectacularly different from the one we perceive with our own eyes. With a huge leap in all key capabilities, Fermi data enable scientists to answer persistent questions across a broad range of topics, including

supermassive black-hole systems, pulsars, the origin of cosmic rays, and searches for signals of new physics. The mission is an astrophysics and particle physics partnership, developed by NASA in collaboration with the U.S. Department of Energy, along with fundamental contributions from academic institutions and space agencies in France, Germany, Italy, Japan, Sweden, and the United States. Italy played a crucial role in construciont of the Large Area Telescope (LAT). The ASDC is involved in the Fermi mission providing several on-line data analysis tools and one mirror of the data archive. The ASDC actively contributes scientific software development and to scientific data exploitation. It represents a reference point on the Fermi data reduction and analysis for the Italian scientific community.



Credit: NASA/DOE/Fermi LAT Collaboration, Capella Observatory





HERSCHEL



Herschel is an ESA mission operated as a Space Observatory: it hosts the largest telescope ever launched into space with a 3.5-metres monolithic primary mirror. The mission has been designed to observe the Universe in a wide spectral domain, that goes from the far infra-red to the submillimeter, with an unprecedented resolution and sensitivity. The ASDC provides a wide-range support

to the Italian astronomical community interested in the Herschel mission, making easier the use of the Herschel facilities and providing assistance for the processing and the analysis of scientific data.



Credit: HI-Gal Key programme





PLANCK



Planck is a Medium-Sized ESA mission devoted to image the anisotropies of the Cosmic Microwave Background Radiation. With its unprecedented sensitivity, angular resolution, and frequency coverage, Planck is a major source of information for both cosmology and astrophysics. Launched on 14 May 2009 togheter with the Herschel satellite, Planck started its scientific program on 11 August 2009 and is expected to operate until the end of 2011 performing 4 all-sky surveys of the microwave sky. Italy is

leading the development and opearation of the LFI instrument onboard Planck and its data Processing Center is based in Italy as well; Italy also provided the cryogenic preamplifiers for the HFI instrument. The ASDC participates to Planck by collaborating with the LFI Data Processing Center in the data reduction and contributes to the Planck scientific program by coordinating a project for the simultaneous observations of blazars involving the SWIFT and Fermi satellites.



Credits: ESA, HFI and LFI consortia. July 2010.













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