



# Observing the Universe at ASI: current programs

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***Agenzia Spaziale Italiana***

**Firtst Lares Scientific Workshop**

**Roma luglio 2009**



The activity of the ASI department of Observation of the Universe is articulated in 3 major branches :

Astrophysics of high Energy Phenomena  
Cosmology and Fundamental Physics  
Exploration of the Solar System

Currently ASI has programs either within the mainframe of th ESA, either in bilateral cooperation ( NASA) or at national level.

# Astrophysics of High Energy Phenomena

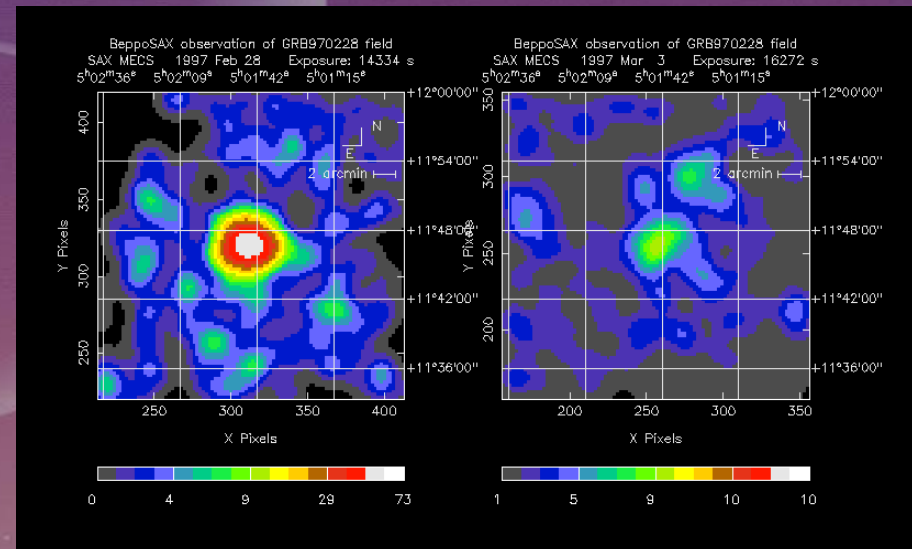
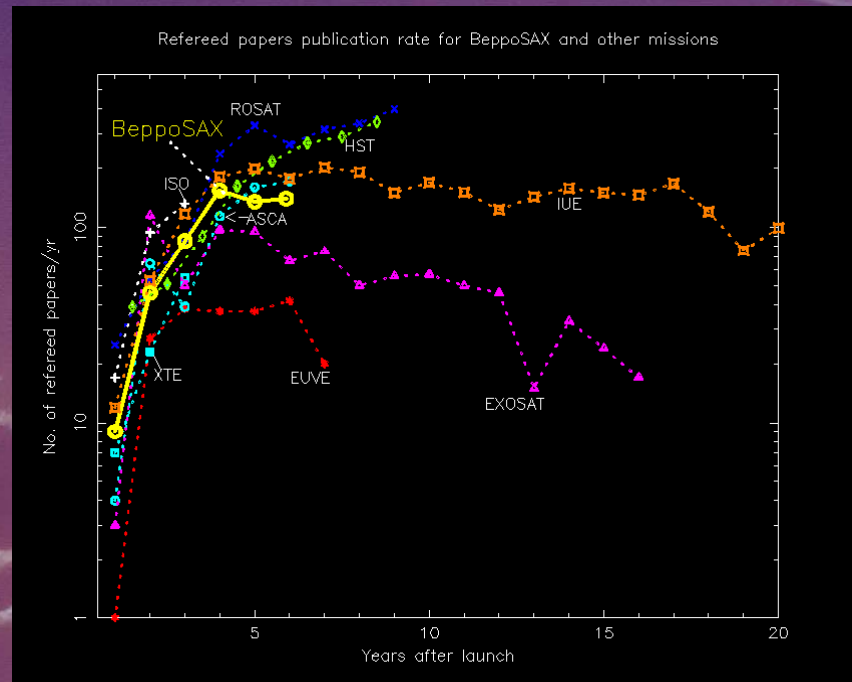




# The Past: BeppoSAX

April, 30 2003

April, 30 1996 – April, 30 2002  
6 years of X-ray astronomy



# The AGILE gamma-ray sky

(above 100 MeV, July 2008)

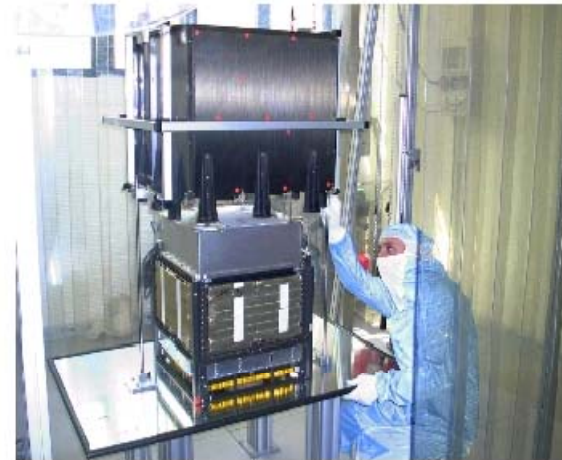
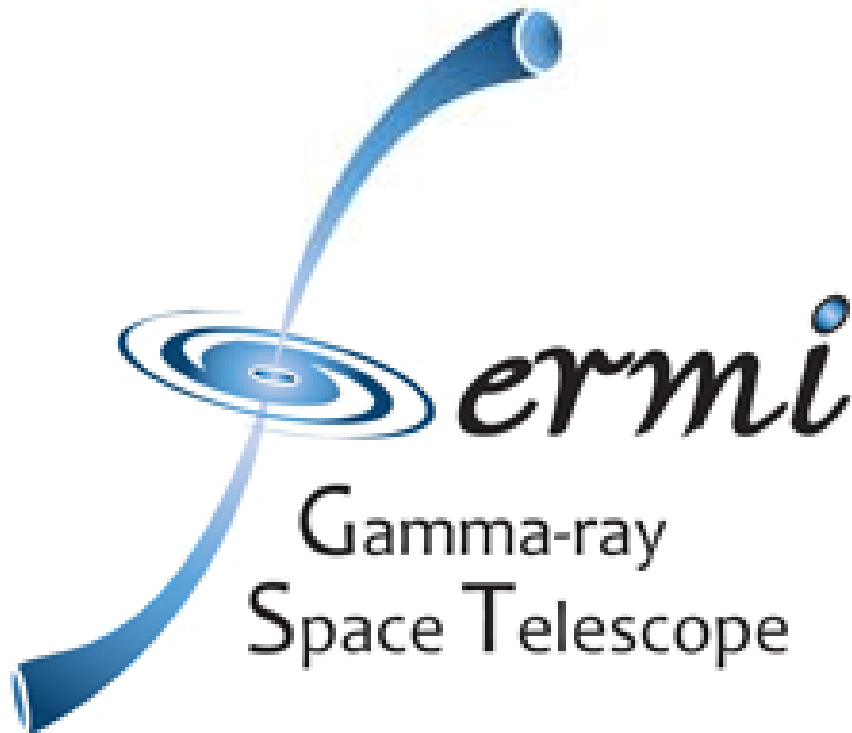


Figura 3 – Integrazione del Modello di Volo dell'Anticoincidenza con il SEM Core di AGILE

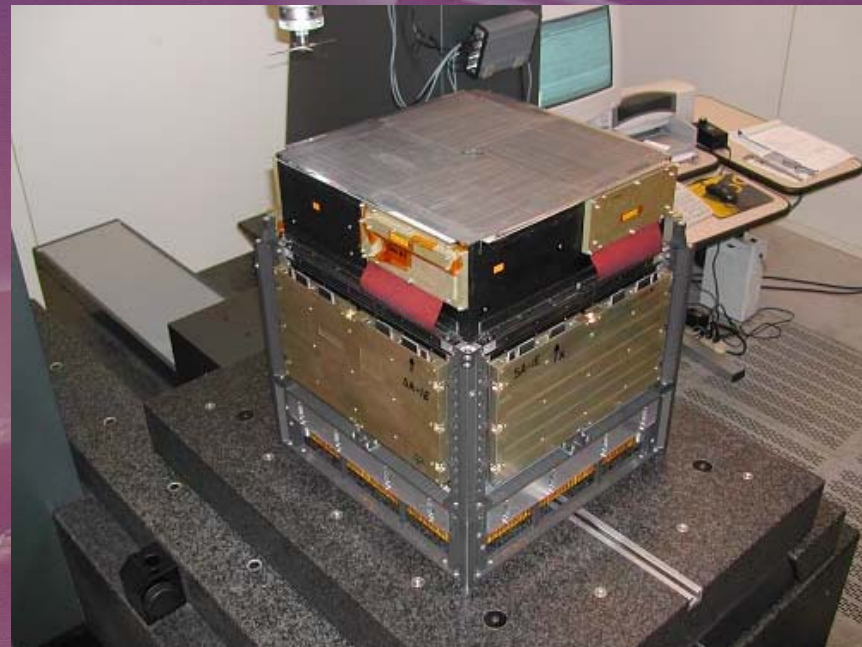
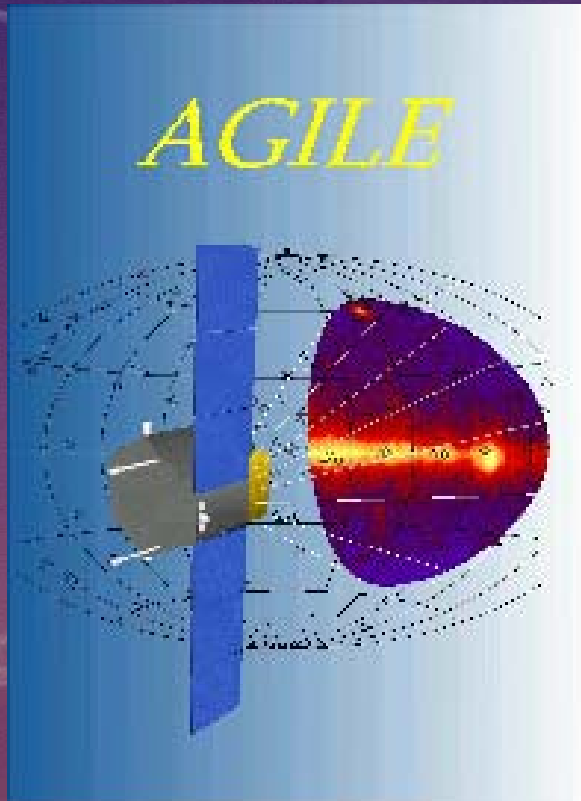


## *Present: AGILE*

launched: 23 April 2007

Italian small mission for gamma ray astronomy

ASI funds and manages the program, in collaboration with the PI and the involved scientific community





# Present: Fermi

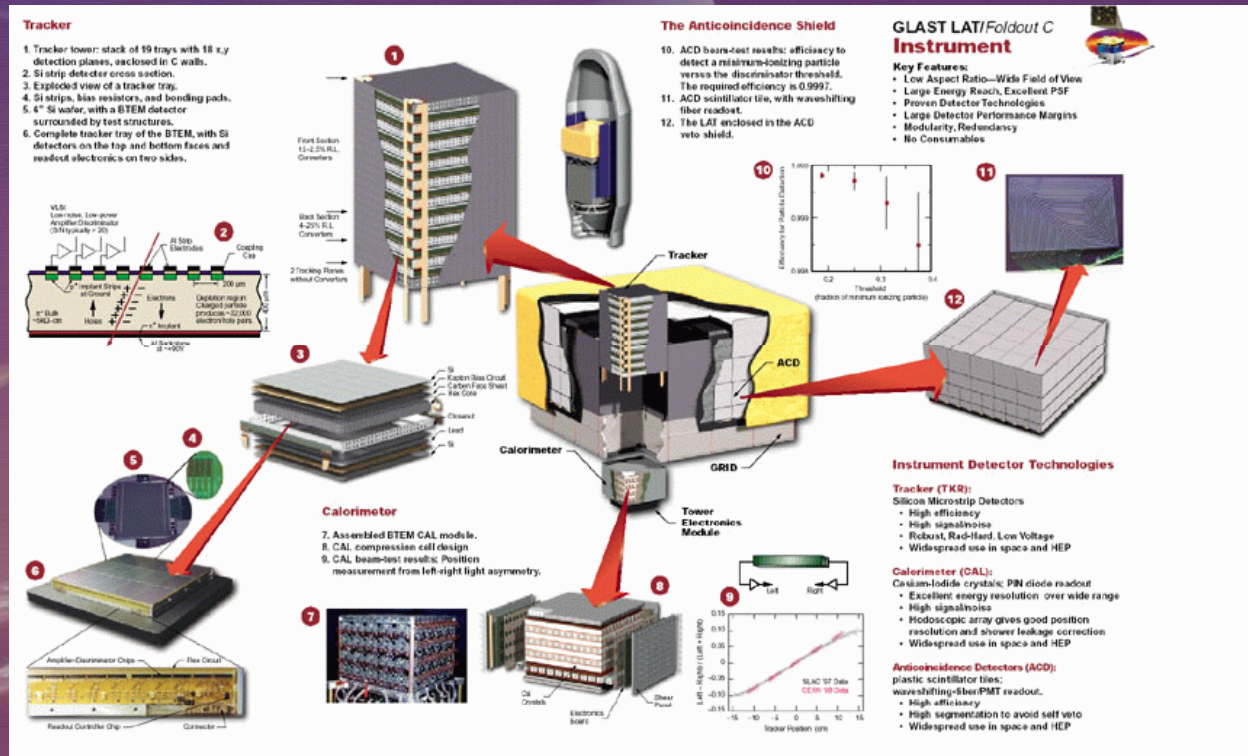
# GLAST

## The Gamma-ray Large Area Space Telescope

### Italian

### participation

- LAT instrument
- Archive
- Science team

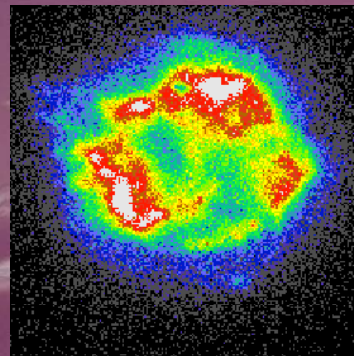
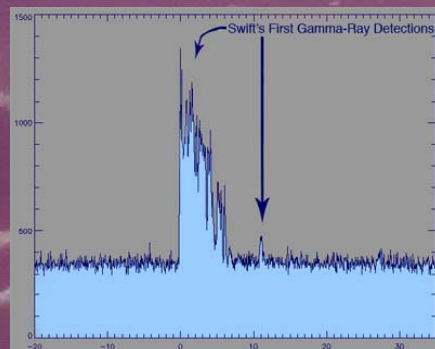


## *Present : Swift*

Swift is a NASA-MIDEX mission with participation of Italy and UK

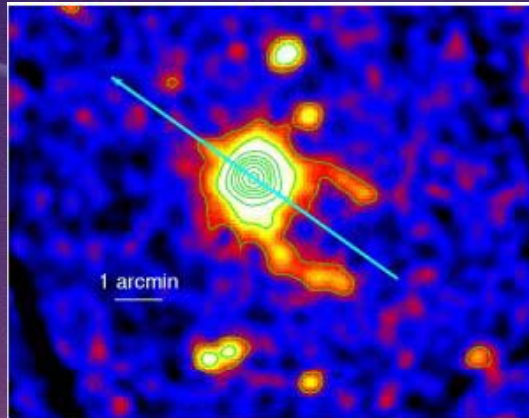
Italian contribution:

- Malindi Ground Station (ASI)
- X-ray mirror (Brera Observatory)
- XRT data reduction software and archive (ASI Science Data Center)





## Recent past events Major Science Results from Newton-XMM and Integral



*Science* 5 September 2003; **301**: 1345-1347

### **Geminga's Tails: A Pulsar Bow Shock Probing the Interstellar Medium**

P. A. Caraveo, G. F. Bignami, A. De Luca, S. Mereghetti, A. Pellizzoni, R. Mignani, A. Tur, and W. Becker

*Nature* **423**, 725 - 727 (12 Jun 2003) Letters to Nature

### **The magnetic field of an isolated neutron star from X-ray cyclotron absorption lines**

G. F. Bignami, P. A. Caraveo, A. De Luca, S. Mereghetti

**Astronomy and Astrophysics**  
Vol. 411 No. 1 (November III 2003)

**Special Letters issue on: First science with INTEGRAL**

*Nature* **428**, 293–296 (2004)

### **Compact sources as the origin of the soft $\gamma$ -ray emission of the Milky Way**

F. LEBRUN, R. TERRIER, A. BAZZANO, G. BÉLANGER, A. BIRD, L. BOUCHET, A. DEAN, M. DEL SANTO, A. GOLDWURM, N. LUND, H. MORAND, A. PARMAR, J. PAUL, J.-P. ROQUES, V. SCHÖNFELDER, A. W. STRONG, P. UBERTINI, R. WALTER & C. WINKLER





**Redshift  $z = 18.3$  ( $t = 0.21$  Gyr)**

125 Mpc/h



**Cosmology and Fundamental Physics**

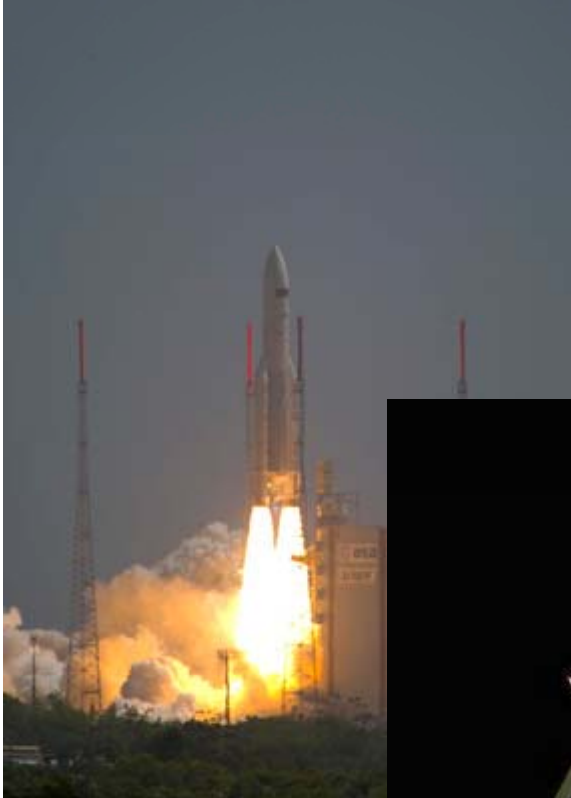
Credits A. Cimatti Univ. Bologna



*Present: : Planck & Herschel*

ESA mission for cosmology,  
presently under development,  
launched 14 May 2009.

ASI funds and manages the  
development of the Italian PI-  
ship instrument LFI and the  
Italian contribution to HFI on  
Planck and Italian contribution to  
the instrument hardware and to  
the Instrument Control Centers  
on Herschel

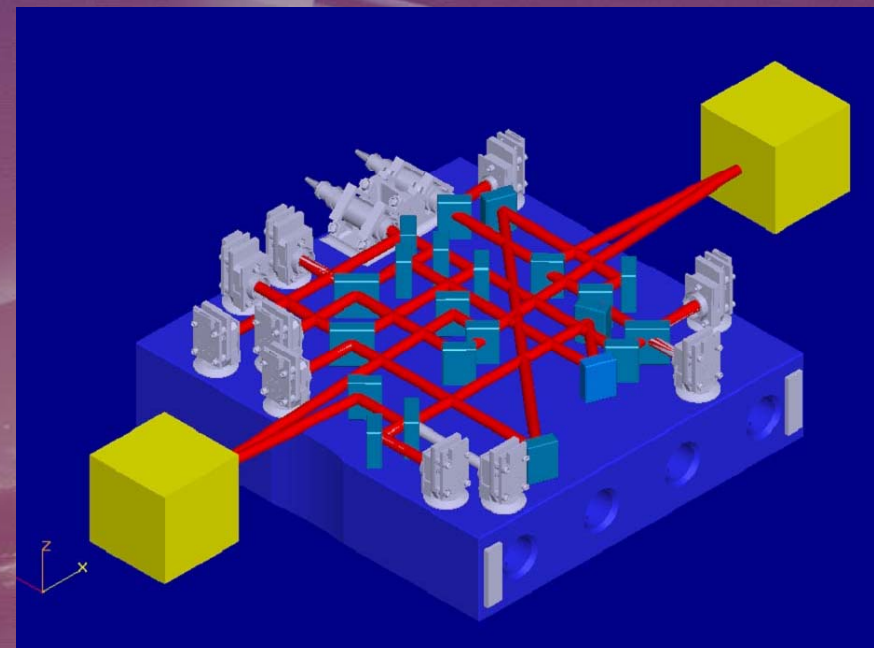




*Present: missions in preparation*  
*Partecipazione to ESA Programme: LISA-PF*

Second mission of the ESA program "Small Missions for Advanced Research in Technology" to test technology for future mission LISA (launch 2009)

Italy is responsible for the architecture of the mission and for the development of the inertial sensor



# The past : Lageos 2



Lageos 2 will be employed for geodetic studies following launch in 1992. (Aeritalia)





# The past : Lageos 2

The present : Lares





# Matter and Antimatter

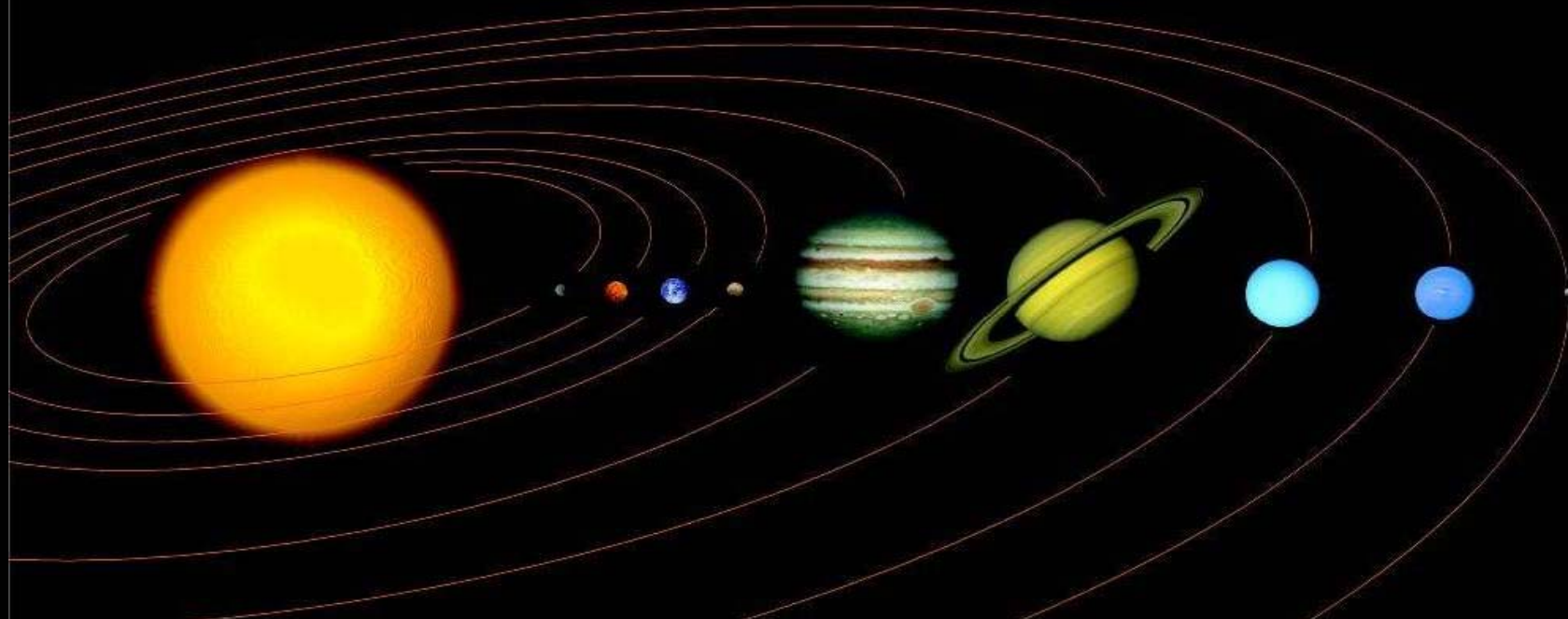


The Present: Pamela



The Future: AMS

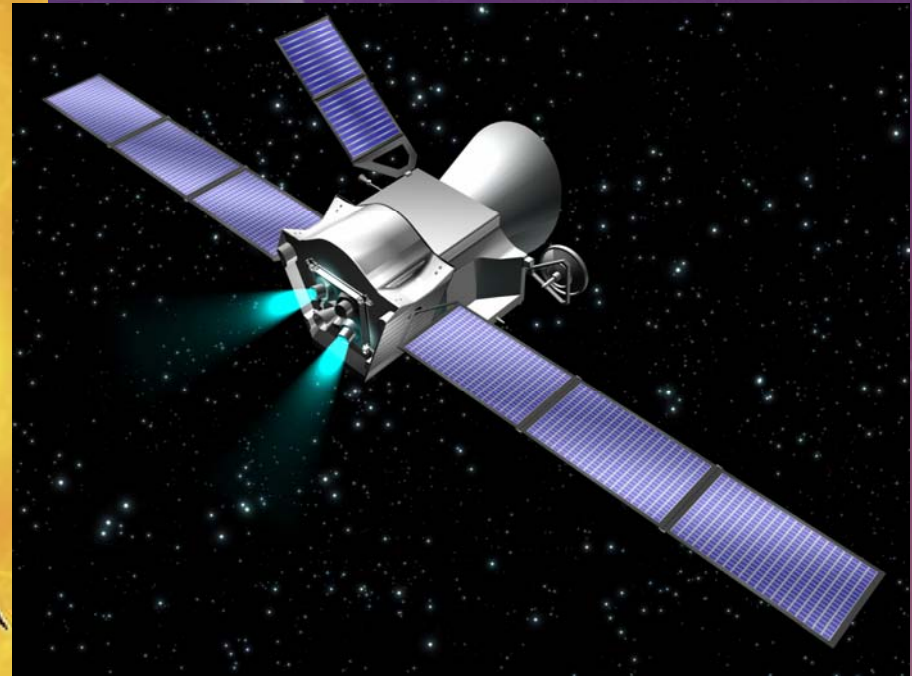
# The Solar System





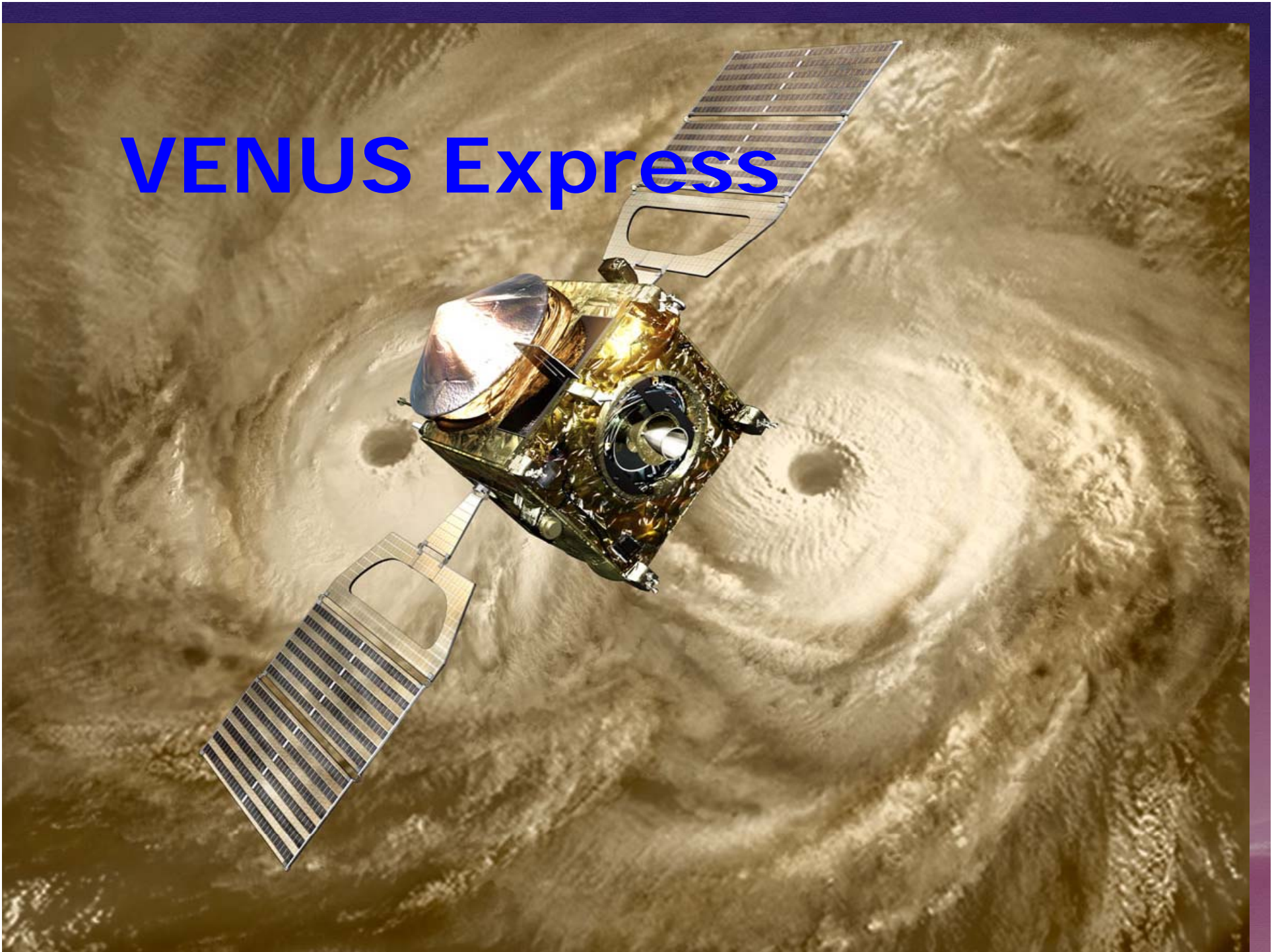
# Mercury

Bepicolombo- 2013





# VENUS Express

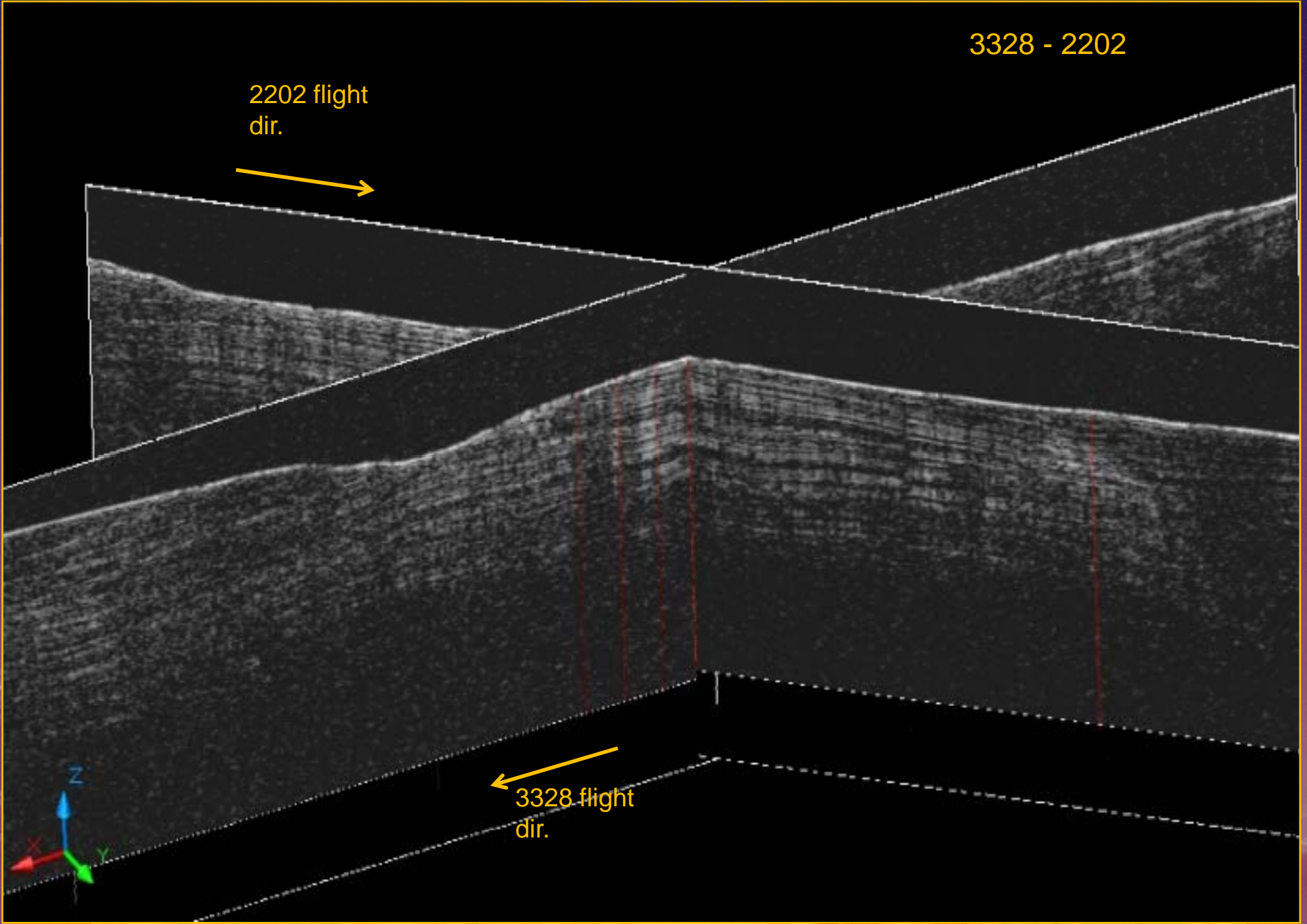
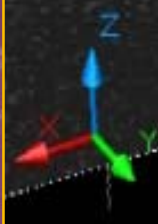


3328 - 2202

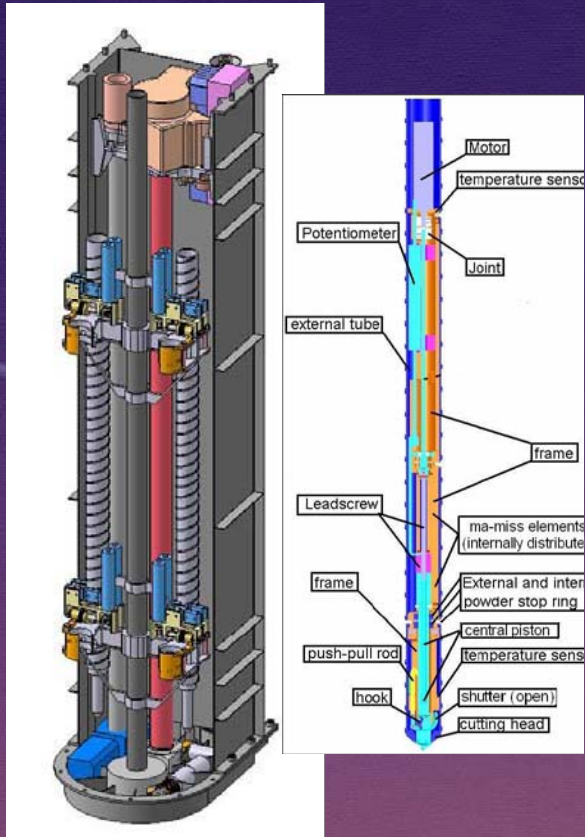
2202 flight dir.



3328 flight dir.

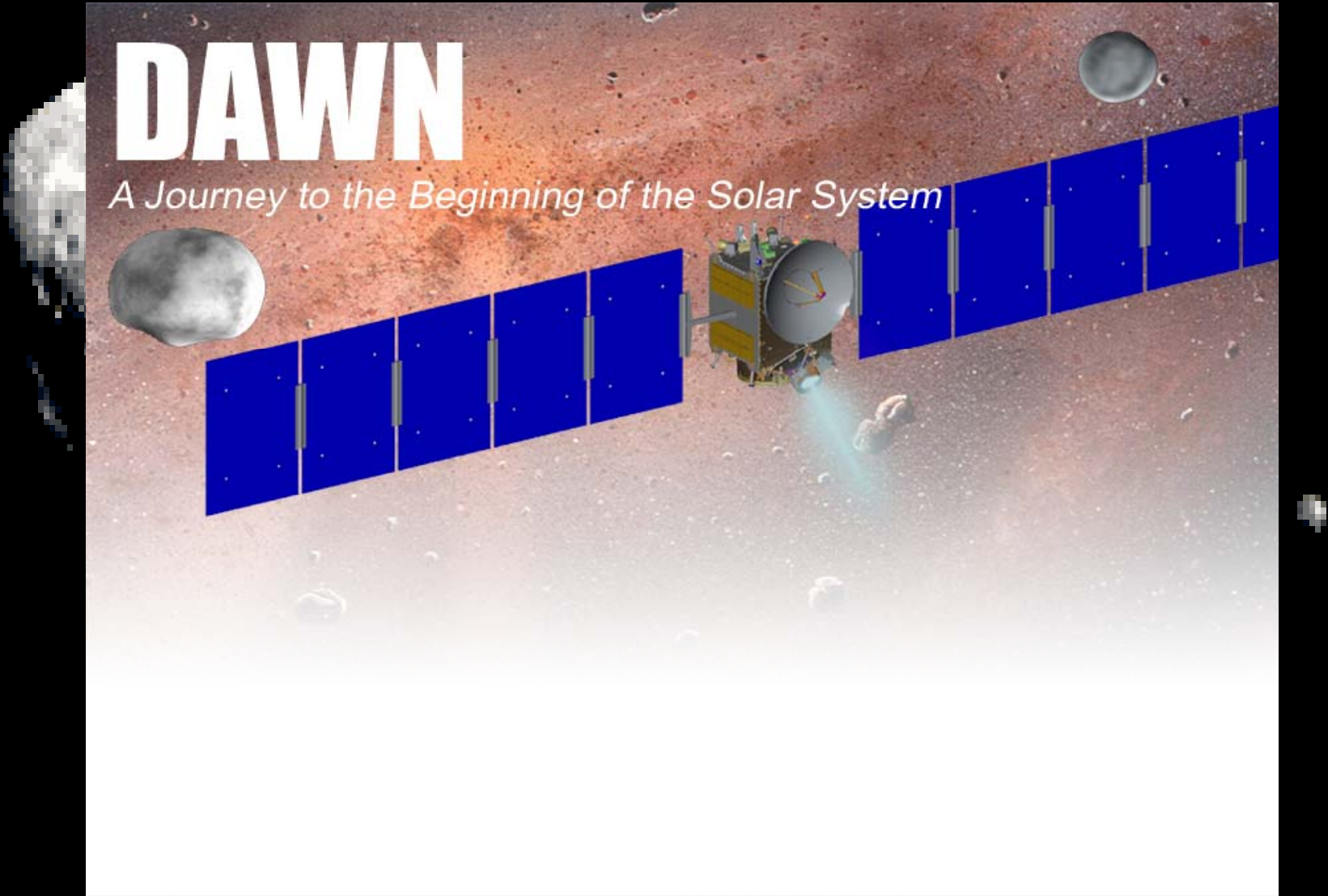






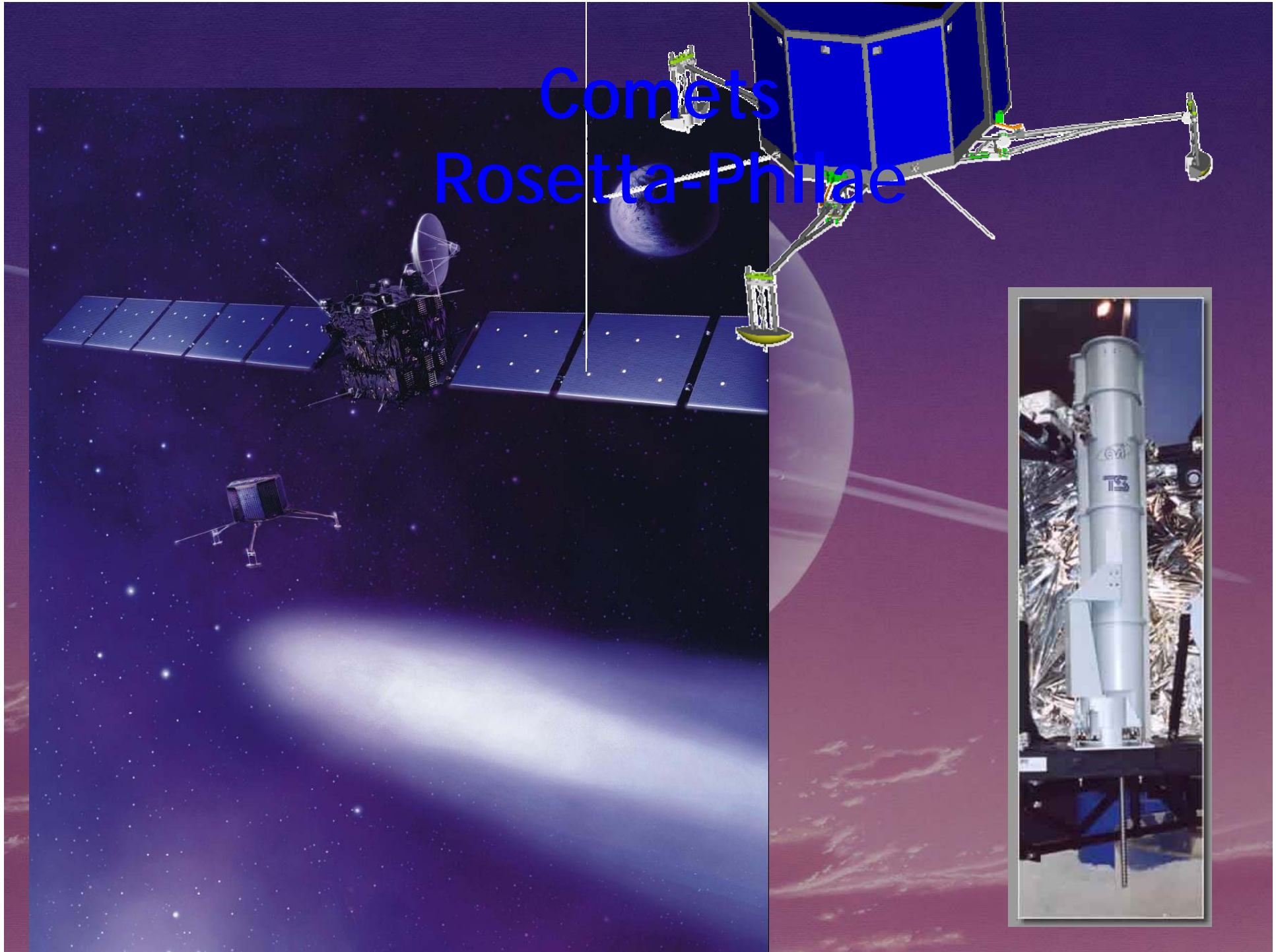
# DAWN

*A Journey to the Beginning of the Solar System*





# Comets Rosetta-Philae





# Cassini-Huygens

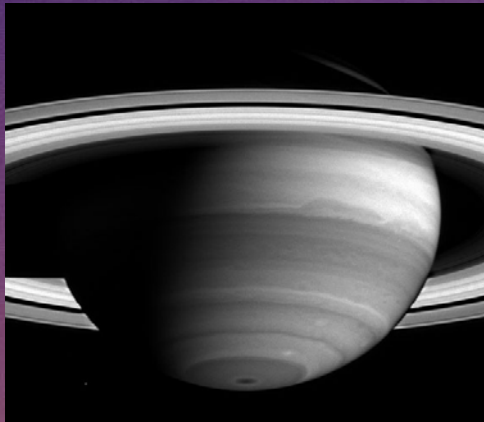




## *Cassini-Huygens at Saturn*

NASA-ESA-ASI partnership for the mission.

Italian participation ruled by the NASA-ASI MoU.



May 2004



14 January 2005



9 February 2005



*Nature* **425**, 374 - 376 (25 Sep 2003) Letters to Nature  
**A test of general relativity using radio links with the Cassini spacecraft**  
B. Bertotti, L. Iess, P. Tortora

# Enceladus



Jan 16

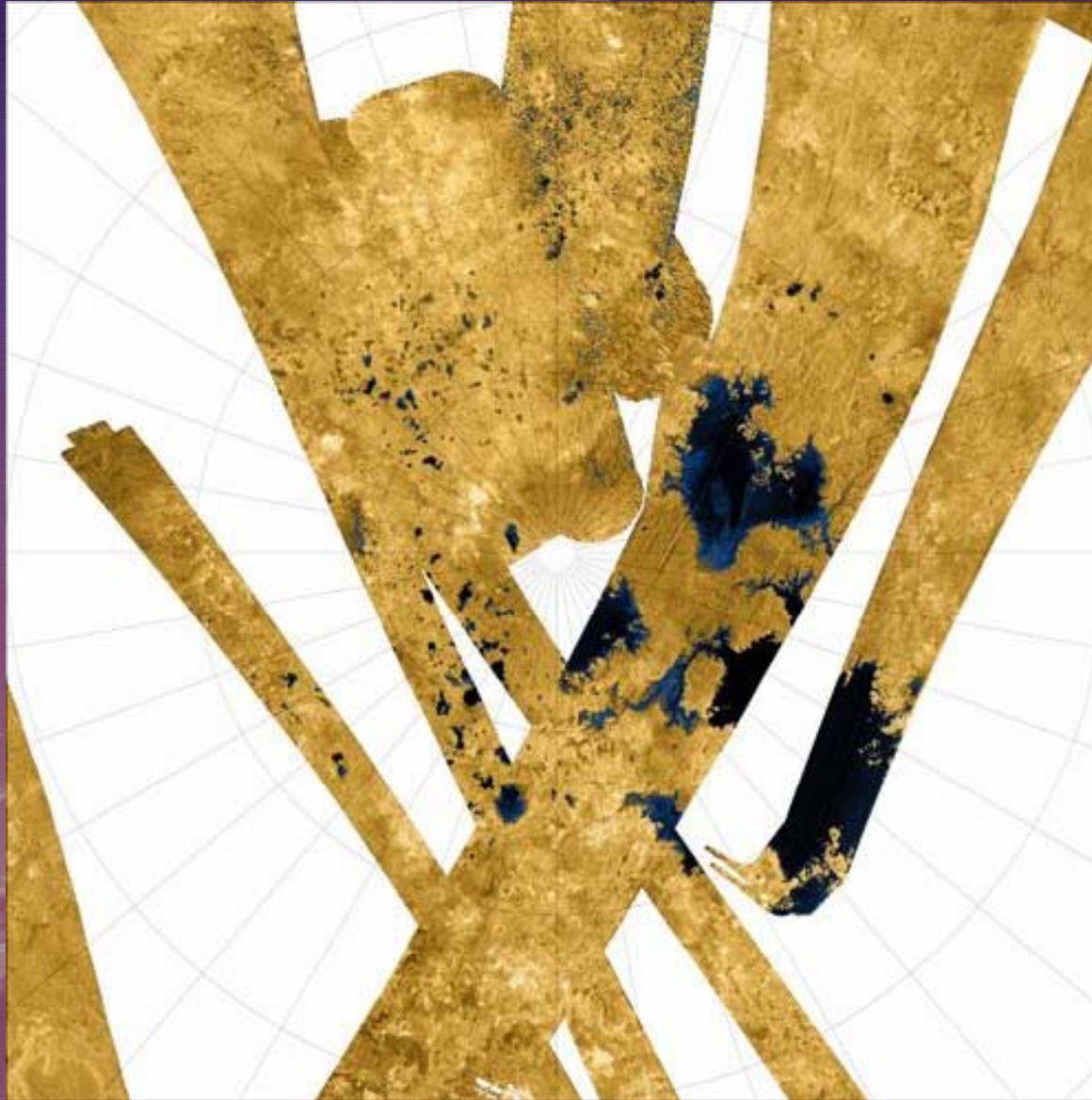


2006

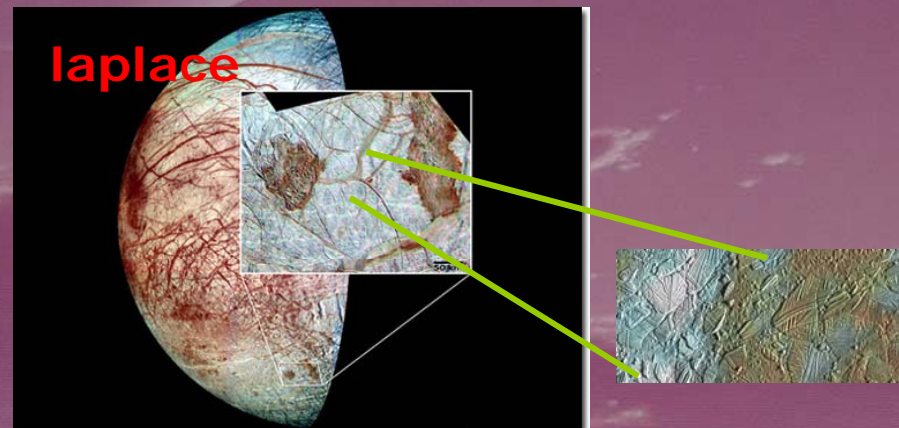


# North Polar Region Mosaic: Ethane and Methane Lakes

2007



# The future: Jupiter System



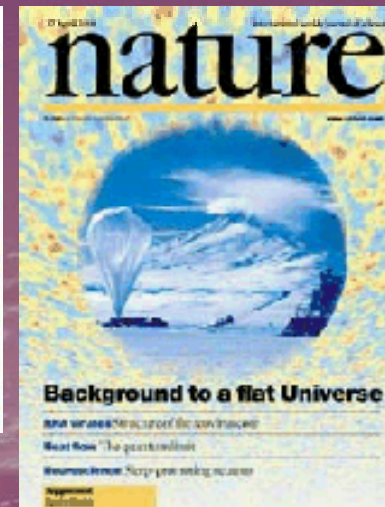
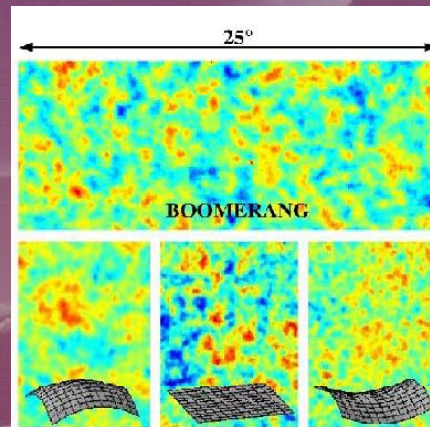


*Recent past events: Stratospheric balloon BOOMERanG*



Last BOOMERanG launch  
Mare di Ross, Antartide, January,  
6 2003

Next flight: 2010  
from Svalbard Islands



April 2000

# Stratospheric Balloon Launch

Now:  
SoRa

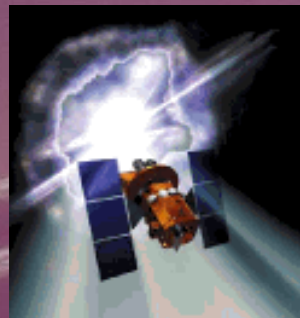
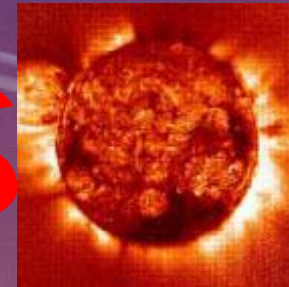
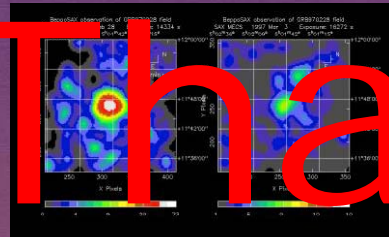


ASI Launch Base



"Dirigibile Italia" Base  
Svalbard





Thanks