EUROPEAN COMMISION
2° Workshop

Space Science and Exploration
18/02/ 2013
Madrid

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1970 . 1988 National Research Council/ Interplanetary Space and Exploration Institute, Rome, Italy
1988 . 2012 Agenzia Spaziale Italiana (ASI)

2003 . 2012 Delegate at ESA PB-SPC, and PB -HME

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«Don’t ask what your country can do for you.
Ask instead what you can do for your country.»

John F. Kennedy

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«Don’t ask what the World can do for Europe.
Ask instead what Europe can do for the World.»

**HORIZON 2020 PROGRAM**

**Globalisation**

**(International Cooperation)**

**The best Brains**

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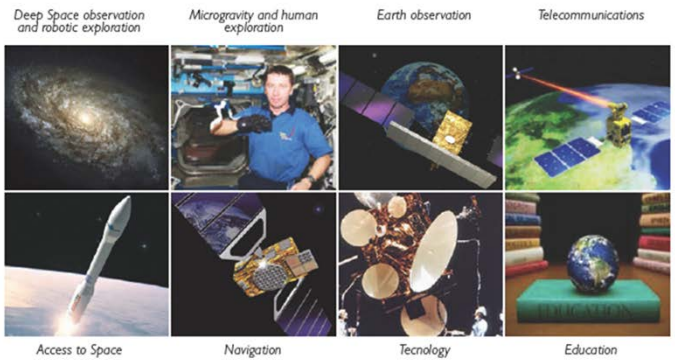
«Don’t ask what Europe can do for Italy.
Ask instead what Italy can do for Europe.»

Areas of Activities




Activities of the Italian Space Agency By Sector

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http://www.asi.it

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## Framework :Italian National Research Plan (PNR)

- Department of Education, University and Research (MIUR) approves the Space Strategic Vision/10 Years (DVS) &Space Activities Plan/3 Years (PTA) both submitted by the ASI CdA to the MIUR
- 
  - Italian Space Agency (ASI)
    ASI President/CdA approves
    the Performance Plan/3 Years & the Performance annual Report
    (37% of the ASI budget is for National activities and programs)
    Need to improve efficiency and effectiveness
  - European Space Agency (ESA )
    The ASI President is the Italian Head od Delegation at the ESA Council
    (based on the geo-return rule 100% of the Italian contribution (53% of ASI Budget) is for the obligatory/optional programs)
    Need to qualify the Technical content of the geo-return–
- European Union/European Commission/ Horizon 2020 Program
  (based on the free competition principle an additional Budget could be available for Italy – for national activities and programs )
  Need to increase the return above the current 60% of the Italian contribution )al

ACTIONS BY

ASI

The new Performance Evaluation System (2011)

Bench marking versus others Space agencies

ESA

Italian Member at Ministerial Council (MIUR Minister)

Head of Delegation at the ESA Council (ASI President)

Italian Delegates at the ESA Program Boards (ASI staff)

Work as an efficient and effective Team

European Union

Italian representatives (in progress)

Need to develop the regional areas action by having the University/Research Center/ Public local Institution/Local SMEs working as a Team (development starting)

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# Highlights

**of the Italian space science programmes:**

**National, ESA and bilateral with NASA**

**some major steps**
**in the period**
**1992 - 2012**

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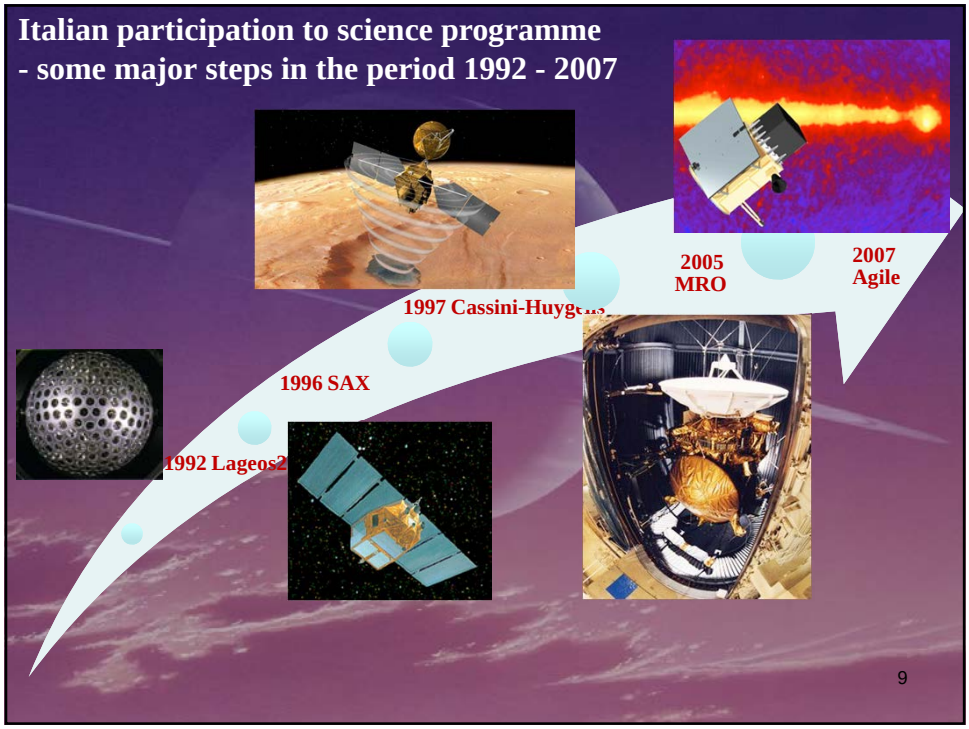
Italian participation to science programme
- some major steps in the period 1992 - 2007
2005
MRO
2007
Agile
1997 Cassini-Huygens
1996 SAX
1992 Lageos2
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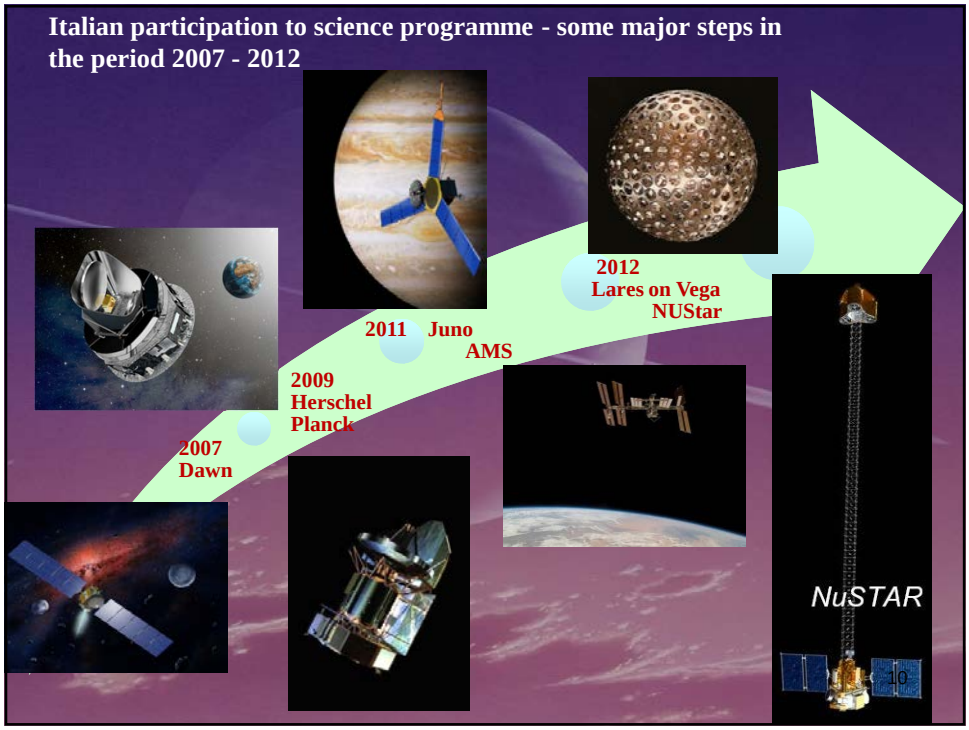
Italian participation to science programme - some major steps in
the period 2007 - 2012
2012
Lares on Vega
NUStar
2011
Juno
AMS
2009
Herschel
Planck
2007
Dawn
NuSTAR
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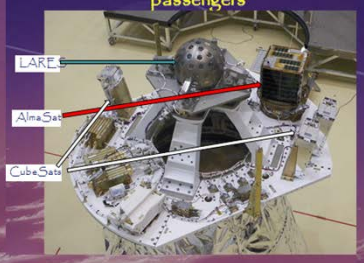
LARES
13/02/2012

VEGA

LARES launch on 13 February 2012 on The VEGA maiden Fl

The LARES System with its passengers




ASI Tracking Capability

Malindi: Swift, AGILE, NuSTAR

Sardinia Radio Telescope

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ExoMars 2016 Mission

EDM
overall configuration

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## ExoMars 2018 Mission

Proton

Carrier Module & Descent Module

Rover +ROCC

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In the following slides (15 - 28) you will find additional technical information as provided by Italy – Mr. Marcello Ricottilli at the first EC workshop

Grazie per la vostra attenzione

Carlo

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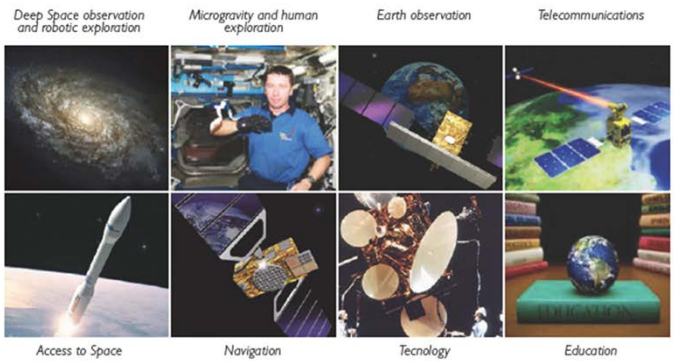
## Areas of Activities




Activities of the Italian Space Agency By Sector

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ASI home page: www.asi.it

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## Financial Planning

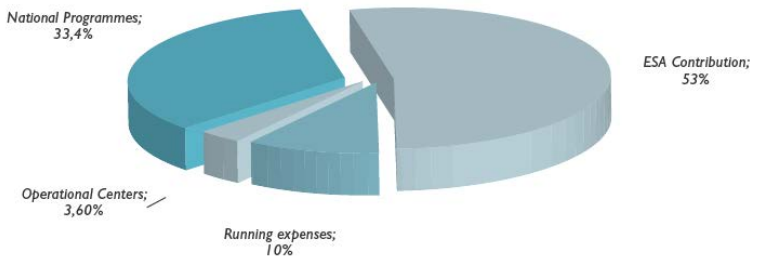


Figure 1 - Financial Planning for Overall Expenses 2010-2020

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## Financial Planning (by areas)

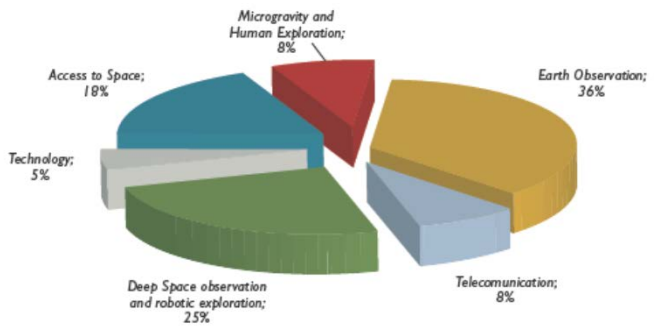


Figure 4 - Global Financial Plan for expenses in the period 2010-2020 by sector

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## Financial Planning

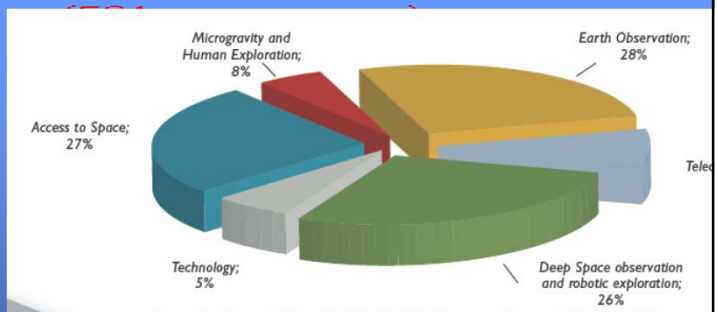


Figure 2 - Financial Plan for ESA Contributions over the period 2010-2020

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## Financial Planning
(national programmes)

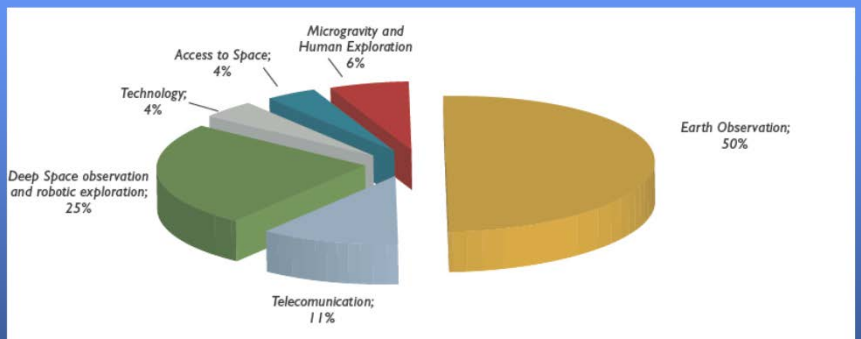


Figure 3 - Financial Plan for National Initiatives for the period 2010-2020

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## Earth Observation

- **Cosmo SkyMed**
  (4 SAR satellites constellation)
- **Cosmo SkyMed Second Generation**
- **PRISMA** (Hyperspectral Imaging Mission)
- **OPSIS** (Very High Resolution Imaging Mission)
- **ROSA** (Radio Occultation Sounder for Atmoshere)
- **Copernicus** (Sentinels)
- **EOPP (ESA)**

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## Deep Space Observation and Robotic Exploration : ESA Cosmic Vision

- ESA Cosmic Vision
  - **Euclid**
    - » Near Infrared Spectrometer & Photometer
    - » Visual Imager
  - **Solar Orbiter**
    - » METIS-Coronagraph
    - » SWA: Solar Wind Plasma Analyser
  - **Juice** (Jupiter Icy Moons Explorer); assessment phase

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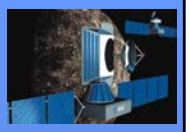
## Deep Space Observation and Robotic Exploration (ESA)



- **BepiColombo** (2015, first European mission to Mercurio)
  - SYMBIO-SYS (High resolution and stereo cameras, Visual and NIR spectrometer)
  - MORE (Mercury Orbiter Radio science Experiment)
  - ISA (Italian Spring Accelerometer)
  - SERENA (Neutral and ionised particle analyser)
- **ExoMars Orbiter** Instruments (2016)
  - Nadir and Occultation for MArs Discovery
  - CaSSIS – Colour and Stereo Surface Imaging System
  - NOMAD - Nadir and Occultation for MArs Discovery
- **ExoMars Rover** Instruments (2018)
  - Ma_MISS - Mars Multispectral Imager for Subsurface Studies
  - WISDOM - Water Ice and Subsurface Deposit On Mars
- **ExoMars Drilling Technologies**

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## Microgravity and Human Exploration

- Increase the use of the ISS both on the basis of bilateral and multilateral agreeements
- Contribute to the development of innovative technologies for future human exploration programmes
- Two Italian Austronauts, Luca Parmisano and Samanta Cristoforetti, are scheduled to fly in 2013 and 2014-2015
- Calls for experiments on biomedicine, biotechnologies, life support technologies, materials science, etc.

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## Telecommunications

- **ATHENA-FIDUS** Programme(Access on THeatres and European Nations for Allied Forces). Geostationary satellite for dual broad-band communications services for Italian and French military and government users (2013-2014)
- **Ku Payload** for E-DRS ESA satellite
- **Technology Development** of
  - Q/V and W frequency bands Payloads for the ESA pre-operational Aphasat mission TDP5 (2013)
  - MMIC for satcom antennas in Ka Q/V bands
  - ASIC for satellite terminals

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## Navigation

Control Room, Galileo Control Centre at Fucino (Italy) / Sala Cantrollo, Centro di Controllo Galileo al Fucino (Italia) ©Telespazio

- **Development of applications for PRS and Civil Aviation**
- **Plans for Development of on board advanced Athomic Clock based on Pulsed Optically Pumped technique**

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## Access to Space (VEGA)

- **VEGA System**
  - GNC
- **Liquid Propulsion**
  - LYRA program and LOx-Methane upper stage
  - Liquid Propulsion R&D Program
  - Test Facilities
  - Theseus (LOx-Methane low thrust demo engine)
- **Hybrid Propulsion**
  - Theseus ( Hybrid engine demonstrator )
  - Hybrid Propulsion R&D Program
- **Solid Propulsion**
  - Stage Engines :P80, Z23, Z9

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## Access to Space (2)

- **Re-entry systems and technologies** (Expert, IXV)
- **ASA- Advanced Structural Assembly** (Investigation on advanced solutions for high temperature infrastructures)
- **Electric Propulsion & Power Generation**
  - Hall Effect Thuster (HET) Electric Propulsion (EP)
  - FEEP: Field Emission Electric Propulsion

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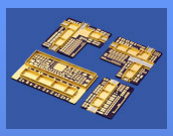
## Non Dependance Thecnologies



- **MMIC in GaN for T/R modules**
- **«Tile» X Band modules (HPA, LNA..)**
- **Hybrid and MMIC HPA in GaN for Space applications**
- **Space qualification of the GaAs PHEMT 0,25 µm process**
- **Testing facilities for GaAs/GaN components**

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