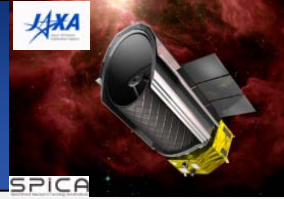


- Heritage in the MIR/FIR
- Cosmic Vision 2015 – 2025
- European Contributions to SPICA
- Current status
- Next steps and the ESA timeline



IRAS (1983)

- 57 cm
- 12-100 μm



ISO (1995-98)

- 60 cm
- 2.4-240 μm



Spitzer (2003-09)

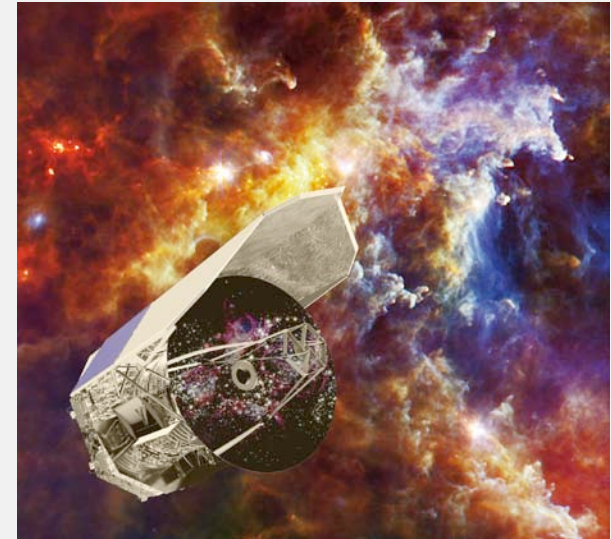
- 85 cm
- 3.6-160 μm
- 5+ years including 'warm'



AKARI (2006-07)

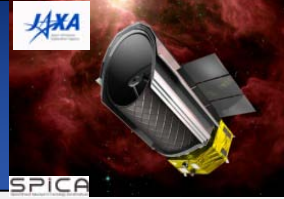
- 67 cm
- 1.7-180 μm
- 3+ years, including 'warm'

All < 1m diameter



Herschel (2009-12)

- 3m-class, passively cooled ($T_{\text{tel}} \sim 80\text{K}$)
- 55-672 μm
 - HIFI: high resolution spectrometer
 - PACS: imaging spectrometer/photometer
 - SPIRE: imaging spectrometer/photometer



IRAS (1983)

- 57 cm
- 12-100 μm



ISO (1995-98)

- 60 cm
- 2.4-240 μm



Spitzer (2003-09)

- 85 cm
- 3.6-160 μm



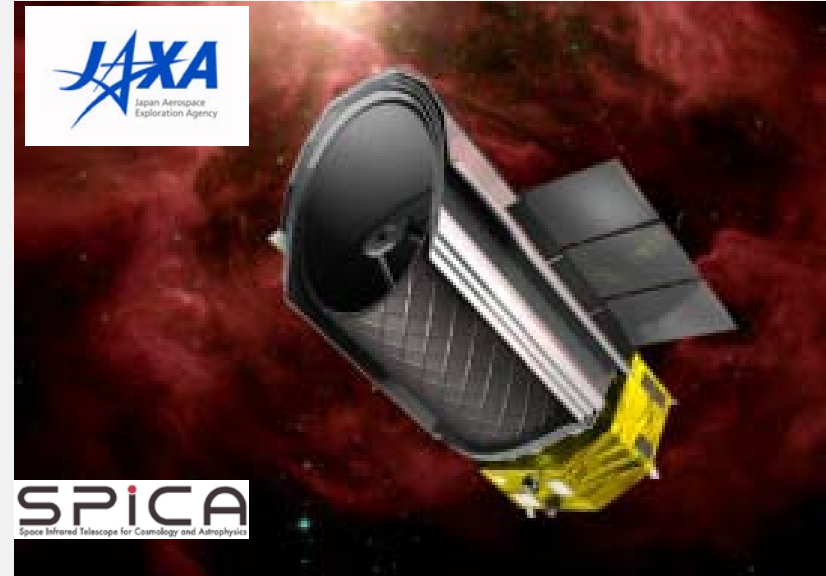
AKARI (2006-07)

- 67 cm
- 1.7-180 μm



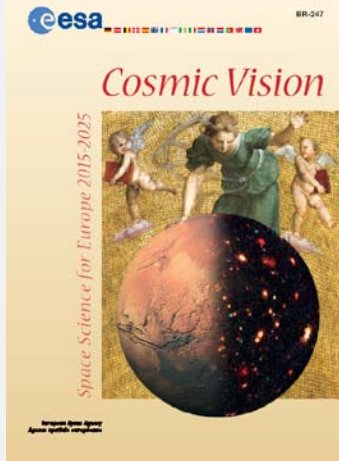
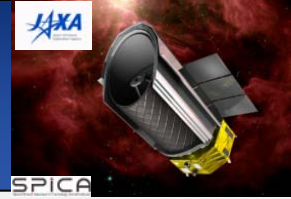
Herschel (2009 -12)

- 3m-class, $T_{\text{tel}} \sim 80\text{K}$
- 55-672 μm



SPICA

- 3m-class, actively cooled ($T_{\text{tel}} < 6\text{K}$)
- 5-210 μm
- Nominal 3 year lifetime, goal 5 years
- Sensitivity limited by sky-background



June '07:

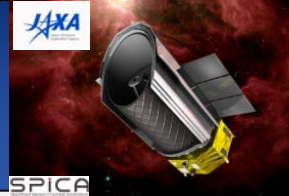
- First call for missions
 - 50 proposals received for M-class and L-class
- SPICA proposal led by Swinyard(UK) & Nakagawa(JPN)
 - ESA to be a junior partner in the JAXA-led mission
 - 3m-class cryogenic telescope assembly (ESA)
 - FIR imaging spectrometer SAFARI (European consortium)

Dec '07:

- SPICA contribution selected as one of 6 *M*-class missions for an 18-month assessment study:
 - Strong science case
 - Herschel heritage (TRL), well-defined contributions
 - “*Mission of opportunity*”

Nov '09:

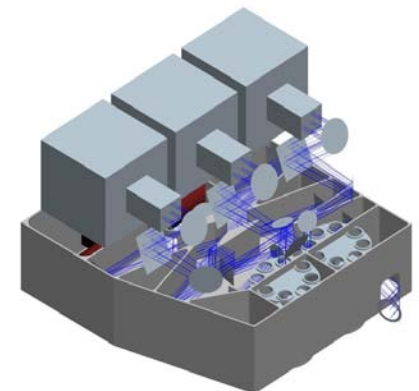
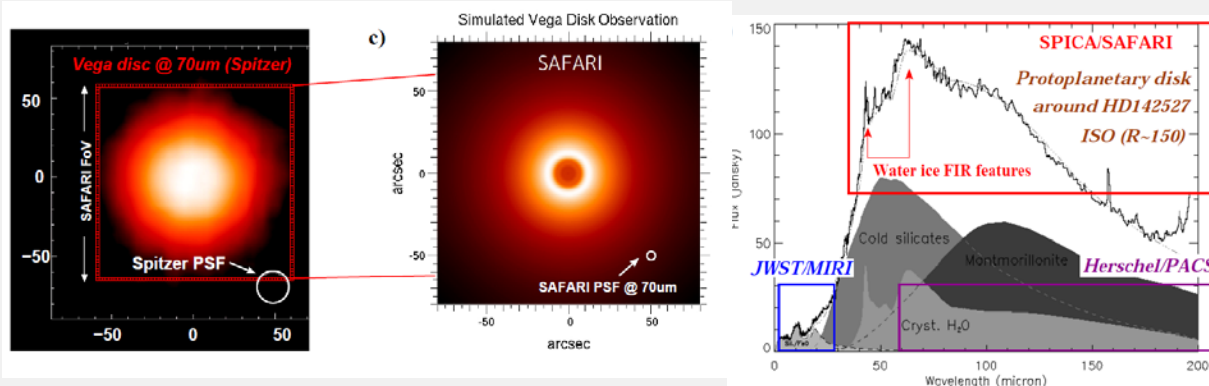
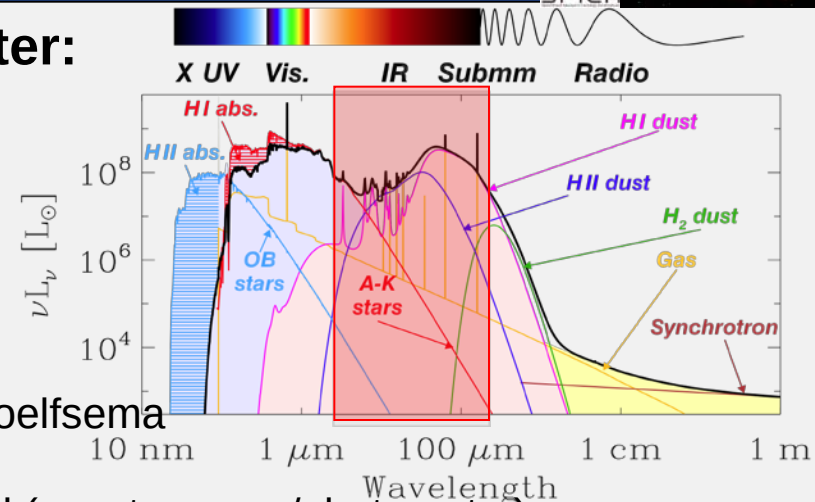
- Proposal for European/ESA contribution to SPICA submitted

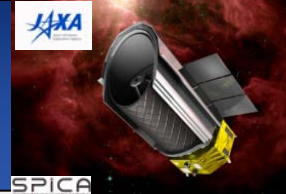


Imaging FIR Fourier Transform Spectrometer:

(see poster)

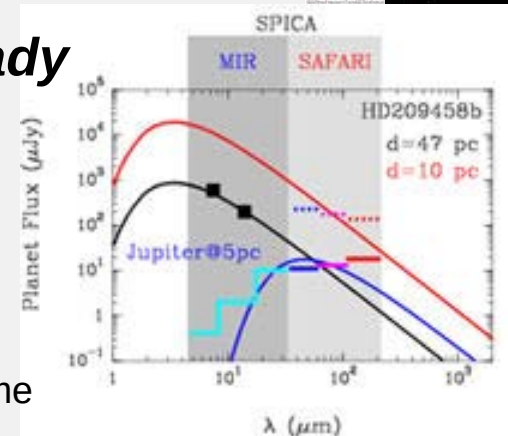
- 34-210 μm in a single spectrum, over a 2' x 2' FoV
- Photometric + spectroscopic capability
- Sky-limited performance using state-of-the-art Transition Edge Sensors (TES)
- European consortium (~25 institutes) led by SRON/Roelfsema
- Raw sensitivity > ~10/~100 times better than Herschel (spectroscopy/photometry)
 - FIR/MIR spectroscopy: AGN-starburst connection over cosmic time; Transitional Disks: planetary systems in formation
 - Mineralogy: the most local debris disk - the inner and outer solar system
 - Photometry: Resolving the FIR background





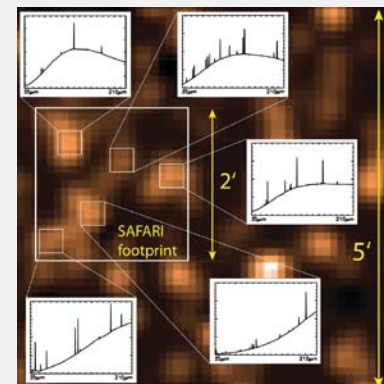
- SAFARI science consortium: >150 scientists already directly involved**

- Expertise (and PIs) from all three Herschel instrument teams
- Interest *and* expertise in all SPICA/SAFARI science areas: galaxy evolution from far to near; cosmology; star-formation; planet formation; ISM; evolved stars; solar system and exoplanets
- Refining instrument requirements, preparing SAFARI science programme



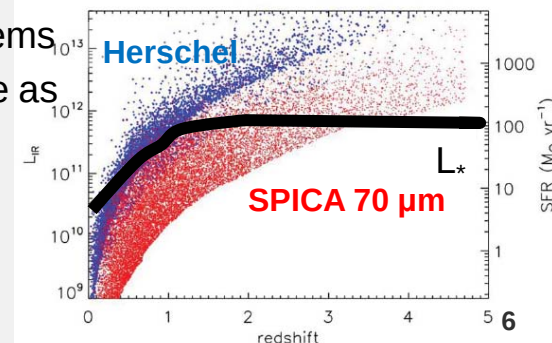
- European science community has a major interest in SPICA as the next step following HERSCHEL**

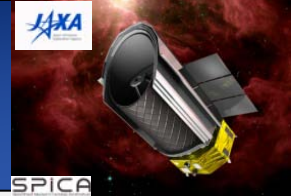
- HERSCHEL ESLAB meeting: over 400 scientists dedicated to FIR
- SPICA Science workshop envisaged for 2011



- Strong commitment from European Research Institutes to technical realisation of SAFARI**

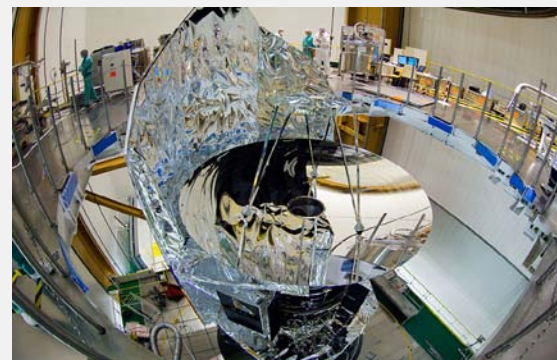
- Ongoing work on instrument design, with breadboarding of key subsystems
- Decisions on the funding of SAFARI will be taken on the same timescale as the decision on an ESA contribution to SPICA





- SPICA telescope assembly (STA) (see poster)
 - Primary and secondary mirrors, support structures and focusing mechanism

Herschel heritage: extensive industrial expertise in Europe in the design, manufacture and testing of light-weight ceramic telescopes



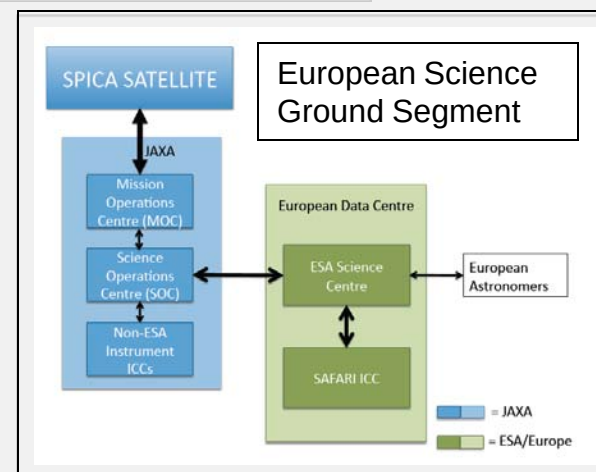
Herschel primary mirror

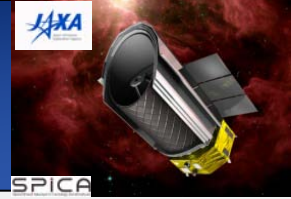


Preliminary designs for the STA from EADS Astrium and Thales Alenia Space

- Operations and Science Ground Segment
 - Ground station time on Cebreros
 - European Data Center

- Management of the scientific, technical and managerial interfaces between the SAFARI consortium, ISAS-JAXA and ESA

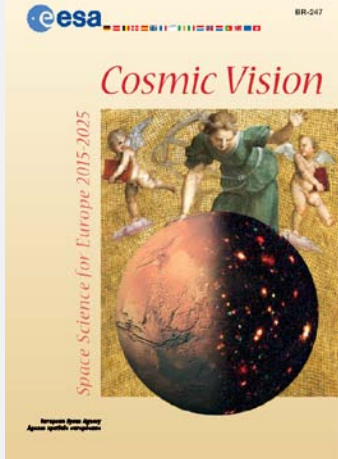




Feb '10:

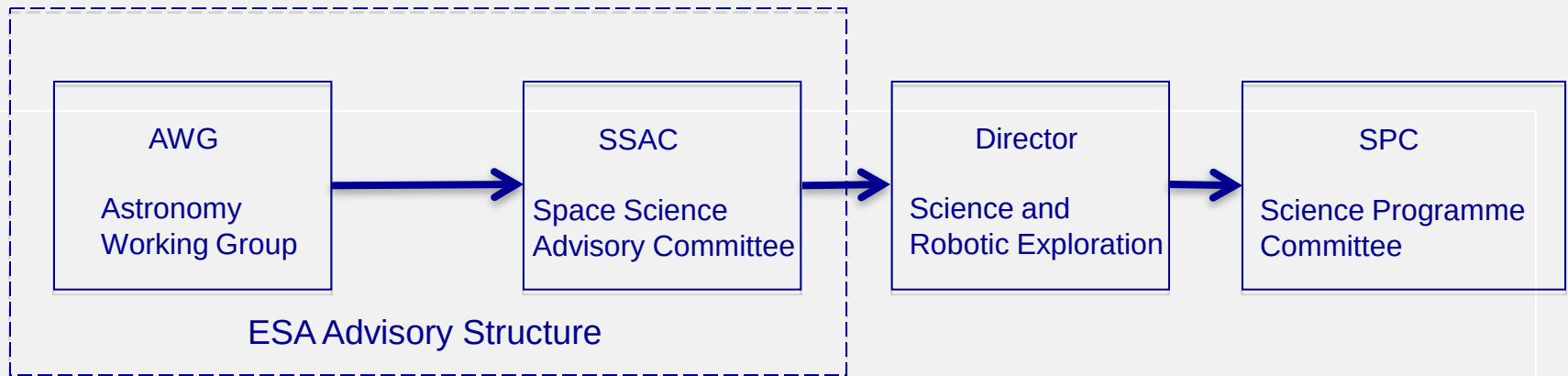
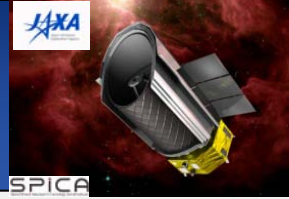
- Highly ranked by ESA advisory structure (with EUCLID and PLATO)
- Not competing directly with EUCLID/PLATO/Solar Orbiter
 - “Mission of opportunity”
 - Still needs to be approved by ESA

→ Awaiting confirmation of SPICA status at JAXA, before seeking approval

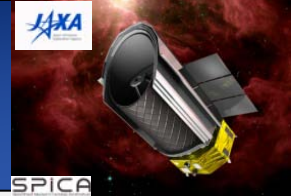


Current Status (Extended design and assessment phase):

- ESA (dedicated study team + expert technical support):
 - Industrial studies of the STA baseline
 - Science Management Plan, Science Ground Segment contributions, ESA SPICA Study Science Advisory Team
 - Definition of spacecraft-STA-SAFARI interfaces
- SAFARI:
 - Refining instrument design and preparing SAFARI science programme

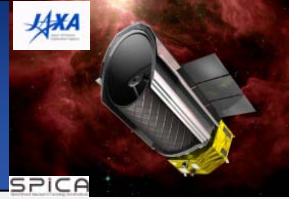


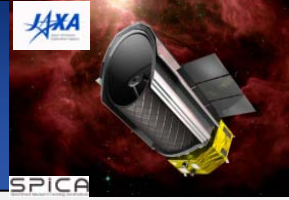
- Proposal for the European contribution to the SPICA mission to be made by Director of Science and Robotic Exploration, with advice from AWG and SSAC, to the SPC:
 - Scientific case
 - Description of the overall mission, including instrument suite
 - Detailed description of contributions eg. telescope, SAFARI, ground segment
 - Overview of science management
- Science management plan
 - Detailed description of how the European community will benefit from SPICA
 - Time allocation, representation in the SPICA project, contribution to science operations
- Total cost of participation to ESA

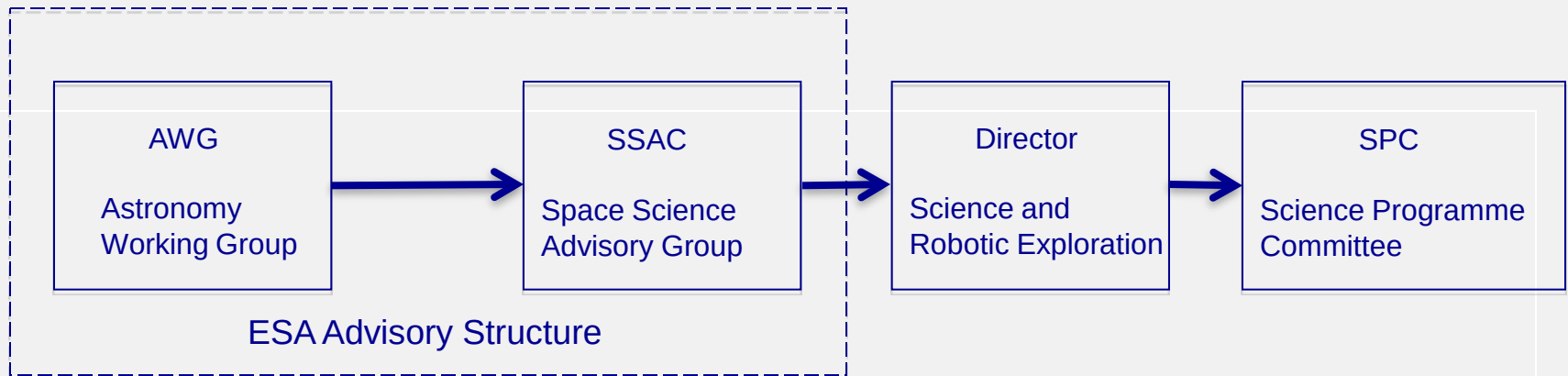
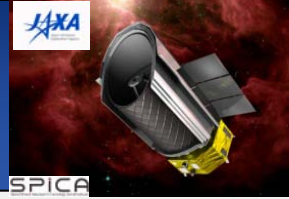


- Strong interest from the European Scientific Community in the SPICA mission, based on significant scientific and technical heritage in the FIR
- Strong commitments from European Research Institutes to SAFARI, with decisions on funding planned on the same time scale as the final decision on ESA's contribution
- The ESA decision process will be synchronized with that of JAXA









AWG – European scientists from the astronomical community:

- makes recommendations in astronomy

SSAC – European scientists from the astronomical planetary sciences and fundamental physics communities

- combines working group input and makes recommendations across all space sciences

SPC – delegates from member states, typically from national funding bodies + science advisors

- takes decisions on the content of the scientific programme, and monitors its execution
- decisions based on a proposal from ESA