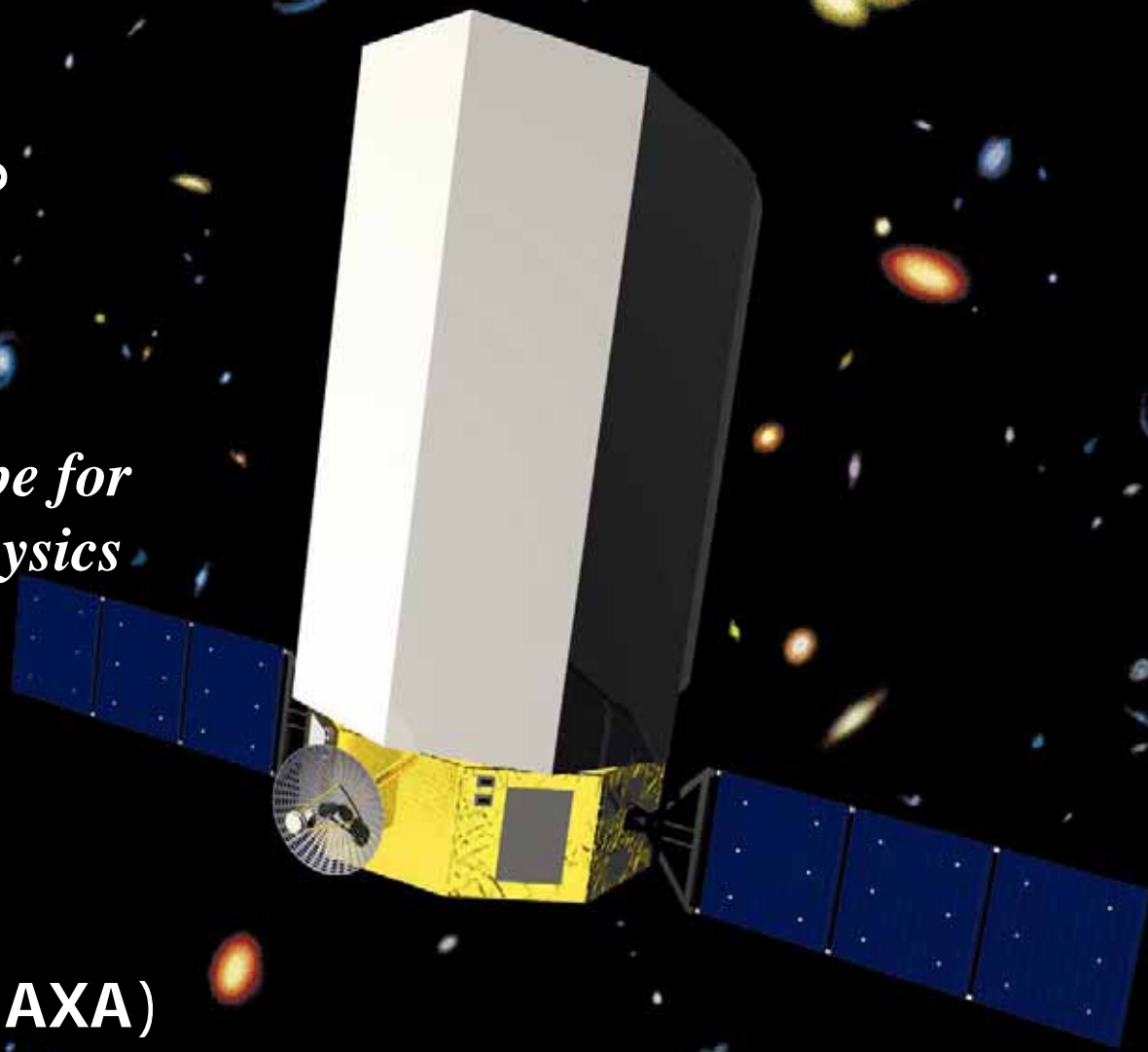


赤外線天文衛星
IRTS, ASTRO-F から

SPICA

*Space Infrared Telescope for
Cosmology and Astrophysics*

中川貴雄 (ISAS/JAXA)
SPICA Working Group



Scientific Objectives

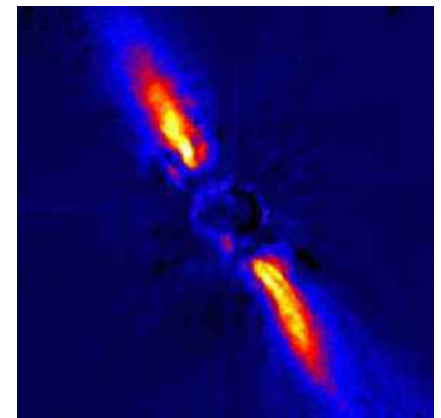
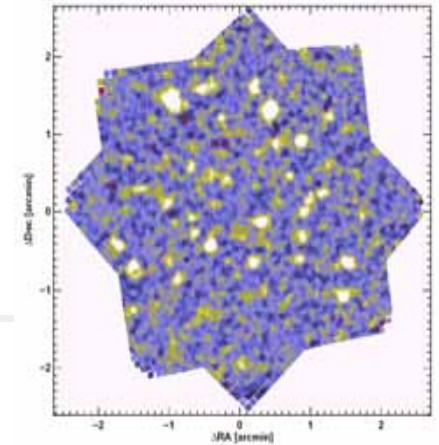
宇宙進化の歴史を探る

■赤外線観測の特徴

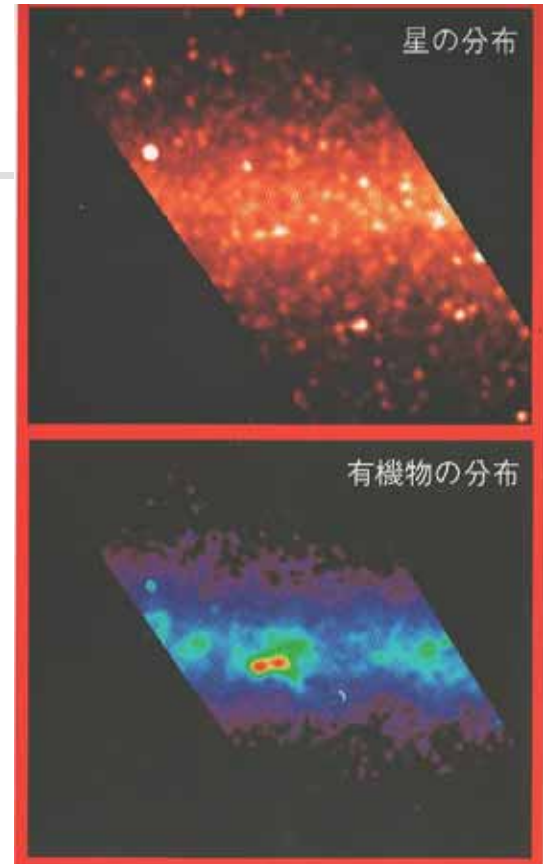
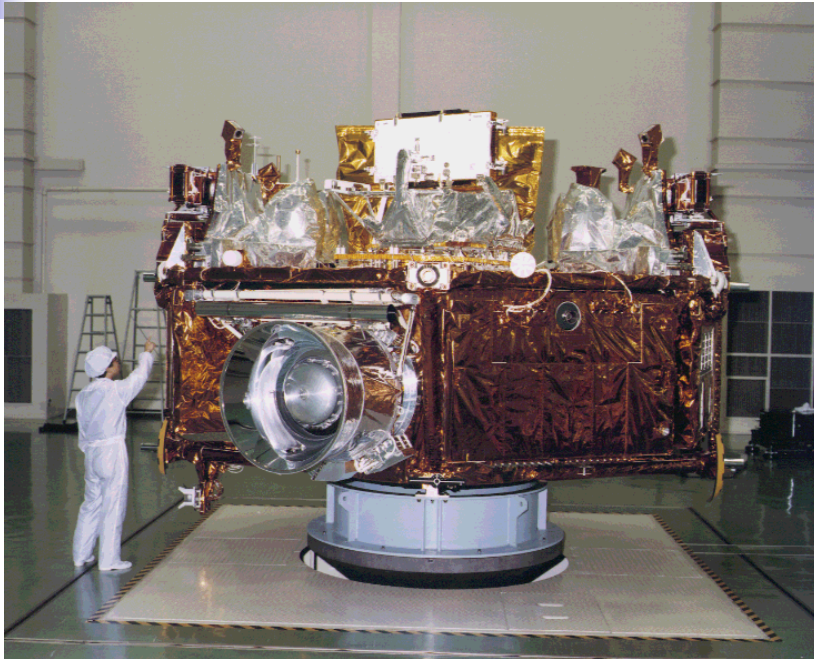
- Low-T Objects
- High-z Objects
- Obscured Objects
- Gas and Solid Chemistry

■ Scientific Objectives

- 銀河の誕生と進化
- 宇宙の化学進化
- 恒星、惑星系の誕生と進化



IRTS on SFU



- 1st Japanese Space Mission for IR Astronomy
 - Launched in Mar. 1995 onboard SFU
- 15 cm cooled telescope

ASTRO-F

- The next-generation IR Surveyor
- 68.5 cm Telescope
- NIR-FIR
 - All-sky Survey in FIR
 - Pointing Obs. In NIR-FIR
- Target of Launch: Fiscal year 2005



Cooled Telescopes: SPITZER & ASTRO-F



SPITZER

Aug 25, 2003 Launched
85 cm cooled Telescope
Observatory



ASTRO-F

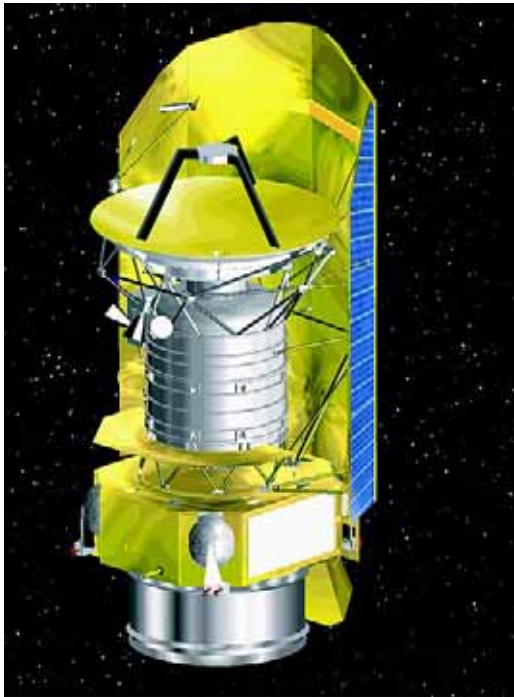
2005 Launch
70 cm cooled Telescope
All Sky Survey

$D < 1\text{m}$



**Wanted !
Larger
Telescope**

Large Telescopes: HSO & JWST

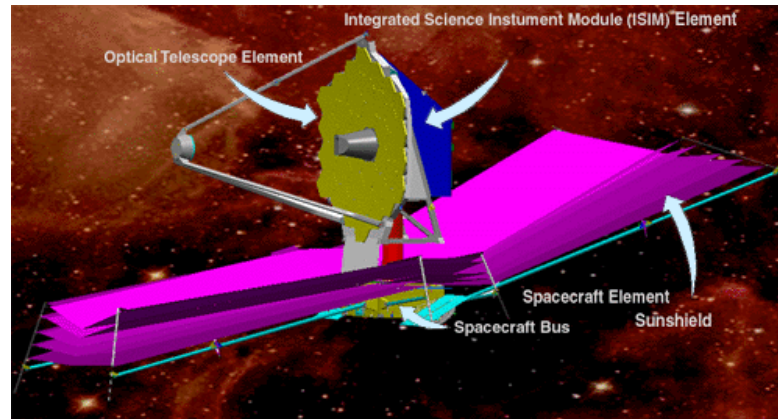


Herschel (HSO)

2007 Launch

3.5 m, 80 K

FIR-Submm



JWST

2011 Launch

~6m, < 50 K

NIR-MIR

$T > 20K$



**Wanted !
Cooled
Telescope**

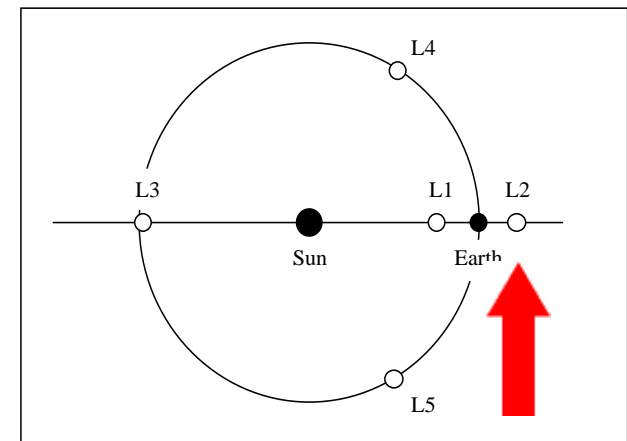
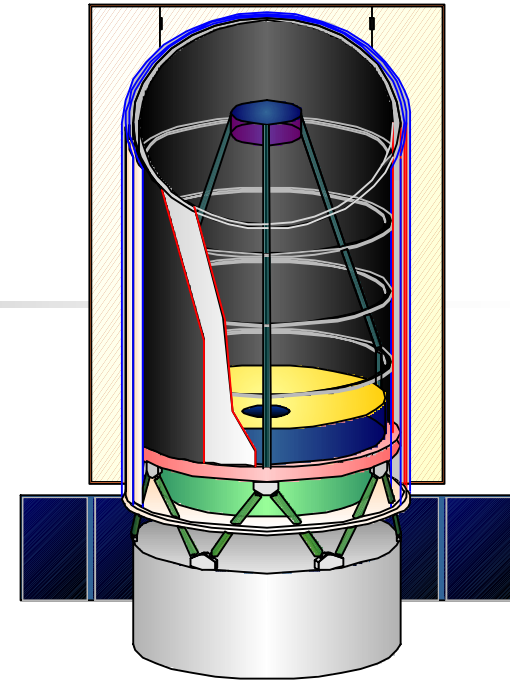
SPICA Mission

■ Goal

- To reveal the cosmic history through high-resolution, high-sensitivity observations in MIR & FIR

■ Specifications

- Telescope: 3.5m, 4.5 K
- Core : 5-200 μm
 - 近赤外線 (1-5 μm) およびサブミリ波 (<500 μm) への拡張を検討
- Orbit: Sun-Earth L2 Halo
- Total Weight: 2.6 t
- Launch: early 2010s by HIIA



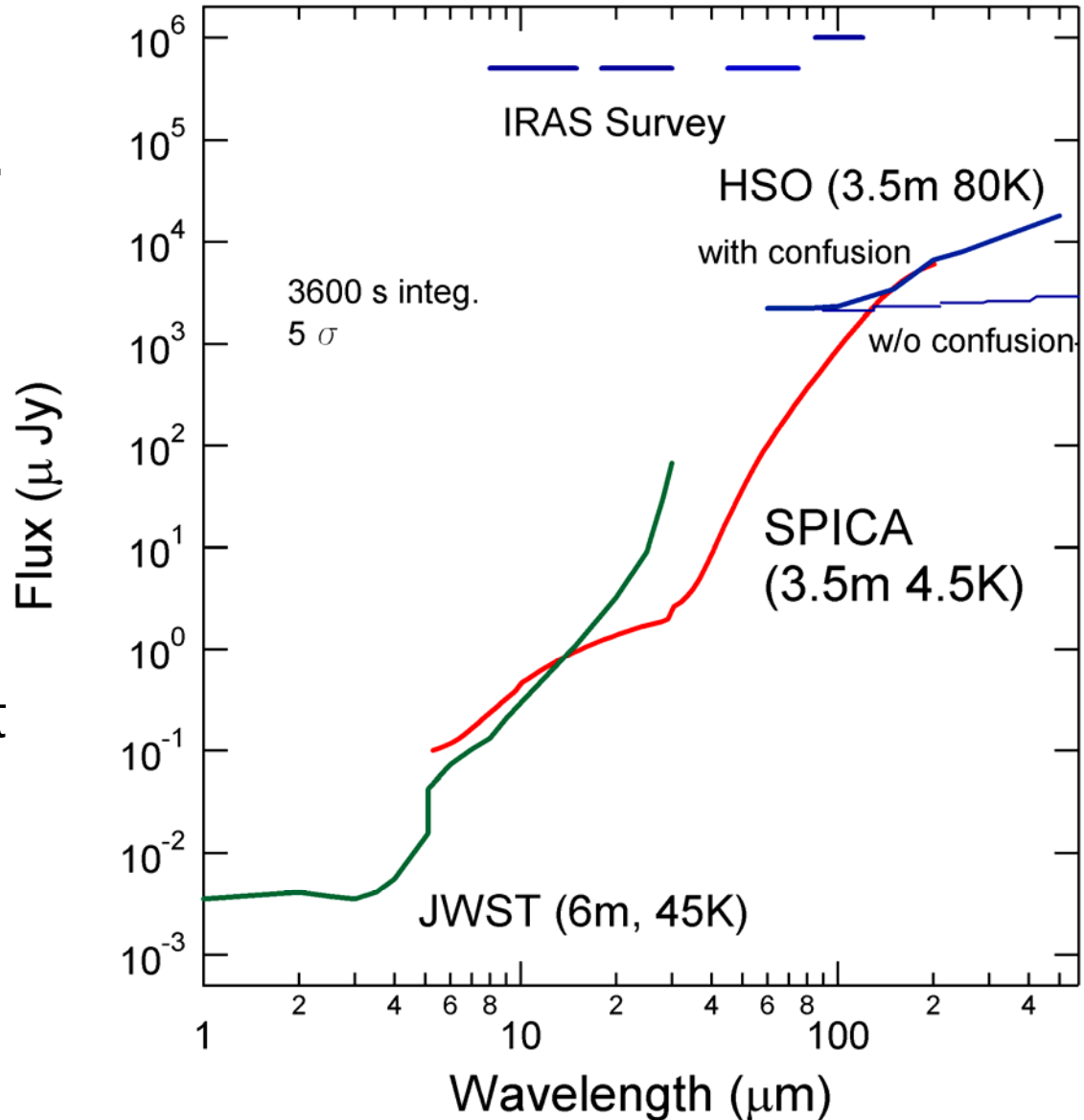
Photometric Sensitivity

- Optimized for Mid- & Far-Infrared

- Most Sensitive among proposed missions @ 15-130 μm

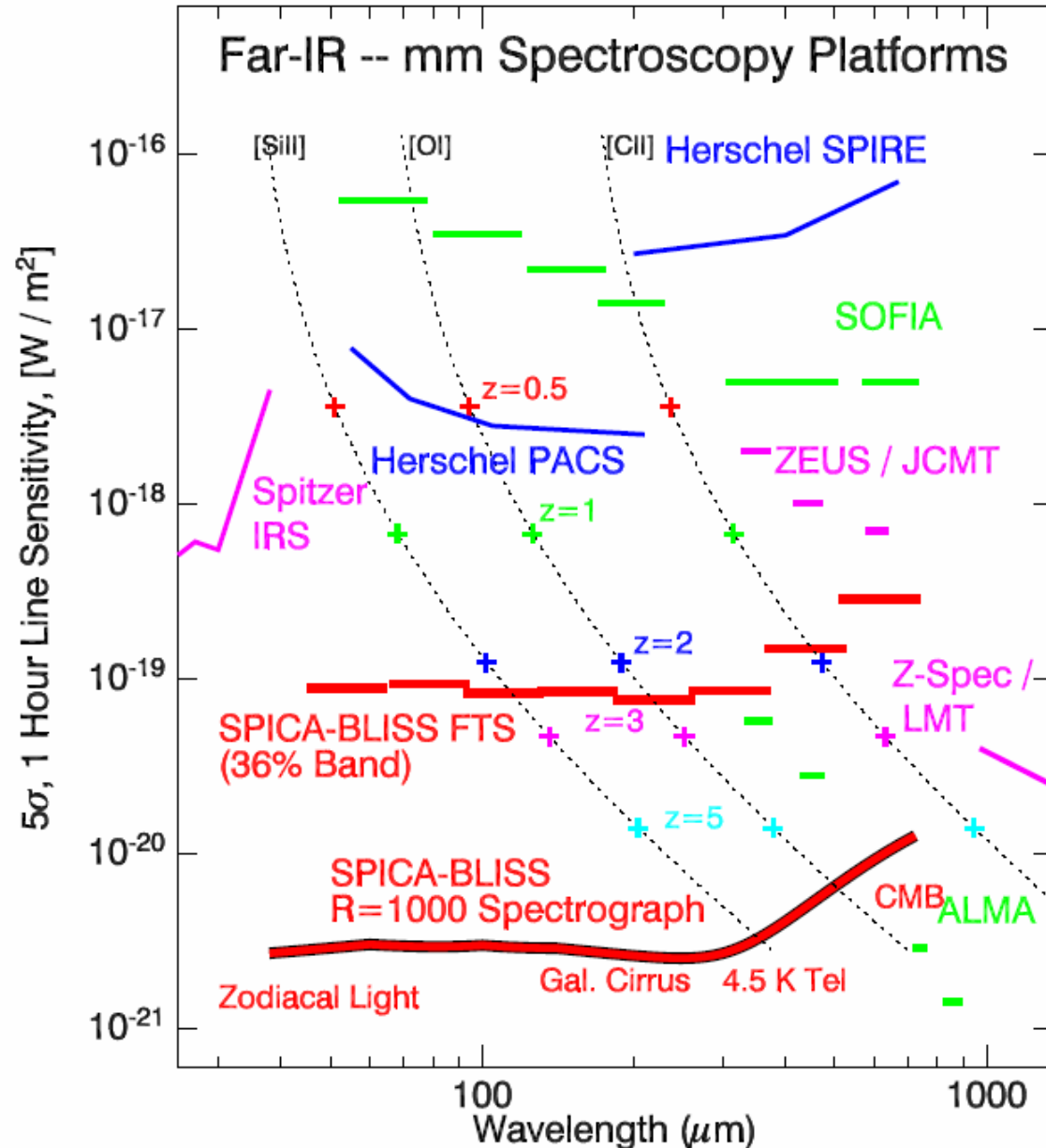
- Confusion limited at longer wavelength

- Complimentary to HSO & JWST



Spectroscopic Sensitivity

- Herschel and SOFIA are limited by emission from warm telescopes.
- Ultimate limitation is photon noise from the astrophysical backgrounds. SPICA's huge gain.



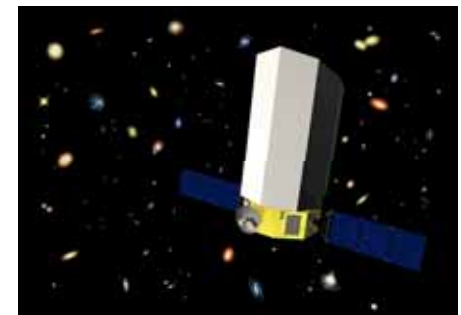


SPICA as an International Mission

- USA (NASA/JPL, University of Arizona, Caltech..)
 - NASA/Origin Concept Study Proposal accepted
 - Sub-mm detectors and spectrometer
- Europe
 - Proposals being prepared by Consortium consisting of UK, Netherlands, France, Germany
 - Far-infrared spectrometer
- Korea (KAO, Seoul National University, Satrec)
 - NIR, MIR Instrument,
 - LOA signed on July 30, 2004

Schedule (Tentative)

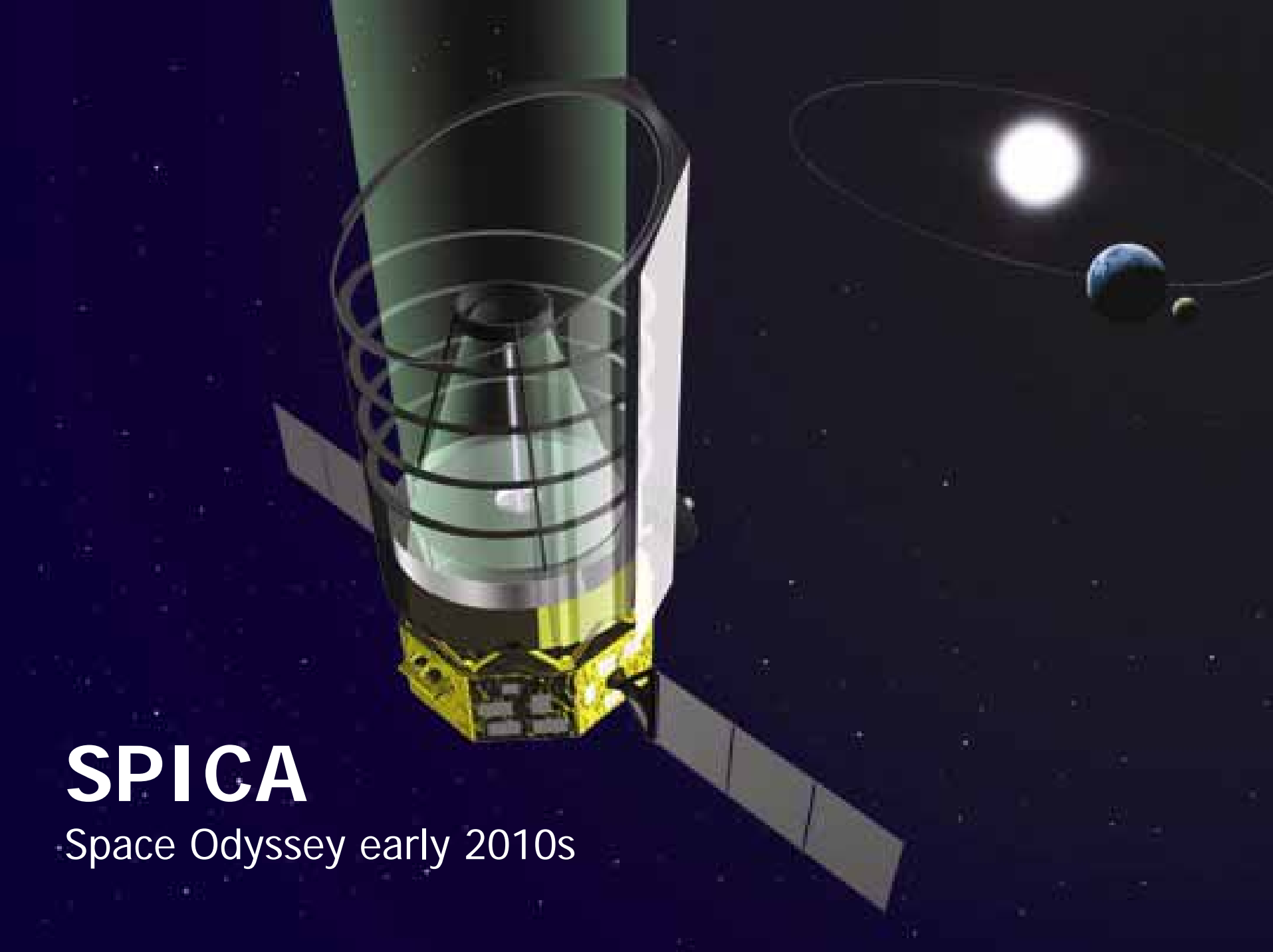
- R&D Programs (since 2001)
 - Cryocoolers, Telescope, Detectors, Spacecraft
- Proposal to Science Committee of ISAS (2004)
 - To put SPICA on the Roadmap of space science
 - To get funded for R&D Program during Phase A
 - Completely Net Category with new concept
- Phase A ~ 2007
 - PDR in 2007
- Proto-Model Phase (2008 ~ 2009)
 - Critical Review for the start of FM (2009)
- Flight-Model Phase (2010 ~ 2012)
- Launch (2012)





関連ポスター

- P7: 「3.5m 大型冷却軌道望遠鏡 SPICA の開発」、尾中(東大)他
- P8: 「SPICA焦点面観測機器」、片ざ(宇宙研)他
- P9: 「次世代赤外線天文衛星 SPICA の冷却系」、杉田(JAXA総合技研)他
- P10: 「SPICAによる原始惑星系円盤の観測」、上野(東大)他
- P11: 「次世代赤外線天文衛星 SPICA」、中川(宇宙研)他
- P12: 「SPICA で狙うサイエンス:系外銀河編」、松原(宇宙研)



SPICA

Space Odyssey early 2010s