The next-generation Infrared astronomy mission



Space Infrared Telescope for Cosmology & Astrophysics

June 1, 2, 2009 SPICA Science Symposium @ Univ. Tokyo Takao Nakagawa (ISAS/JAXA)







Misay image at 9i\$ibte bightKARI

With these news maps of the IR sky, let's start "treasure hunting"

~ from Surveyor to Observatory ~





Scientific Goals

- How did the Universe originate and what is it made of ?
- What are the conditions for stellar and planetary formation ?
- How did the universe evolve chemically ? The emergence of life ?









Mission Overview

- Specifications
 - Telescope: 3.5m, 5 K
 - Revolving CIB at its energy peak
 - Direct detection of exoplanets
 - Core wavelength: 5-200 μ m
 - MIR Instrument
 - Including Coronagraph
 - Far-Infrared Instrument (SAFARI)
 - Orbit: Sun-Earth L2 Halo
 - Mission Life
 - 3 years (nominal)
 - 5 years (goal)
 - No expendables
 - Weight: 3.5 t
 - Launch: 2017 (H-IIA/B)









Requirements: Large! Telescope



- 3m-class telescope is required
 - Resolve CIB into individual sources
 - Direct detection of exoplanets





Requirements: Cool ! Telescope





(No paralell observations)





Huge Gain of Sensitivity !







Revolution of Design Philosophy



No Cryogen \rightarrow Large Telescope ISO: 2.6t for 60cm \rightarrow SPICA 3t for 3.5m

Heritage of Mechanical Cryocoolers

AKARI

- 2-stage Stirling
 200mW @ 20 K
- Long-life test > 5yrs
- **2006**

SMILES
 IT 30m\

- JT 30mW@
 4.5 K
- 2009







- SUZAKU
 - ADR, 60mk reached

2005

- Cryocooler technology is strategic techniquie for space science in Japan
 - Future Missions: Kaguya, Planet-C, ASTRO-G, ASTRO-H, SPICA





Monolithic mirror



3.5m is technically a good choice

- Monolithic Mirror
- No deployable mechanism
 - Simple, Feasible, Reliable
- Smooth PSF
 - Essential for Coronagraph
- Herschel & AKARI Heritage
 - AKARI: WFE 0.35 µ m, 6K
 (70cm)
 - Herschel: 3 5m (WFE 6 // m





Status in Japan

JAXA Pre-project



SPICA Proposal to JAXA (P.I. Nakagawa, JAXA)

- -Mar '08 Mission Definition Review
- Jun '08
 Project Preparation Review
- July '08 Pre-Project started
- Nov '08- GOPIRA SPICA TF started
- Apr '09- SPACE Basic Plan in Japan
- Schedule
 - Fall '09 System Requirement Review
 - System Requirement to be fixed
 - Fall '10 System Definition Review
 - 2011 Project full approval





International Collaboration

- Europe
 - Nov '07 European participation to SPICA was selected as a candidate of future missions in ESA Cosmic Vision 2015-25
 - Unique infrared mission is ESA CV
 - European Contribution
 - ESA: Telescope, Ground Segment
 - Consortium: SAFARI
 - Schedule
 - Feb'10 CV Down Selection
 - Nov '11
 Final Selection
- Korea
 - FPC with NAOJ, under discussion
- USA
 - BLISS, under discussion



ESA Cosmic Vision Proposal (P.I. Swinyard, RAL, UK)





Schedule



Now





Purposes of the symposium

Toward SRR and SDR in Japan

- To polish up scientific purposes (Uniqueness!!)
- To optimize specifications of FPIs
- To optimize requirements for the mission
 - Available resource is pretty much limited
- To make the best use of International collaboration
 - To lead International collaboration
 - SPICA International Science Meeting
 - July 6-8, at Oxford, UK



Space Odyssey in 2017