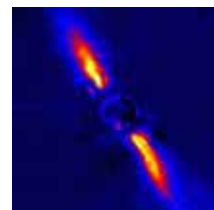
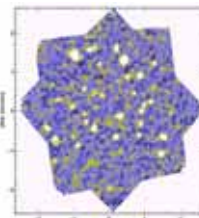




Scientific Objectives

宇宙進化の歴史を探る

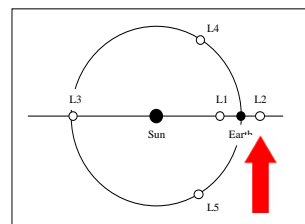
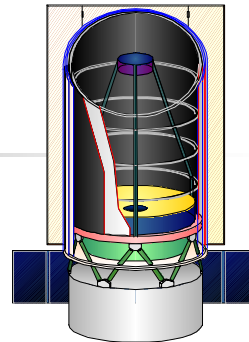
- 銀河の誕生と進化
 - 塵に隠された銀河形成の歴史を $z > 5$ まで明らかにする
- 星形成と宇宙の化学進化
 - ガスと固体の両面から化学進化を解明
- 惑星系の形成
 - 木星型系外惑星の直接検出と分光





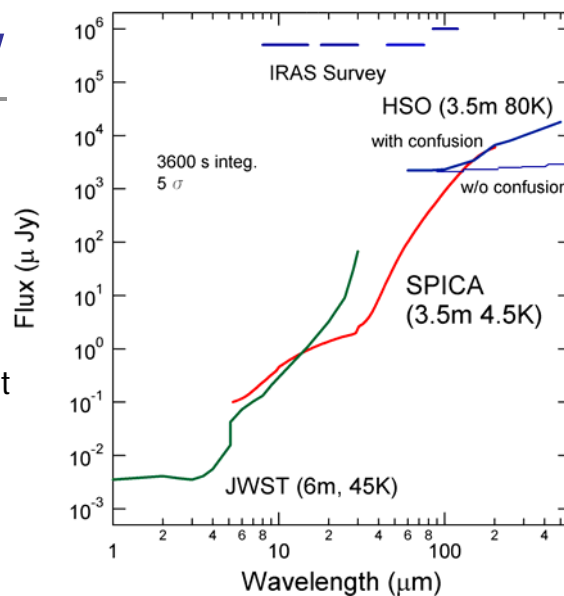
SPICA Mission

- 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



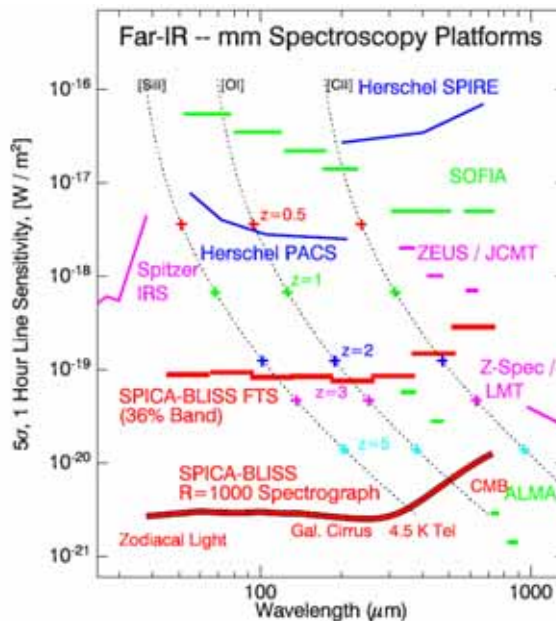
Photometric Sensitivity

- Optimized for Mid- & Far-Infrared
 - Most Sensitive among proposed missions @ 15-130 μm
 - Confusion limited at longer wavelength
- Complimentary to HSO & JWST



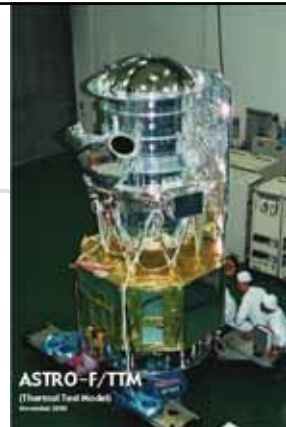
Spectroscopic Sensitivity

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



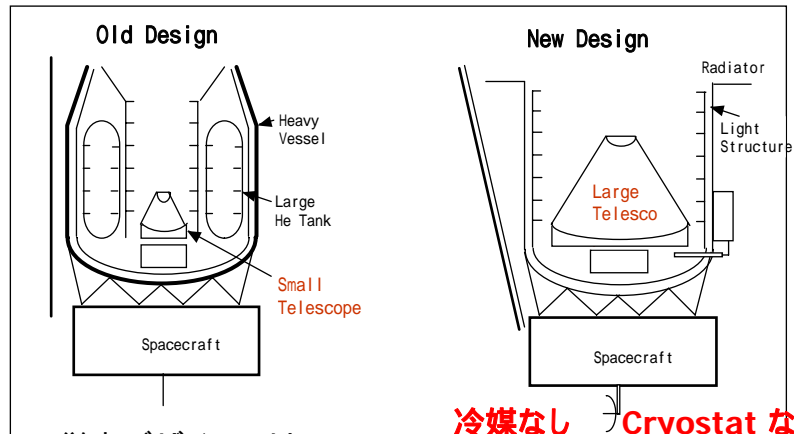
ASTRO-F Heritage

- Science
 - ASTRO-F: Survey
 - SPICA: detailed Obs.
- Technology
 - Cryocoolers
 - Light-weight mirror
 - Large-format detector array



Stirling cooler on ASTRO-F

大口径へ：設計思想の改革



従来デザインでは
搭載不可能

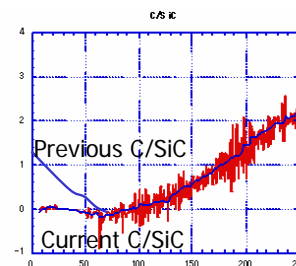
冷媒なし Cryostat なし
画期的な軽量化

R & D の進展

- 経過
 - 1996年ごろより検討開始
 - 2000年度より R&D 予算化
- システム検討
 - 2000年度にRFP/RFI発行
 - 姿勢系、熱設計が重要
- ミッション部
 - 2002年度にRFP/RFI発行
 - 熱設計、冷凍機開発
 - 軽量望遠鏡開発
 - 観測機器検討



宇宙用機械式冷凍機として
世界最低温度を記録 (1.4K)



軽量鏡用材料 (C/SiC) の
低 CTE 化に成功



History of SPICA Project

- Conceptual Study since late 90s
 - International Conference in 2000 at ISAS
- Pre-phase-A Study of the mission
 - Funded since 2001
- R&D Programs
 - ASTRO-F Heritage
 - Cryocoolers: since 2001
 - Light-weight Mirror: 2002-2004
 - Detectors: since 2001



SPICA as an International Mission

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

Schedule (Tentative)

- 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
- 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)

