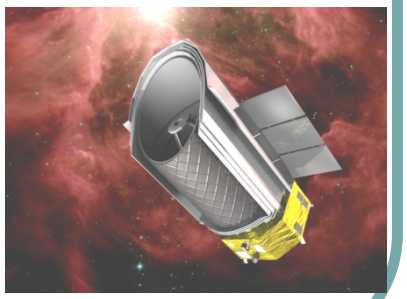
SPICA
Space Infrared Telescope for Cosmology and Astrophysics

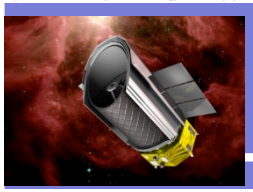
JAXA
Japan Aerospace Exploration Agency

SPICA Overview

December 16, 2010

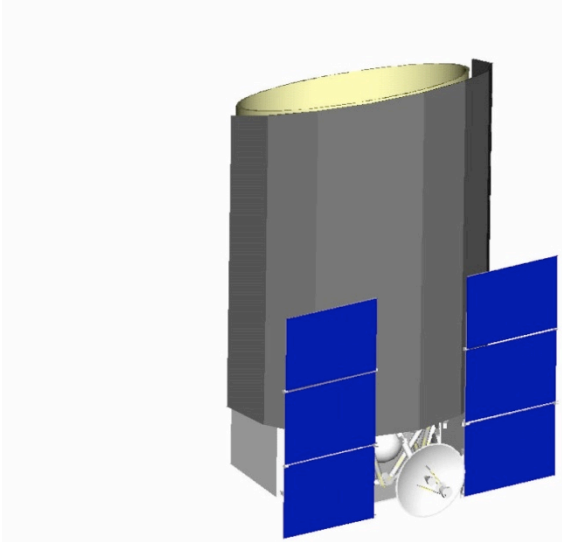
Takao Nakagawa (JAXA)
For SPICA team

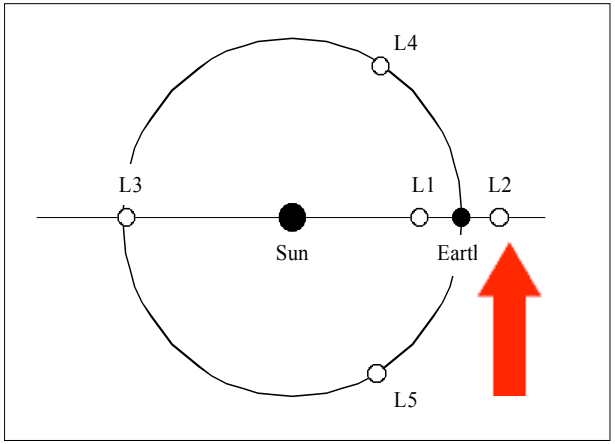




SPICA Mission Overview

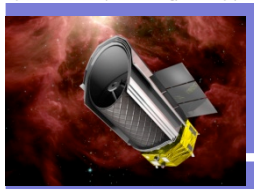
- Specifications
  - Telescope: 3.2m (EPD 3.0m), 6 K
    - Revolving CIB at its energy peak
    - Direct detection of exoplanets
  - Core wavelength: 5-210 μm
    - MIR Instrument
      - Including Coronagraph
    - Far-Infrared Instrument (SAFARI)
      - US Instrument (Optional)
  - Orbit: Sun-Earth L2 Halo
  - Mission Life
    - 3 years (nominal)
    - 5 years (goal)
    - No expendables
  - Weight: 3.7 t
  - Launch: FY2018





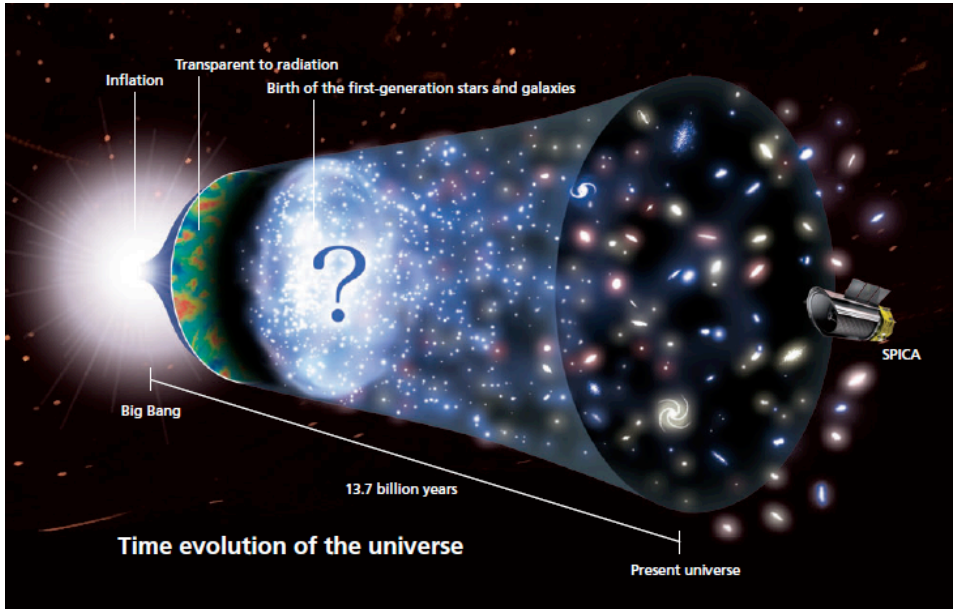

Our Scientific Goals
How did the Universe originate and what is it made of ?
What are the conditions for stellar and planetary formation ?

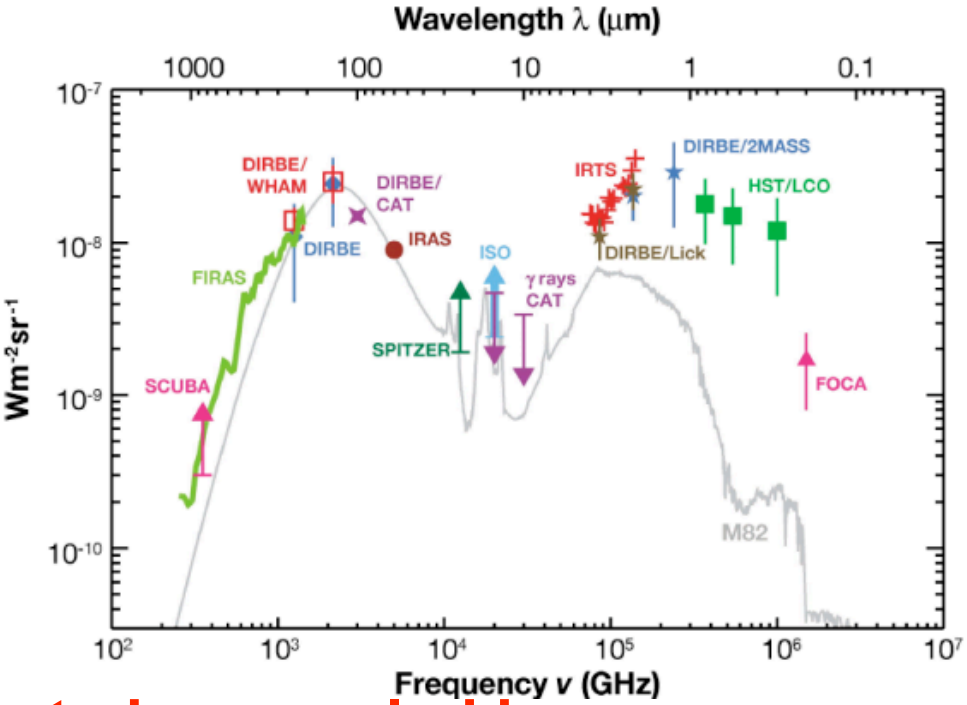
SPICA
Space Infrared Telescope for Cosmology and Astrophysics



Scientific Goals 1

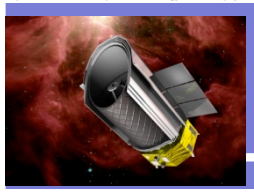
- How did the Universe originate and what is it made of ?





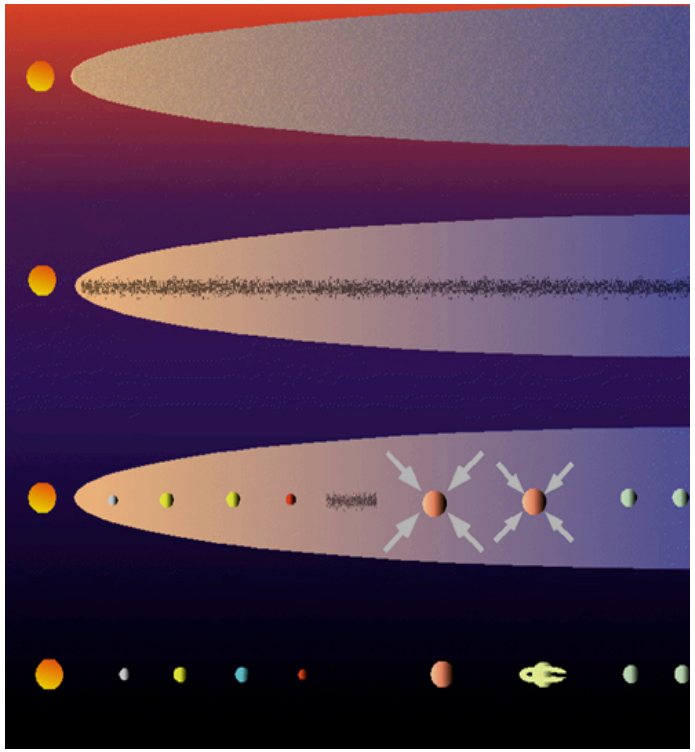
→ **Hidden Universe to be revealed by FIR Observations**

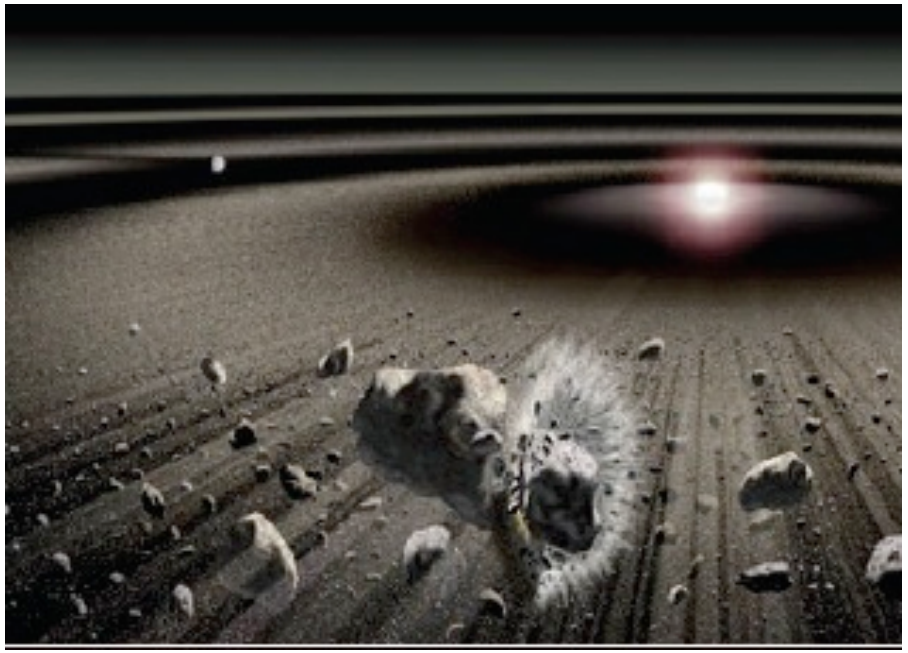
SPICA
Space Infrared Telescope for Cosmology and Astrophysics



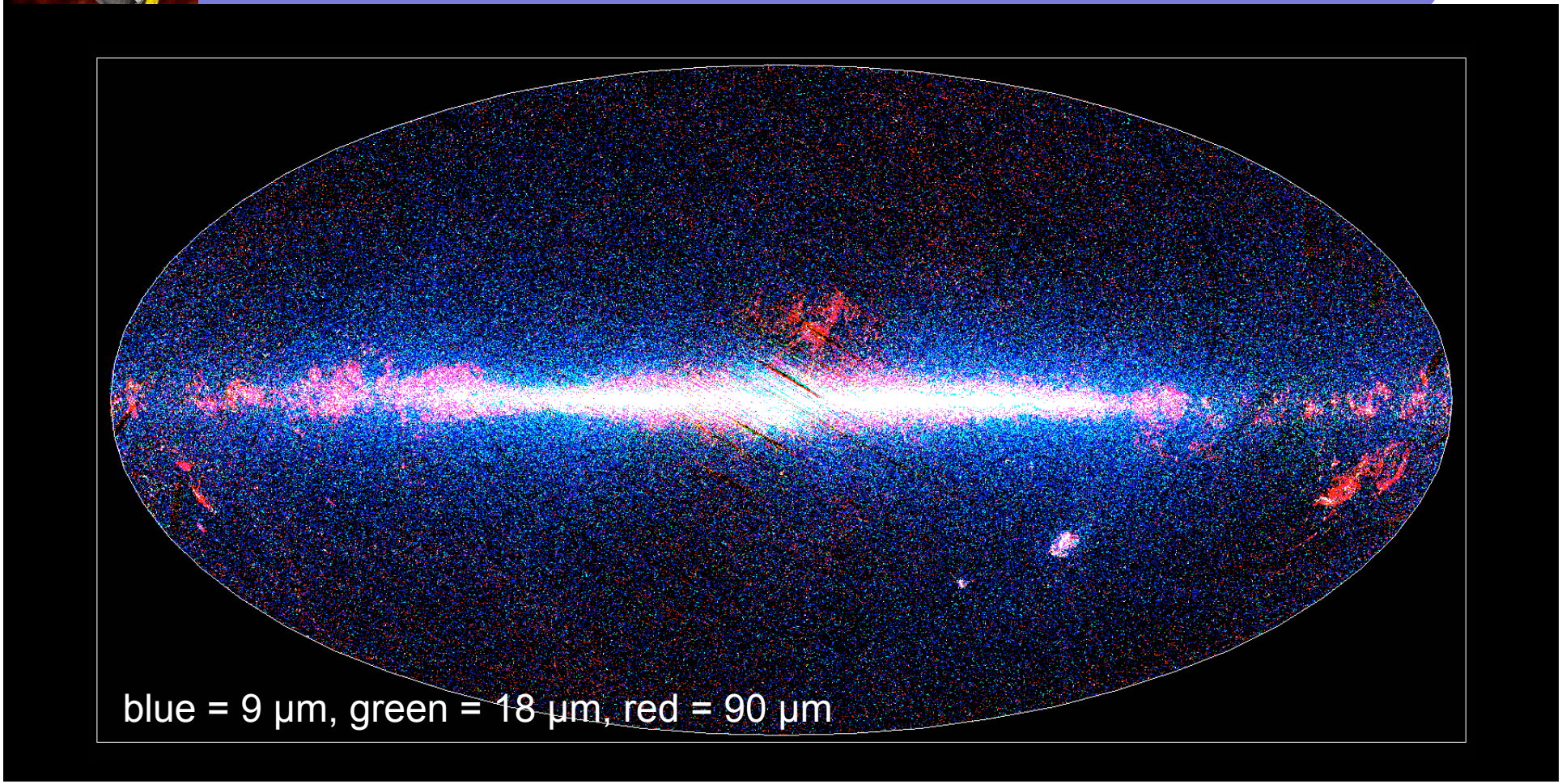
Scientific Goals 2

- What are the conditions for stellar and planetary formation ?





Heritage: AKARI all-sky survey

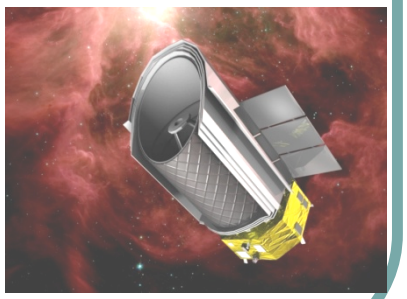


- Ideal guide map for SPICA
  - 0.9 million sources in MIR, 0.4 million sources in FIR

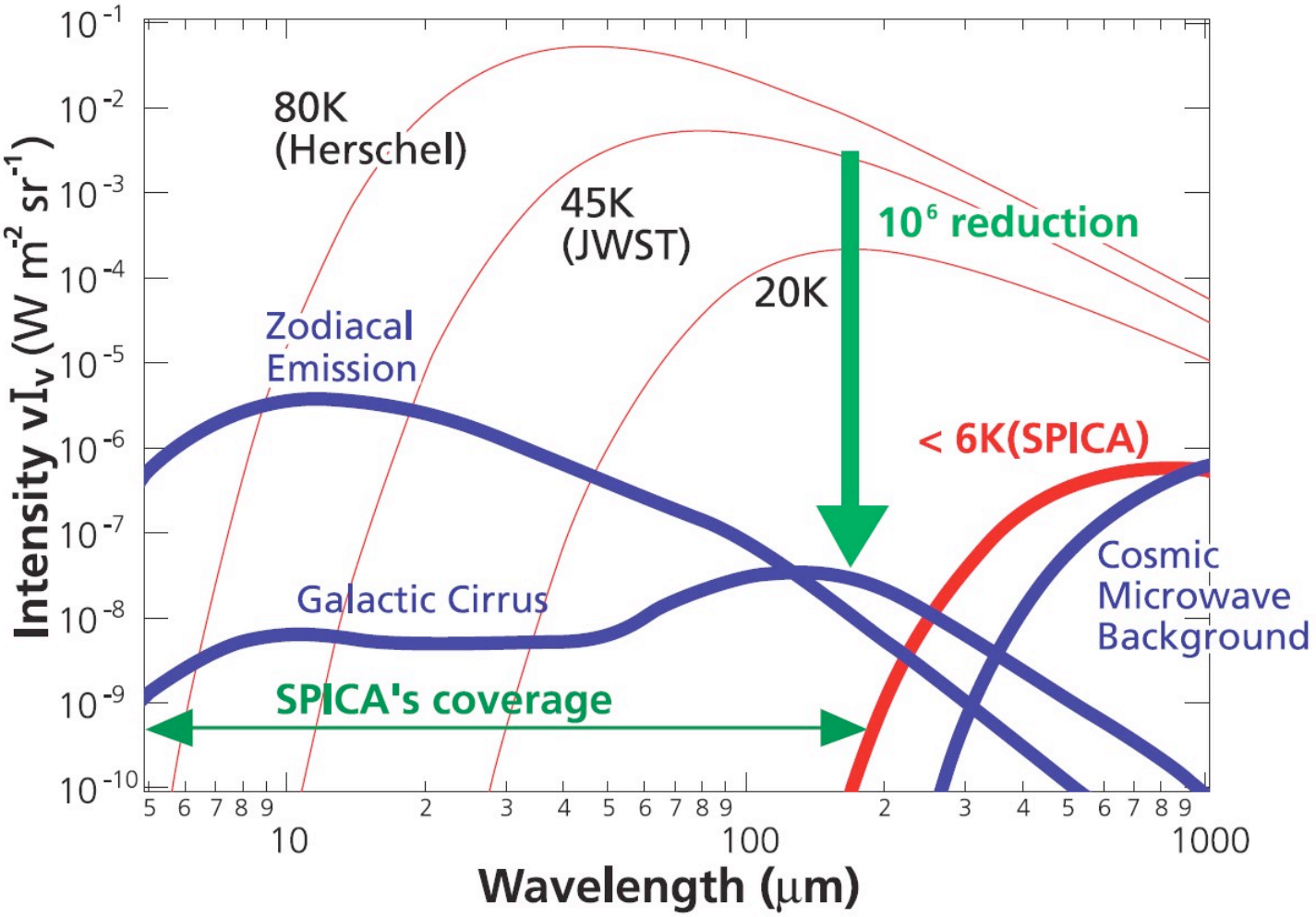
SPICA
Space Infrared Telescope for Cosmology and Astrophysics

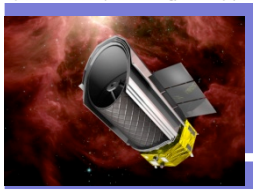
JAXA
Japan Aerospace Exploration Agency

Instrumentation



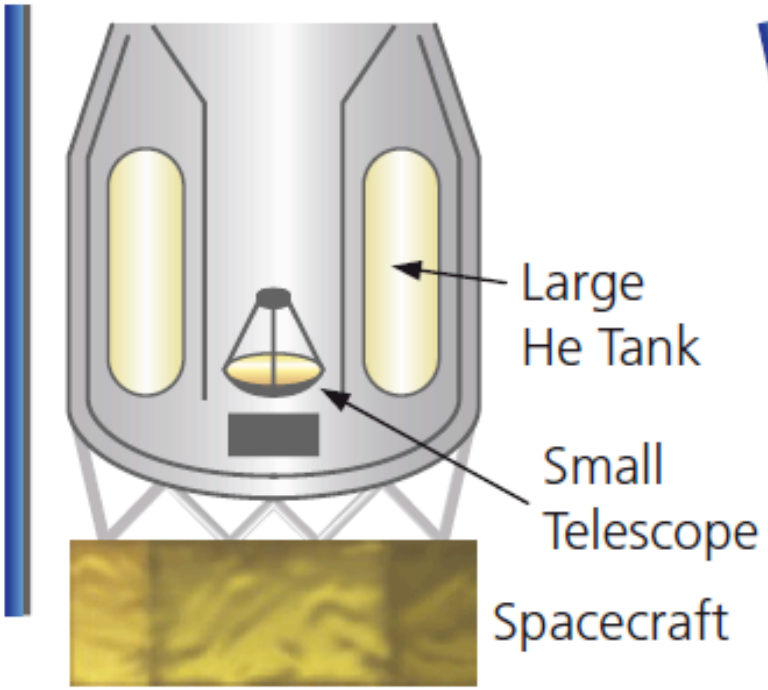
Cool Mission !



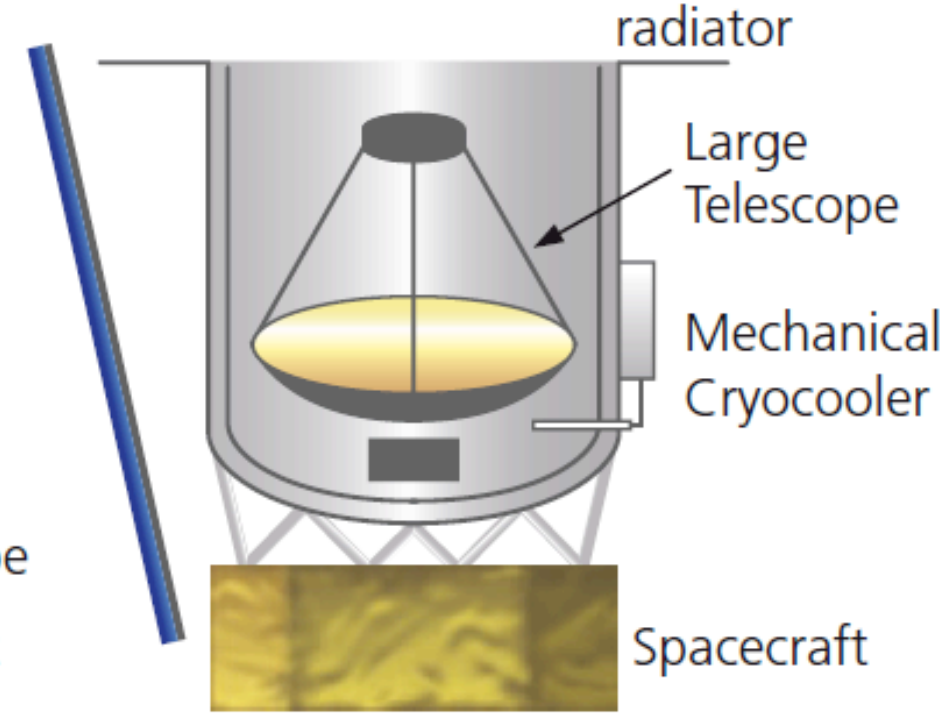


How can it be cooled ?

Today's Space Telescopes

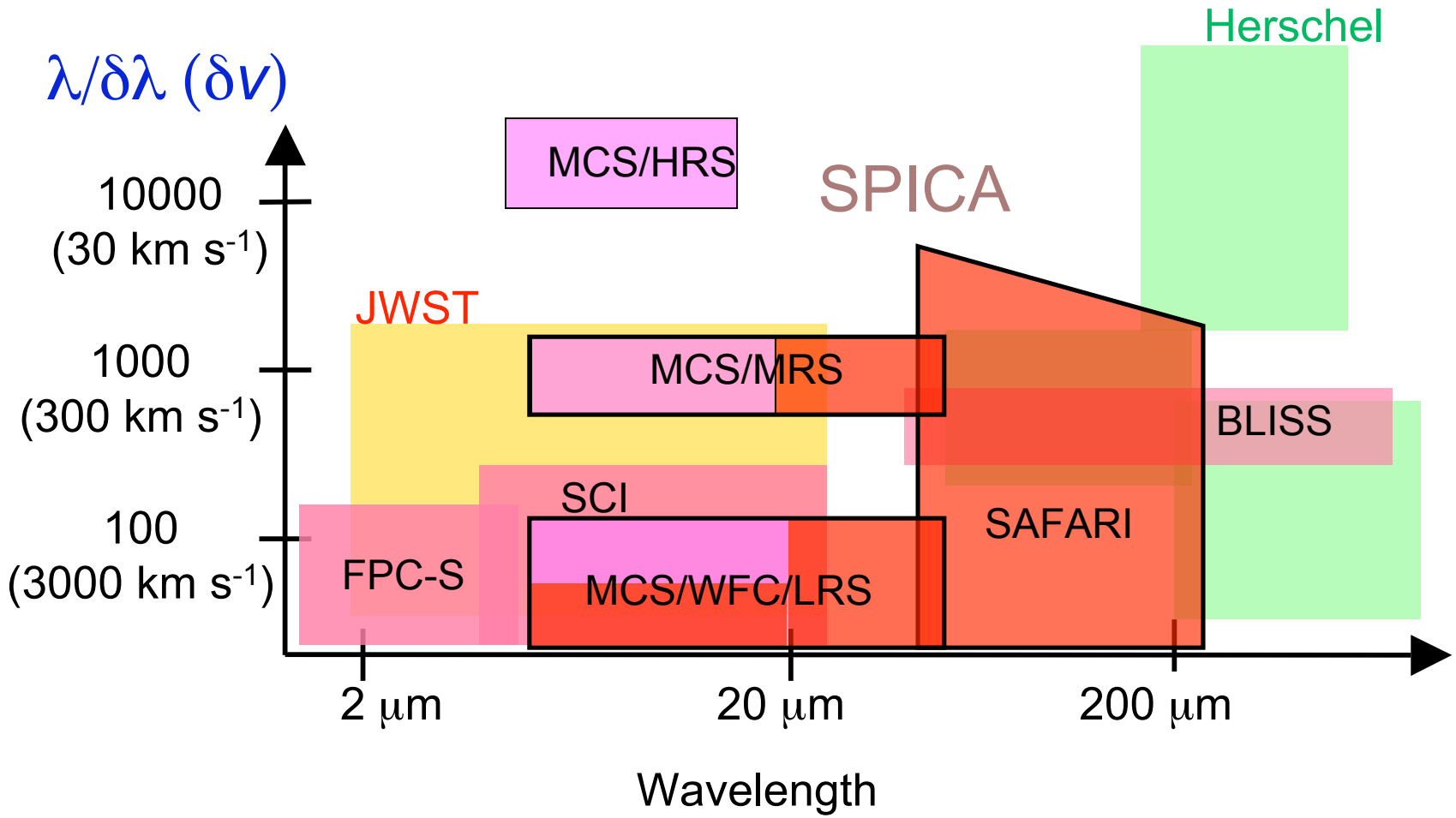


SPICA new design

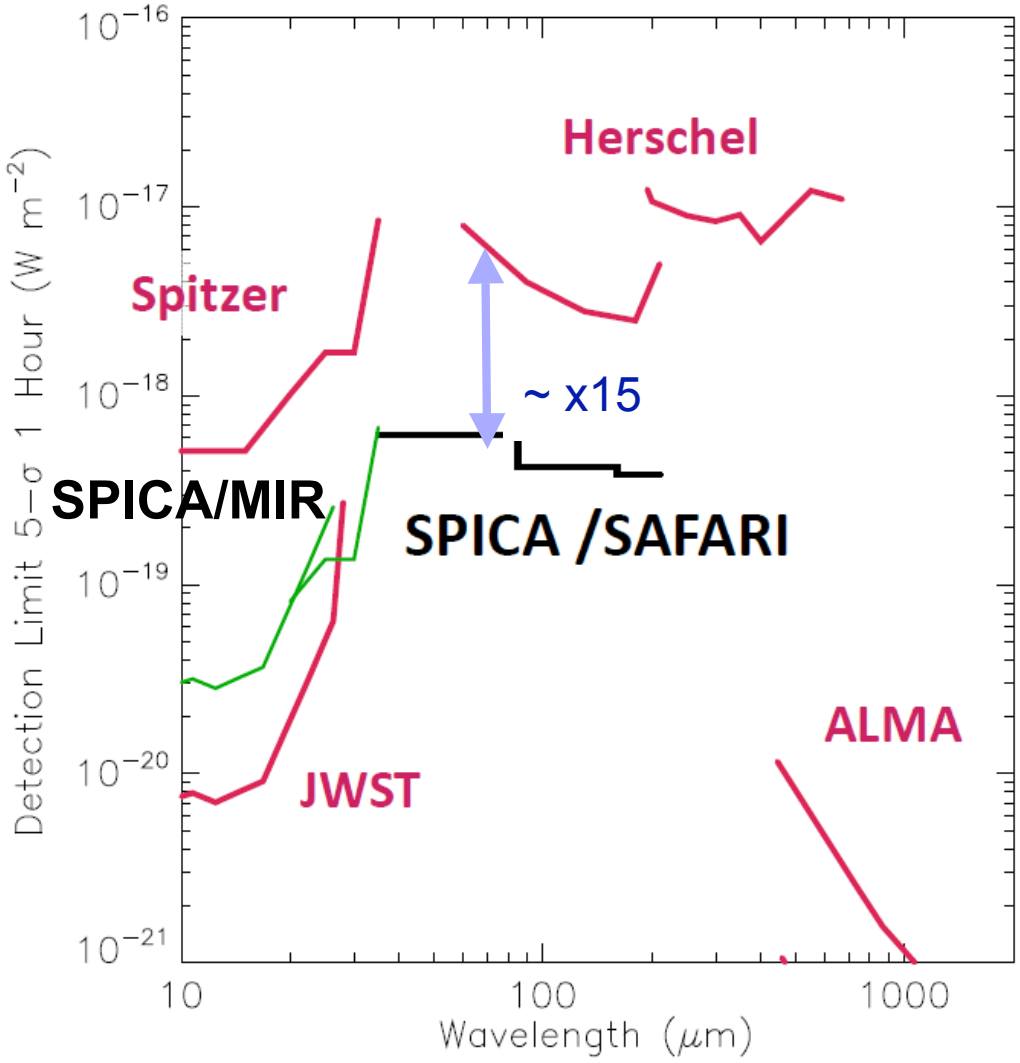


Focal Plane Instruments

Wavelength coverage vs Resolving Power

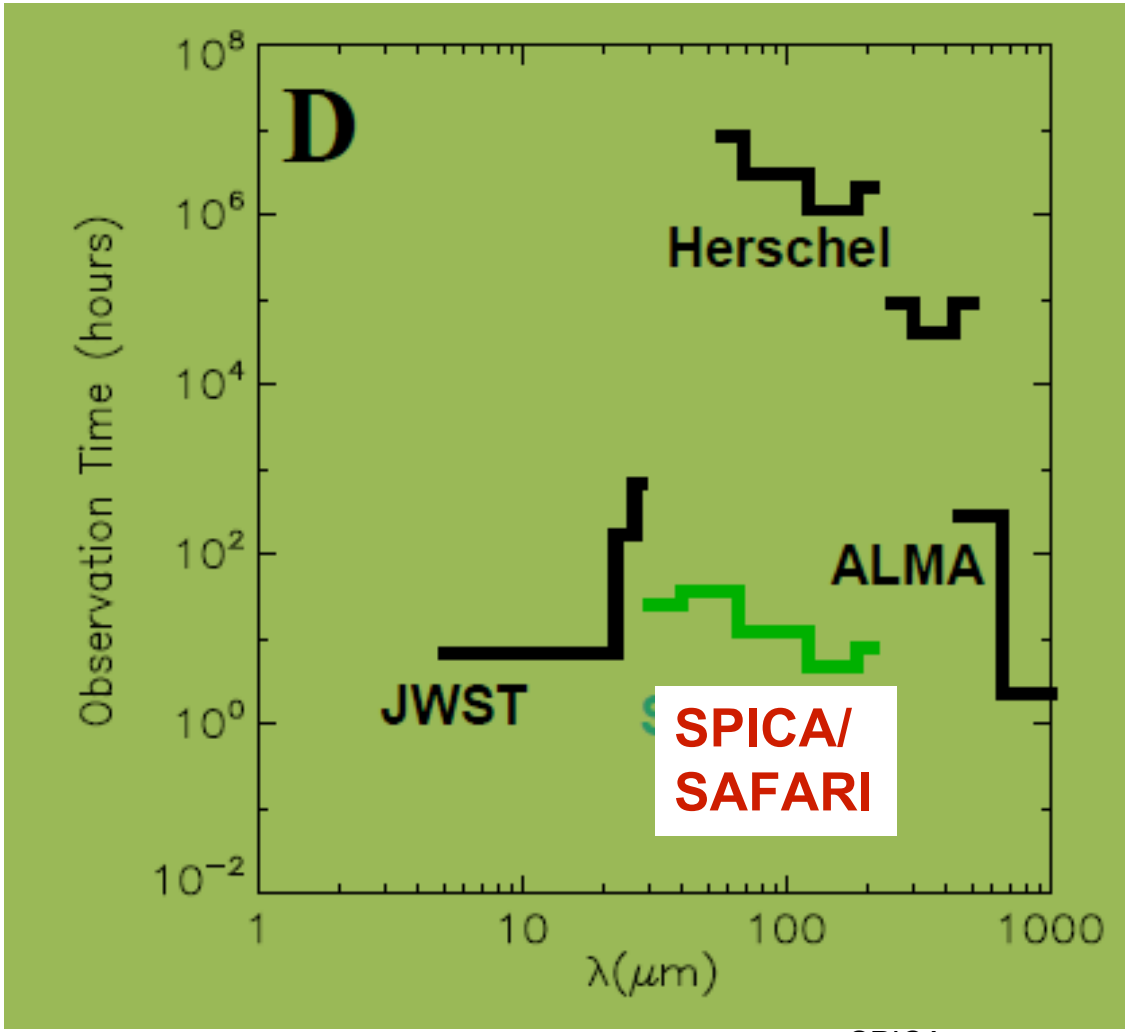


Superior Sensitivity



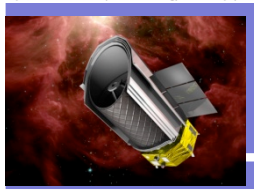
Continuous Coverage from MIR to FRI

Huge Gain of Mapping Speed



Gain of 10^3 !

Mapping a full 2x2 arcmin field covering the full wavelength range



Spectroscopoic Survey

900 hours
Of Obs.

Large-scale
structure

Dark matter
vs
Barionic
Matter

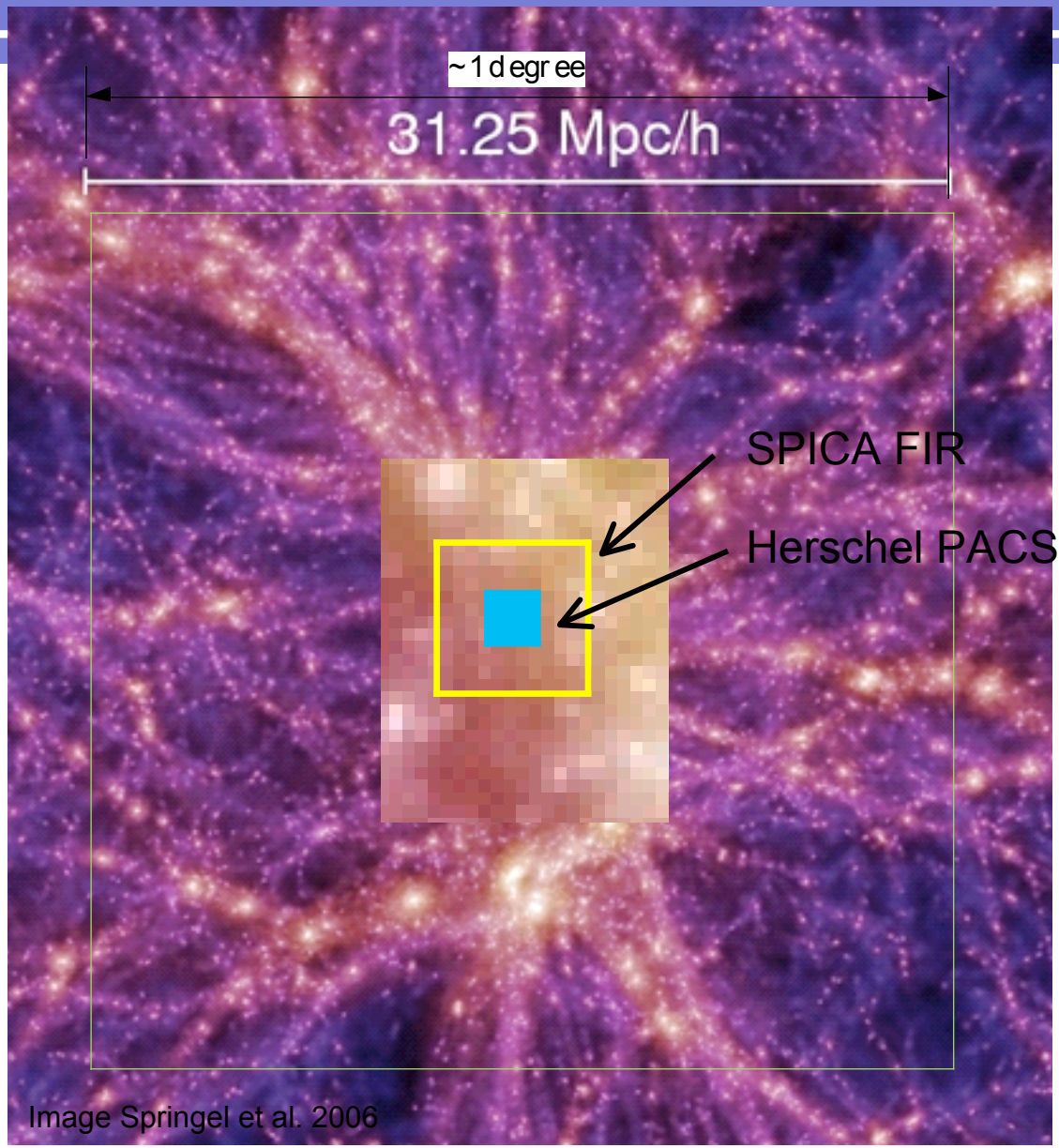
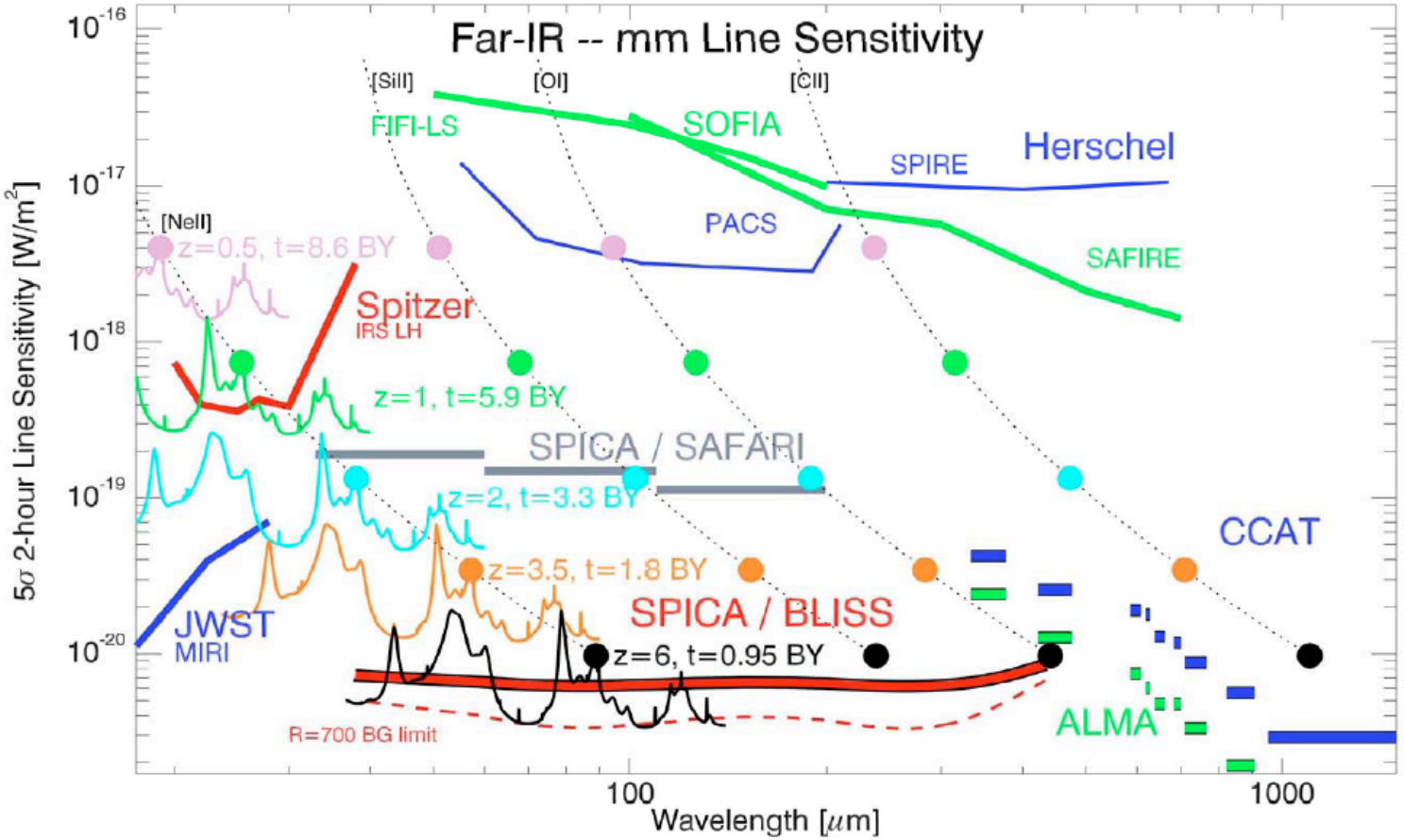


Image Springel et al. 2006

US Instrument (BLISS)

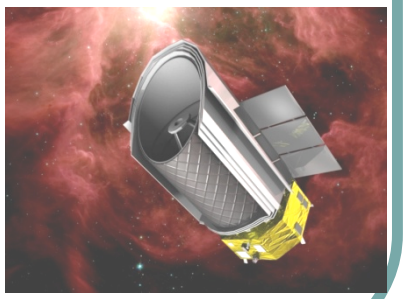


- Note: 3.5m version (to be updated for 3m)

SPICA
Space Infrared Telescope for Cosmology and Astrophysics

JAXA
Japan Aerospace Exploration Agency

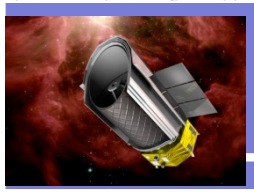
Schedule



SPICA short-term schedule

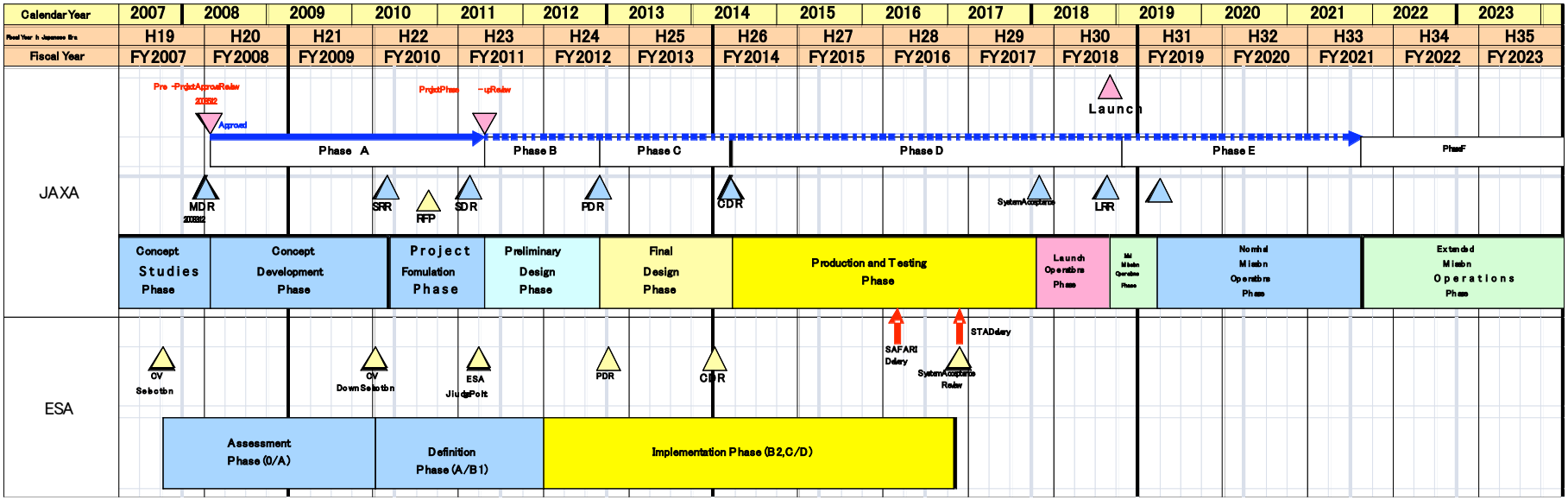
- Status
  - JAXA: Preproject since 2008 (three-year phase), planning a next phase-up review in FY2011.
  - ESA: Missions of Opportunity under the framework of CV
  - USA: strong recommendation in ASTRO2010
- Major Reviews
  - System Requirements Review (SRR, finished, June-Sep, 2010)
    - Consistency (with mission requirements) and feasibility of system requirements approved
  - Request for Proposal (RFP, planned FY2010)
    - To determine industry partners
  - System Definition Review (SDR, planned , FY 2011)
    - Resulting in all technical specifications settled prior to Project approval
  - Project Phase-up Review (planned, FY 2011)
- Other Reviews
  - Focal Plane Instruments (FPI) review

SPICA
Space Infrared Telescope for Cosmology and Astrophysics



Long-term schedule

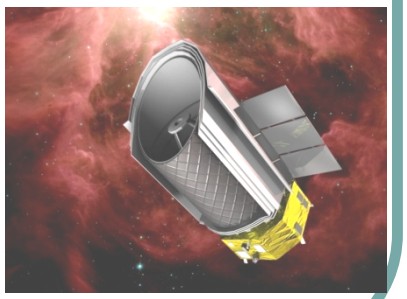
- Current Baseline: Launch FY2018
  - Long-term schedule under discussion
- JAXA's detailed planning (including mission profile, budget and schedule) in the review that will take place in the course of the Japanese fiscal year 2011 (i.e. April 2011-March 2012).
- FPI delivery in mid 2016

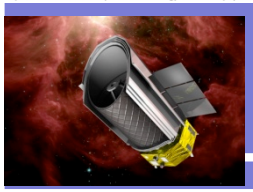


SPICA
Space Infrared Telescope for Cosmology and Astrophysics

JAXA
Japan Aerospace Exploration Agency

International Collaboration





International Collaboration Scheme

SPICA Steering Committee

- SPICA Joint Project Office

Science Advisory Committee

Joint Systems Engineering Team

- JAXA SPICA team: System Integration

Telescope
- JAXA Integration (test @<10K)
- ESA Manufacturing (test @ 80K)

FPI : SAFARI
- ESA I/F Management
- SAFARI Consortium System Integration
  - European Teams
  - Japanese Teams

FPI:MIRs＋SCI
- JAXA Subsystem Integrator
- Japanese Group

FPI:US Inst.
- NASA Team (TBD)

FPI:FPC
- Korean Team
- NAOJ (TBD)

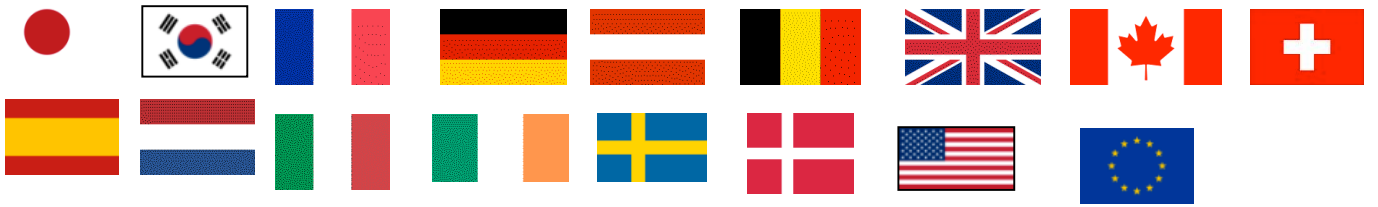
※ FPI : Focal Plane Instrument
SAFARI : SPICA Far-Infrared Instrument
MIRs : Mid Infrared Insturuments (MIRACLE,MIRMES,MIRHES)
BLISS : Background-Limited Infrared-Submikimeter Spectrograph
FPC : Focal Plane finding Camera

Current Status & Schedule

- Europe
  - Role: STA & SAFARI
  - Assessment Study under the framework of ESA Cosmic Vision
  - Waiting for the JAXA's final approval
- Korea
  - Role: FPC
  - Official Study Team formed at KASI (with Universities)
- USA
  - Role: Sub-mm Spectrometer
  - Assessment Study by 3 teams funded by NASA
  - Strong recommendation in the US Decadal Survey
- Taiwan
  - Discussion on possible collaboration

International Collaboration

- 16 countries and one Int. org.




SPICA
Space Infrared Telescope for Cosmology and Astrophysics
Space Odyssey in FY2018