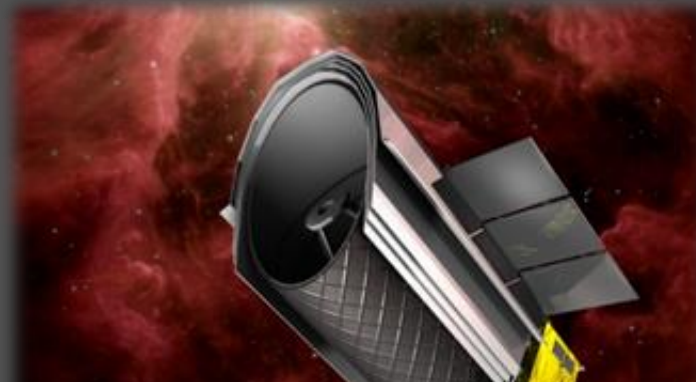
# SPICA/SAFARI Fact Sheet

## SAFARI Overview

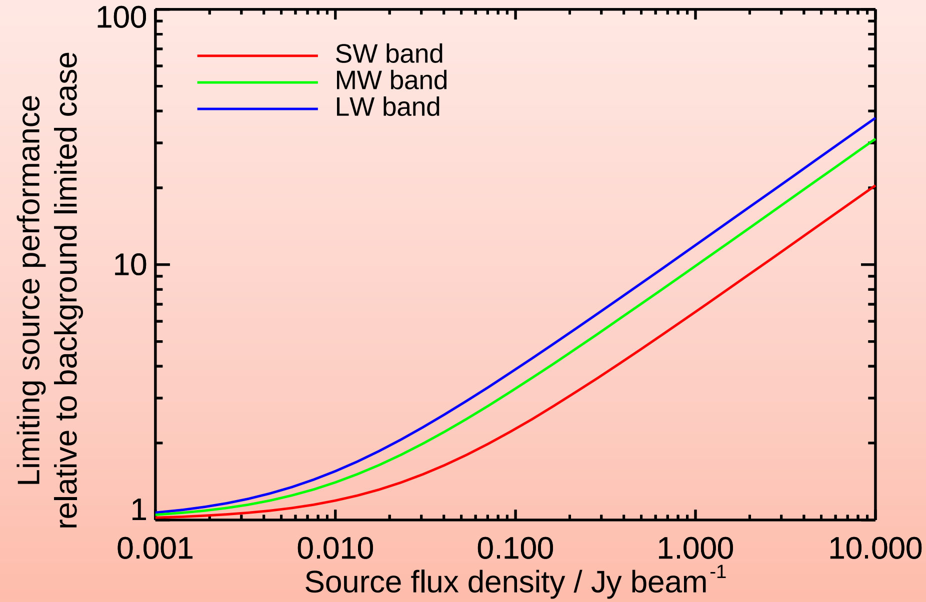
- Three band Fourier transform spectrometer
- Continuous spectroscopic capability from 34-210 μm
- Simultaneous broadband photometry in three bands
- Background limited performance
- Synchronous field of view of 2’x2’ in all three bands

| Parameter | Waveband SW | Waveband MW | Waveband LW | |
|---|---|---|---|---|
| Band centre | 47 μm | 85 μm | 160 μm | General |
| Wavelength range | 34-60 μm | 60-110 μm | 110-210 μm | General |
| Band centre beam FWHM | 4″ | 7″ | 13″ | General |
| Number of detectors | 43 x 43 | 34 x 34 | 18 x 18 | General |
| Confusion limit | 0.015 mJy | 0.5 mJy | 5 mJy | Photometry |
| Minimum Zodiacal background | 8.0 $MJysr^{-1}$ | 3.8 $MJysr^{-1}$ | 2.1 $MJysr^{-1}$ | Photometry |
| Limiting source flux density (5σ-1hour)* | 14 μJy | 21 μJy | 32 μJy | Photometry |
| Time to reach confusion limit at 5σ* | 123 s | 0.3 s | 0.006 s | Photometry |
| Limiting line flux (5σ-1hour)* | $3.7x10^{-19}$ $Wm^{-2}$ | $3.4x10^{-19}$ $Wm^{-2}$ | $2.9x10^{-19}$ $Wm^{-2}$ | Spectroscopy |
| Limiting line flux density 5σ-1hour* – High Res. (R~2000) | 11 mJy | 19 mJy | 31 mJy | Spectroscopy |
| Limiting line flux density 5σ-1hour* – Medium Res. (R~500) | 2.9 mJy | 4.9 mJy | 7.8 mJy | Spectroscopy |
| Limiting line flux density 5σ-1hour* – Low Res (R~50) | 0.3 mJy | 0.5 mJy | 0.8 mJy | Spectroscopy |



## SPICA Telescope

- Effective mirror diameter 3.05 m
- Primary mirror temperature 6 K




- Change in system performance, as a function of target flux density, relative to the background limited case.
- The decrease in sensitivity is a result of the increased photon noise from the target source

SAFARI

*Values are based on single pixel raw sensitivity estimates

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# SAFARI

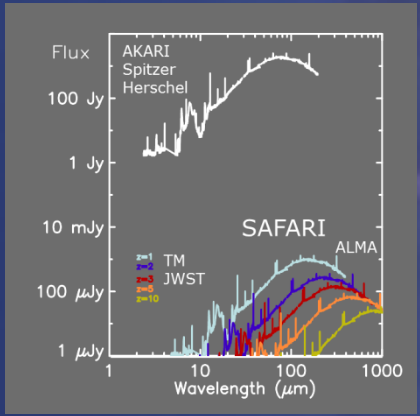
***The exquisite sensitivity of SPICA/SAFARI, limited only by the natural astronomical background, provides an unprecedented spectroscopic mapping capability across the 34-210 μm wavelength range. Consequently, SAFARI is a general purpose instrument of interest to many branches of astronomy, from nearby Solar-System studies, through star-formation to high redshift cosmology observations.***

## Key science drivers for SAFARI

***How do stars and galaxies form and evolve over cosmic time?***

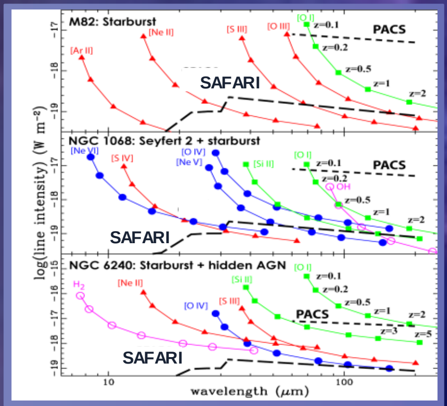
***How does our solar system relate to other planetary systems and could life evolve elsewhere?***

## Tracing the evolution of galaxies over cosmic time




The spectra of high redshift, i.e. far away and old galaxies, become weaker and shift to the far infrared. These weak, 'red' sources are best studied in the domain of SAFARI.

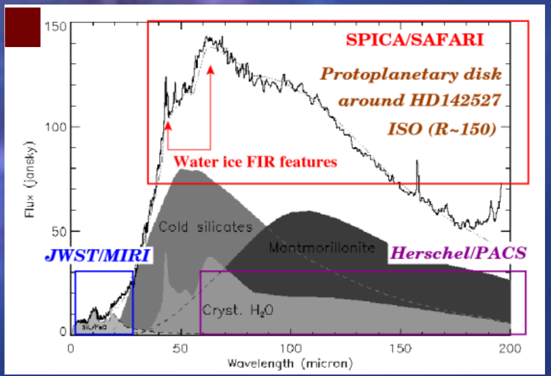
By taking spectra of *thousands* of galaxies out to high redshift, the evolution of these objects over cosmic timescales can be followed. SAFARI will readily detect atomic and molecular lines, and possibly even PAHs out to redshifts of 3 to 4. This will allow us to determine which of the different formation and evolution processes is the dominant one: star formation or black hole matter accretion.




With SAFARI the ionic lines – fundamental tracers of star formation – can be detected for many galaxies out to much higher redshift than is possible today.

## From gas and dust to planets

With SAFARI we will be able to study proto-planetary discs, trace the presence of dusty disks similar to our Kuiper Belt out to ~150 pc, and provide a comprehensive inventory of stars with circumstellar disks for future planet imaging facilities. We will be able to study the transition from protoplanetary to debris disks which is of prime importance to understand the process of planet formation. We will resolve the "snow line" in nearby "Vega" disks and follow the main gas coolants and key chemical species (e.g. water, oxygen, organics) in proto-planetary disks.




The ISO spectrum towards the young star HD142527 (Malfait et al. 1999) showing the components of the MIR/FIR disk emission. Water ices can be detected through the 43/62μm emission features.