

A SPICA far-IR imaging spectrometer SAFARI – its challenges to accomplish scientific goals

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SAFARI (SpicA FAR-infrared Instrument) is an imaging F ourier Transform Spectrometer designed to provide continuous spectral coverage in photometry and spectroscopy from 34 to 210 μm with a high sensitivity of $\sim 3 \times 10^{-19} \text{ Wm}^{-2}$ at 48 μm (5σ , 1 hour). A high spectral resolution of $R = 1000 \sim 6000$ (1000 at 200 μm , 2000 at 100 μm and 6000 at 34 μm) will be achieved with selectable spectral resolution modes of $R \sim$ few hundred and $20 < R < 50$.

SAFARI's superior capability by nature demands multidisciplinary challenges to optimise the whole instrument. Highly sensitive TES detector arrays of $\text{NEP} = 2 \times 10^{-19} [\text{W}/\sqrt{\text{Hz}}]$ that covers a wide field of view ($2' \times 2'$) with high spatial resolutions (3.6 \sim 11.5 [arcsec]) as well as a large dynamic range (> 2000) is the high priority issue. Heat dissipation of large-formatted arrays, susceptibility to environmental electro-magnetic interferences, high accuracy/stability of the telescope pointing, good optical alignment and stray light control, mechanical vibration level of the satellite's BUS module, are all to be thoroughly designed and controlled so that we can achieve a wide variety of science cases that are to be covered by SAFARI, including galaxy evolution, planetary system formation and tracing the transmigration of interstellar matter.

We present the best expected performance of the SAFARI instrument and describe its scientific potential.