

## W210a **Highly sensitive far-IR superconducting Edge Sensor array development for the SAFARI instrument onboard SPICA**

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SAFARI (SpicA FAR-infrared Instrument) is an imaging Fóurier Transform Spectrometer designed to provide continuous spectral coverage in photometry and spectroscopy from 34 to 210  $\mu\text{m}$  with a high sensitivity of  $\sim 3 \times 10^{-19} \text{ Wm}^{-2}$  at 48  $\mu\text{m}$  ( $5\sigma$ , 1 hour). To accomplish SAFARI's superior capability, large-formatted arrays of highly sensitive TES detector ( $\text{NEP} = 2\text{--}3 \times 10^{-19} [\text{W}/\sqrt{\text{Hz}}]$ ), which cover a wide field of view ( $2' \times 2'$ ) with high spatial resolutions (3.6  $\sim$  11.5 [arcsec]), have been developed. The detector set consists of three arrays of  $\sim 300\text{--}\sim 2000$  pixels, whose electrical signals are read out by 160-times multiplexing in frequency domain to reduce electric wires and thus reduce heat flow into the cold detector modules.

In this presentation, we describe the current technology achievements and the scope of the further developments of the SAFARI's TES detector. Individual technical components, including high sensitivity ( $\text{NEP} = 4\text{--}5 \times 10^{-19} [\text{W}/\sqrt{\text{Hz}}]$ ) as well as high optical coupling ( $\sim 60\%$ ), are already demonstrated in the lab. and are achieving the required goal performances. Fabrication of the full-scale arrays as well as frequency-domain multiplexing are also under tested. Since the detector has unprecedentedly high sensitivity, careful designing is required to prevent electromagnetic interfering. Susceptibility for the vibration environments during the launch of the satellite as well as observations on orbit is also an important issue and requires careful considerations.