

# Upgrade of the SMART Focal Plane Array Receiver for NANTEN2

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We present the recent upgrade to the KOSMA SMART 2x 8-pixel dual-color focal plane array receiver. The 460–490 GHz channel has been upgraded from 4 to 8 pixels. We use standard tunerless waveguide mixers with corrugated horns and all-Niobium single junction SIS devices. The measured noise temperatures are around 70 K over the RF band for an IF of 3.5–4.5 GHz for all pixels. At the IF the receiver is enhanced with new bias-tees and low noise MMIC amplifiers developed at Caltech.

In the 800–880 GHz channel, devices with NbTiN-SiO<sub>2</sub>-Al tuning structures replace older SIS devices with Al-SiO<sub>2</sub>-Al tuning microstrip circuits. Their fabrication at KOSMA's nanofabrication facilities utilizes electron beam lithography and chemical-mechanical planarization processing steps developed for the HIFI Band 2 devices. These devices need less local oscillator power, which facilitates the upgrade from 4 to 8 pixels. Measured noise temperatures per pixel are between 250 K and 300 K over the RF band for an IF of 4–8 GHz. In SMART the IF band is 1–2 GHz in order to simultaneously cover the CO 7-6 and the <sup>3</sup>P<sub>2</sub>-<sup>3</sup>P<sub>1</sub> Carbon lines at 807 GHz and 809 GHz in the lower and upper sidebands. All noise temperatures are measured with a 13 μm thick Mylar beam splitter, are uncorrected and calculated according to the Callen-Welton formalism.

The receiver is currently being installed at the KOSMA Gornergrat observatory. After a two-month test run, it will be shipped to the NANTEN2 telescope in Chile to be installed as a facility instrument in time for the southern hemisphere winter.