

16 pixel, 3 mm band, Cryogenic Array Receiver for Users of the Sardinia Observatory (CARUSO)

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Abstract - The CARUSO instrument provides 16 independent dual polarization heterodyne receivers in 4x4 configuration operating at W-band frequencies and configured as a focal plane imaging array. CARUSO is designed for use on the 64 m diameter Sardinia Radio Telescope (SRT, www.srt.inaf.it) and detects over the frequency range 70 to 116 GHz. Individual cryogenic pixels use HEMT low noise amplifier technology combined with sideband separating subharmonic heterodyne mixing. Polarisation duplexing is achieved by means of a compact, low loss, orthomode transducer. An image of a single pixel is shown in Fig. 1. The receiver array is mechanically cooled to 20 K in a novel conical shaped cryostat. Integrated receiver front-end assemblies are located at the SRT's Gregorian focal plane and provide high quality beam patterns with high antenna efficiency. The field of view covered by the 4x4 array is $2:15 \times 2:15$ arcmin², unfilled, with separation between contiguous elements of 43 arcsec.

When installed, CARUSO will provide a state-of-the-art W-band array receiver and will detect both

continuum and molecular spectral lines from astronomical sources and radio emission from the Sun in the 3 mm atmospheric window. The overall system concept and latest receiver performance results will be presented.

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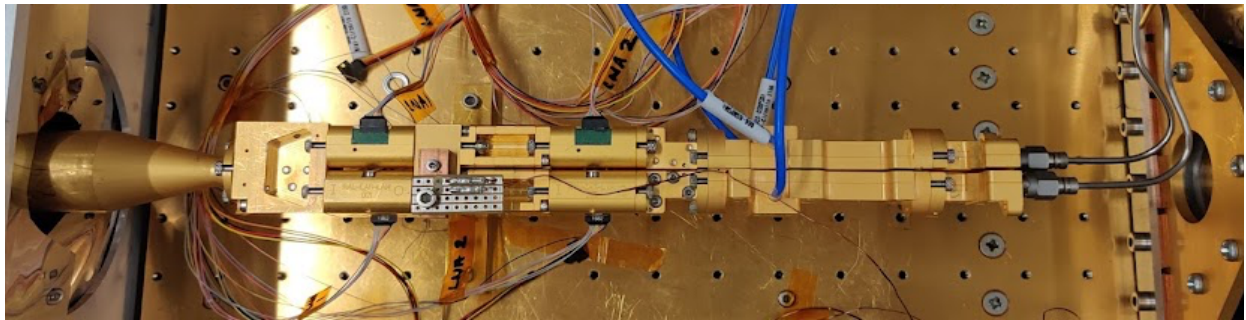


Figure 1: Photograph of a single dual polarization pixel during cryogenic testing. From left of photograph, components are a smooth walled feedhorn, orthomode transducer, low noise amplifiers #1, waveguide isolators, low noise amplifiers #3, subharmonic sideband separating subharmonic mixers and frequency triplers

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