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ASTRONOMY DEPARTMENT FACULTY PUBLICATION SERIES

Title

SuperCam: a 64-pixel heterodyne imaging array for the 870-micron atmospheric window (Proceedings Paper)

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Publication Date

2006

Journal or Book Title

Proceedings of Spie

Abstract

We report on the development of *SuperCam*, a 64 pixel, superheterodyne camera designed for operation in the astrophysically important 870 μm atmospheric window. *SuperCam* will be used to answer fundamental questions about the physics and chemistry of molecular clouds in the Galaxy and their direct relation to star and planet formation. The advent of such a system will provide an order of magnitude increase in mapping speed over what is now available and revolutionize how

observational astronomy is performed in this important wavelength regime. Unlike the situation with bolometric detectors, heterodyne receiver systems are coherent, retaining information about both the amplitude and phase of the incident photon stream. From this information a high resolution spectrum of the incident light can be obtained without multiplexing. *SuperCam* will be constructed by stacking eight, 1×8 rows of fixed tuned, SIS mixers. The IF output of each mixer will be connected to a low-noise, broadband MMIC amplifier integrated into the mixer block. The instantaneous IF bandwidth of each pixel will be ~2 GHz, with a center frequency of 5 GHz. A spectrum of the central 500 MHz of each IF band will be provided by the array spectrometer. Local oscillator power is provided by a frequency multiplier whose output is divided between the pixels by using a matrix of waveguide power dividers. The mixer array will be cooled to 4K by a closed-cycle refrigeration system. *SuperCam* will reside at the Cassegrain focus of the 10m Heinrich Hertz telescope (HHT). A prototype single row of the array will be tested on the HHT in 2006, with the first engineering run of the full array in late 2007. The array is designed and constructed so that it may be readily scaled to higher frequencies.

DOI

10.1109/MWSYM.2015.7166873

Comments

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Volume

6275

Recommended Citation

Groppi, C; Walker, C; Kulesa, C; Putz, P; Golish, D; Gensheimer, P; Hedden, A; Bussmann, S; Weinreb, S; Kuiper, T; Kooi, J; Jones, G; Bardin, J; Mani, H; Lichtenberger, A; and Narayanan, Gopal, "SuperCam: a 64-pixel heterodyne imaging array for the 870-micron atmospheric window (Proceedings Paper)" (2006). *Proceedings of Spie*. 1157.
[10.1109/MWSYM.2015.7166873](https://doi.org/10.1109/MWSYM.2015.7166873)

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