

## Heterodyne Instrumentation Development for the Caltech Submillimeter Observatory

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Under development at the Caltech Submillimeter Observatory is a dual polarization, continuous comparison (correlation) receiver. The instrument has two beams on the sky; a reference and a signal beam. Using only cooled reflecting optics, two polarizing grids, and a quadrature hybrid coupler, the sky beams are coupled to four tunerless SIS mixers (both polarizations). The 4-8 GHz mixer IF outputs are, after amplification, correlated against each other. In principle, this technique results in flat baselines with very low RMS noise and is especially well suited for high red shift Galaxy work.

At the same time an upgrade is planned to the existing facility heterodyne instrumentation. Dual frequency mode receivers have been development for the 230/460 GHz and 345/660 GHz atmospheric windows. The higher frequency receivers are implemented in a balanced configuration, which reduces both the LO power requirement and noise. Each mixer has 4 GHz of IF bandwidth and can be controlled remotely.

Not only do these changes greatly enhance the spectroscopic capabilities of the CSO, they also enable the observatory to be integrated into the Harvard-Smithsonian Submillimeter Array (SMA) as an additional baseline. Installation is expected to commence in the Fall/2003.

Keywords: Radial probe, full-height waveguide to thin-film microstrip transition, split-block, superconducting-insulating-superconducting (SIS) tunnel junction, broad bandwidth quadrature waveguide hybrid, DC-break, IF match.

