

Plans and Progress in the Construction of Receiver Systems for ALMA

The ALMA system is an interferometer comprising 64 Cassegrain antennas, each twelve meters in diameter, having maximum baseline lengths up to 14 kilometers. Each antenna will be outfitted with a cryogenically cooled heterodyne radio receiver that covers all the atmospheric windows between 30 and 950 GHz in ten bands. In each of these bands the two orthogonal polarizations must be simultaneously detected each in an IF bandwidth of 8 GHz. For frequency bands above 84 GHz SIS junctions, cooled to below 4 Kelvin, will be used to meet stringent performance specifications. Initially just four of the ten bands will be constructed with the balance following at a later date. In addition, a water-vapour radiometer operating at 183 GHz will be incorporated in each front end and used to track atmospheric delay variations. The local oscillator system is a unique design that was developed to meet the difficult phase and amplitude noise requirements required for an interferometer working at such high frequencies and long baselines.

Given the high (> 5000 m) and remote site (Chilean Atacama dessert) and the large number of antennas, special weight has been given to developing a design that is simple, reliable and easy to use. In addition, care has been taken to produce a design that is both suitable for series production and cost-effective.

In this talk technical details of the front end design will be described and the current state of development will be reviewed. Plans for the construction phase will also be presented.