

ALMA SITE AND CONFIGURATIONS

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The international Atacama Large Millimeter Array will be constructed on the high (5050 m) plateau southwest of Cerro Chajnantor, Chile, about 40 km east of the village of San Pedro de Atacama. Measurements since 1995 have demonstrated this is a premier site for observations at millimeter and submillimeter wavelengths, with exceptional atmospheric conditions, i. e., transparency and stability. The entire area has been declared a “scientific preserve” by decree of the Chilean government. The 225 GHz and 350 μm atmospheric transparency is better more often at Chajnantor than at Mauna Kea. The first quartile zenith transparencies at Chajnantor and the South Pole are roughly equal.

The ALMA will consist of sixty four antennas, each 12 m diameter. These antennas are transportable so the array can be reconfigured to provide a variety of observational capabilities. Instead of discrete configurations, the ALMA will use a flexible reconfiguration scheme. By moving a few antennas, the array size can be increased or decreased slightly in a self-similar manner. In operation, the array will be reconfigured continuously, cycling from the smallest to the largest configuration and back with a schedule adjusted to meet scientific demand. The ALMA configurations have a total of 250 antenna stations and span a 100:1 dynamic range from 150 m to 14 km diameter. Design goals depend on the configuration size. The smallest configuration is designed for maximum surface brightness sensitivity, the intermediate configurations, about 250 m to 3 km diameter, are designed for high quality imaging with Gaussian synthesized beam shapes that minimize sidelobes and reconstruction errors, and the largest configuration is designed for maximum resolution.

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