The SMT is the most accurate submillimeter astronomical telescope in the world (15 microns rms). It is designed specifically to operate in the submillimeter wavelength region of the spectrum, 205GHz to 490GHz (less than 2mm wavelength!).

The major areas of millimeter/sub-millimeter science pursued at Steward Observatory include studies of the structure and dynamics of late-type stars and planetary nebulae, molecular cloud morphology, star formation, as well as astrochemistry of interstellar and circumstellar material. These investigations require instruments called heterodyne receivers. These receivers are sensitive enough for molecular line searches and large-scale mapping of molecular emission.

Our sister scope located 1 hour west of Tucson on Kitt Peak, is called The 12m. The 12m heterodyne receivers cover the 65-183 GHz range (2 and 3 mm windows), and the SMT supports 200-490 GHz receivers. Future instrumentation is planned to operate up to 800GHz. Many of these receivers are dual polarization and single sideband. The ARO also supports array receivers, at present, the 345 GHz, the seven-pixel Desert Star array, to be followed by SuperCam. ARO is also actively involved in millimeter-wave VLBI, in collaboration with M.I.T. Haystack.

Forefront Scientific Research Programs

The unique capabilities of the ARO telescopes include a broad frequency coverage and many stable, sensitive receiver systems and back-ends that allow for deep line searches, complemented by an active supporting laboratory spectroscopy group that focuses on potential interstellar molecules - a prime combination for astrochemical studies; also an innovative instrument lab. Routine remote observing has allowed for 24-hrs a day operations from October – June from Asia, Europe and South Africa.