

Development of a High Efficiency 600-700 GHz Backward Wave Oscillators for Submillimeter Applications

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Calabazas Creek Research, Inc. is funded by the National Aeronautics and Space Administration to develop efficient, light-weight, backward wave oscillators (BWOs) for applications from 300 GHz to 1 THz. These devices are needed as local oscillator (LO) sources in heterodyne receivers. Very low noise heterodyne receivers are needed at submillimeter wavelengths for low-background radio astronomy observations and remote sensing of comets, Earth and other planetary atmospheres. Above 100 GHz, only BWOs have broad tunability (over 100 GHz) and high output power (~1 mW); however, they are heavy (over 20 kg), consume a lot of power (270 W), required water cooling, and have poor output mode purity.

Development is continuing on advanced backward wave oscillators that will incorporate energy recovery, air cooling and significant weight reductions by use of lighter advanced magnetic materials. An improved coupler has been developed to transform the generated RF power to a high purity Gaussian output mode. The design of a 600-700 GHz BWO incorporating these improvements is currently underway. Construction of this tube is expected to begin in late 2001.