CSO’s Scientific Achievements

Over 23 Years of Operation
Since 1986
Development of Superconducting-Tunnel-Junction

- Development of superconducting-tunnel-junction detectors for radio astronomy, now commonly used on ground- and space-based radio observatories such as ALMA, CARMA, and Herschel.
The quest for higher frequencies: 600-720 GHz (ca 1995)

Submillimeter Line Forest

• Detection of the submillimeter “line forest”, using the line survey technique, as well as of key hydride molecules, which has led to improve understanding of the interstellar chemistry.

Comito et al. 2005
Role of Atomic Carbon [CI] in the Interstellar Medium

Pardo et al. 2005
Mapping of Molecular Gas of Radio Galaxies

NGC5128 (Centaurus A)

Contour: Radio jet
Gray scale: Optical image

Phillips et al. 1987
Spectroscopy of Distant and Local Galaxies using Z Spec

CO in Cloverleaf QSO at z=2.56
Z-Spec at CSO

April 2008
7.9 hours
half $\tau$~0.5, half $\tau$~0.15
Heavy Water in Comets

- Determination of the volatile composition of comets, including the first ground-based detection of HDO (heavy water) in a comet, leading to improved understanding of the origin of comets and of terrestrial water.

Bockele-Morvan et al. 1998

Spectrum of the 101–000 line of HDO at 464.925 GHz in C/1996 B2 (Hyakutake)
Rare Molecule ND$_3$

- Discovery of ND$_3$, a rare type of ammonia, about 11 orders of magnitude stronger than initially presumed to exist.

Barnard 1: Lis et al. 2002
NGC1333: Van der Tak et al. 2002
Stellar Debris Disks

• Spatially resolved imaging of nearby stellar debris disks, using SHARC, providing evidence for the presence of planets in these systems.

Backman et al. 09

Marsh et al. 06