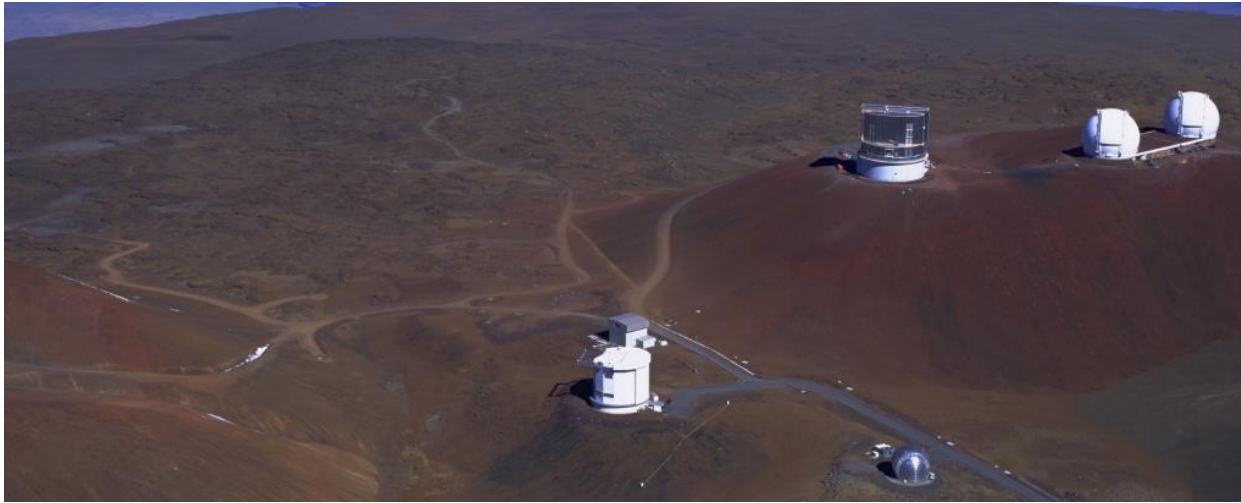


SMA

Jack Welch Fest
September 9, 2005

Mauna Kea: Submillimeter Valley



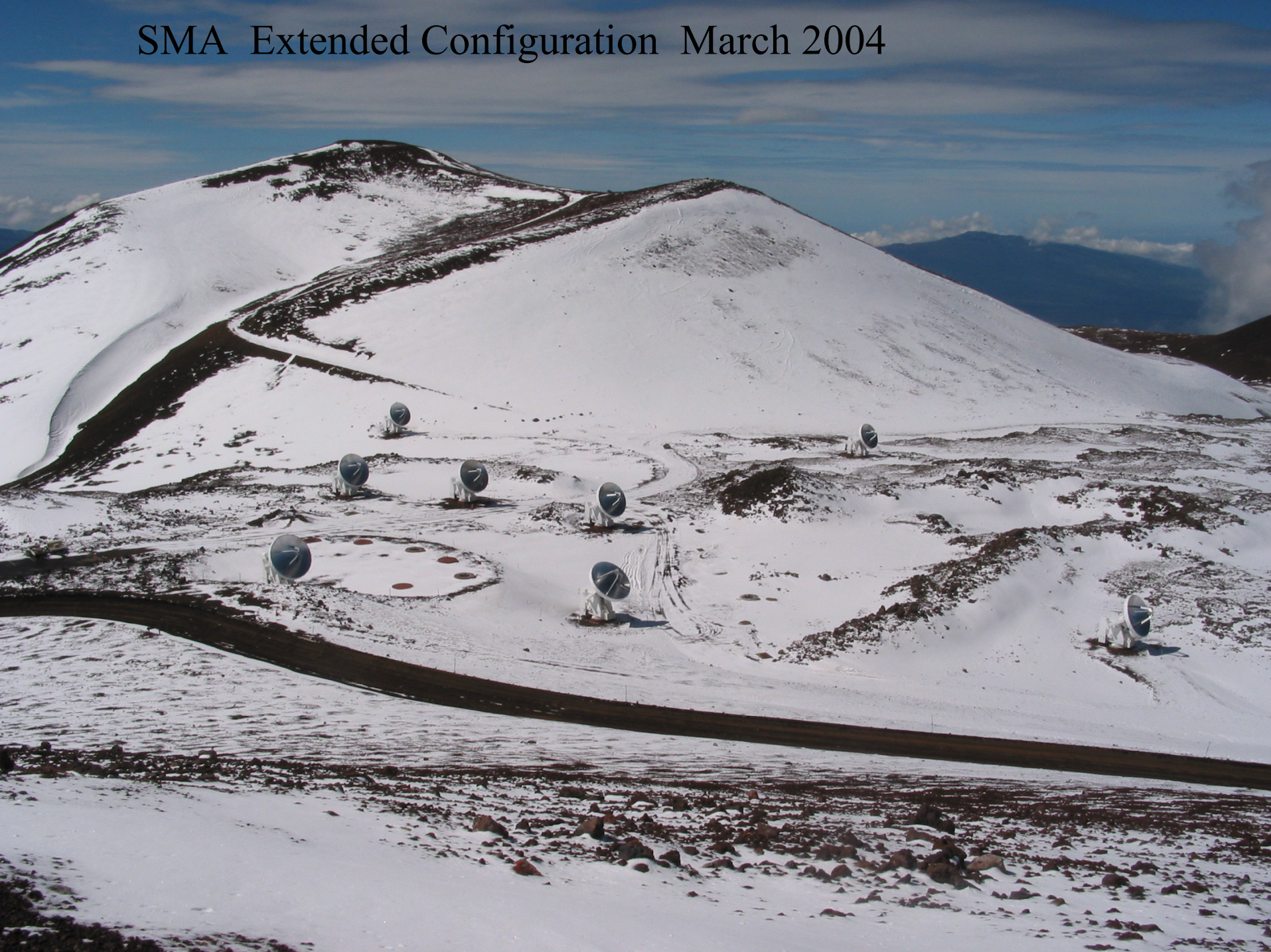
1998



SMA Dedication
November 2003



SMA Extended Configuration March 2004



SMA Very Extended Configuration May 2005



capabilities

Antennas: 8 antennas of 6 m diameter, 12 μm rms surface

Configurations: 24 pads in four rings
baseline lengths 8 - 508 m,

Receivers: max 8 per antenna; 2 simultaneously

177-256 GHz (8 in operation)

256-360 GHz (8 in operation)

320-420 GHz (start May 2005)

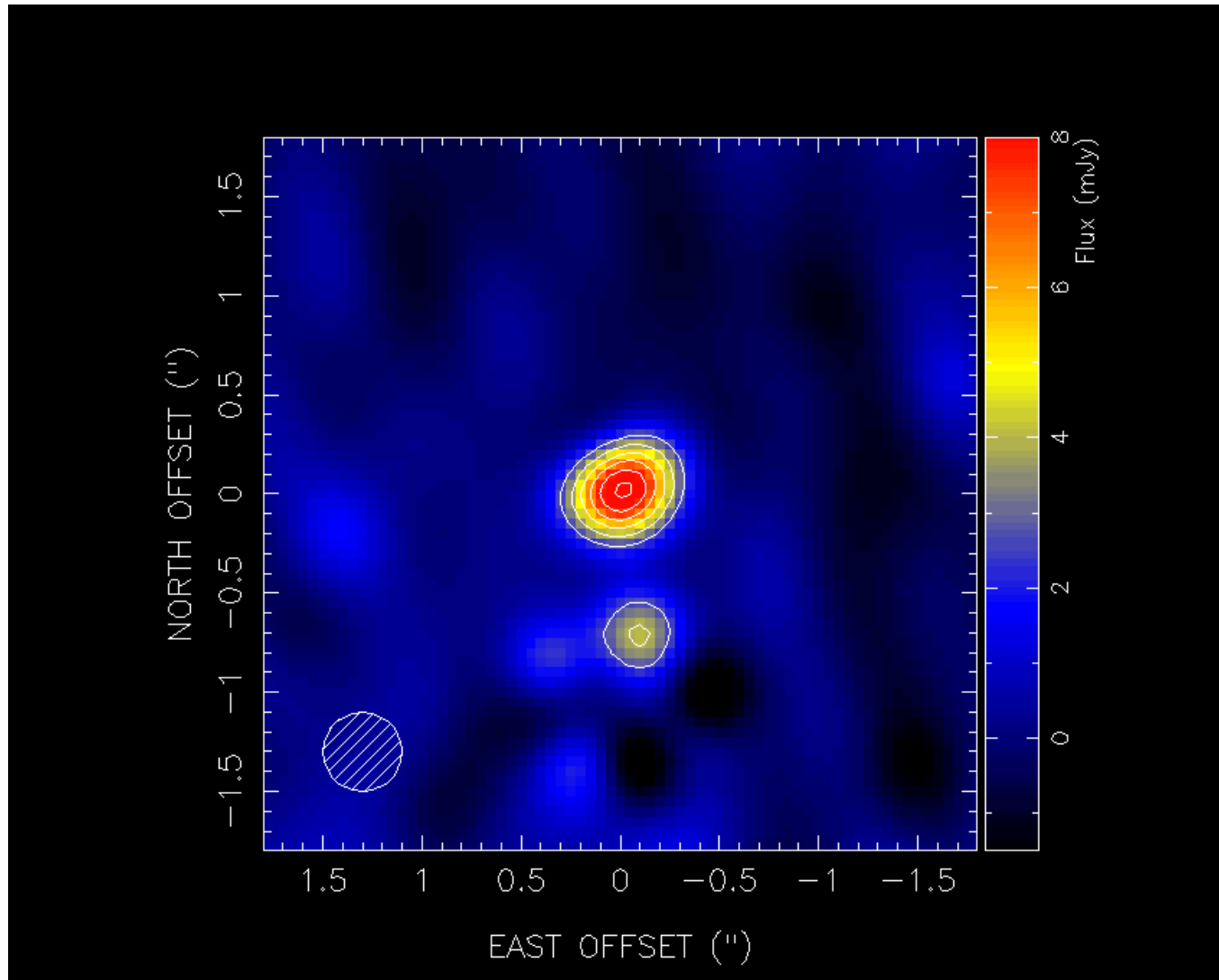
420-520 GHz (future)

600-720 GHz (6 in operation, 2 more in May 2005)

780-920 GHz (future)

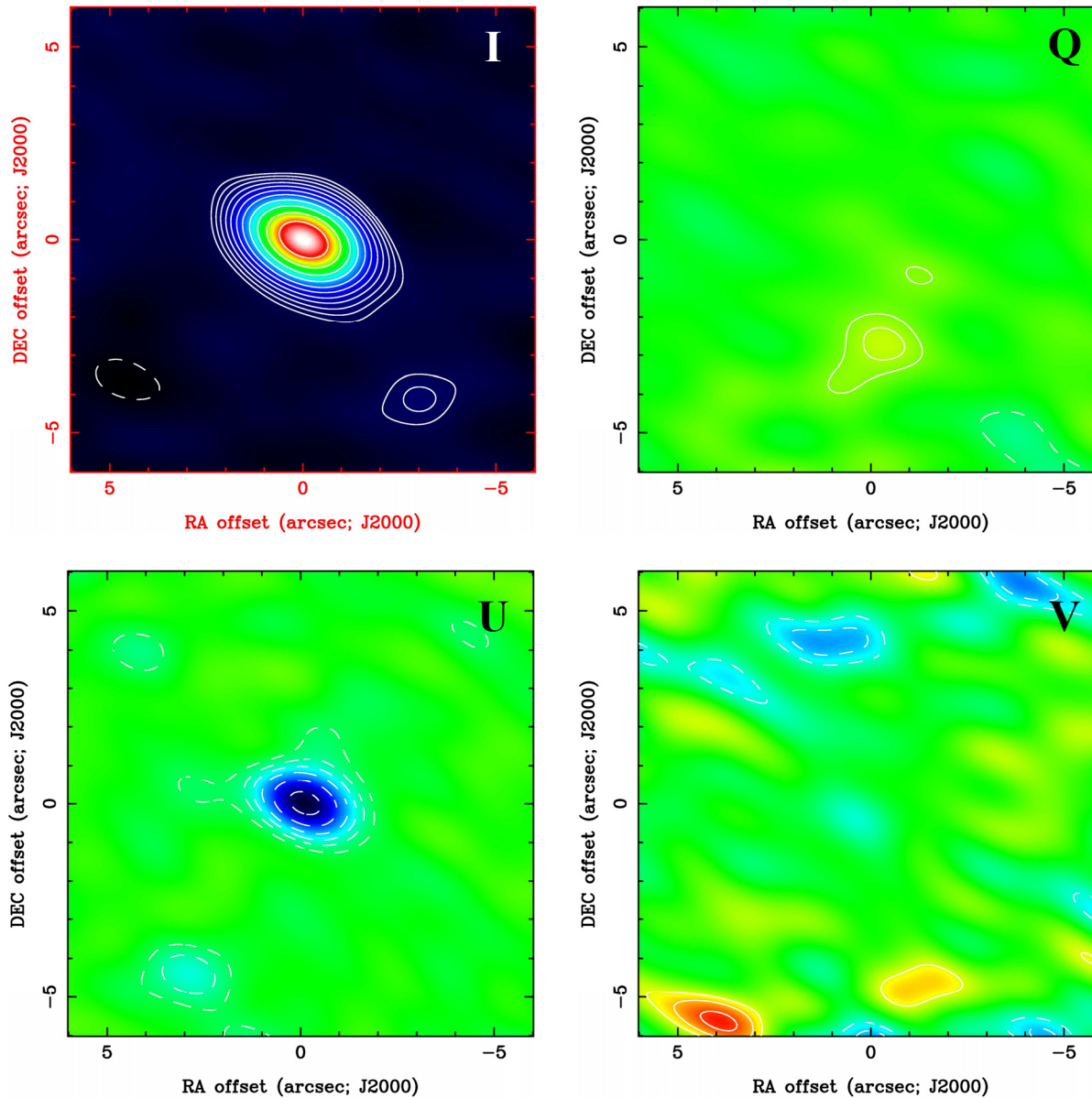
Correlator: 2 GHz bandwidth, 1 MHz resolution at full bw/2rcvrs

PLUTO and CHARON



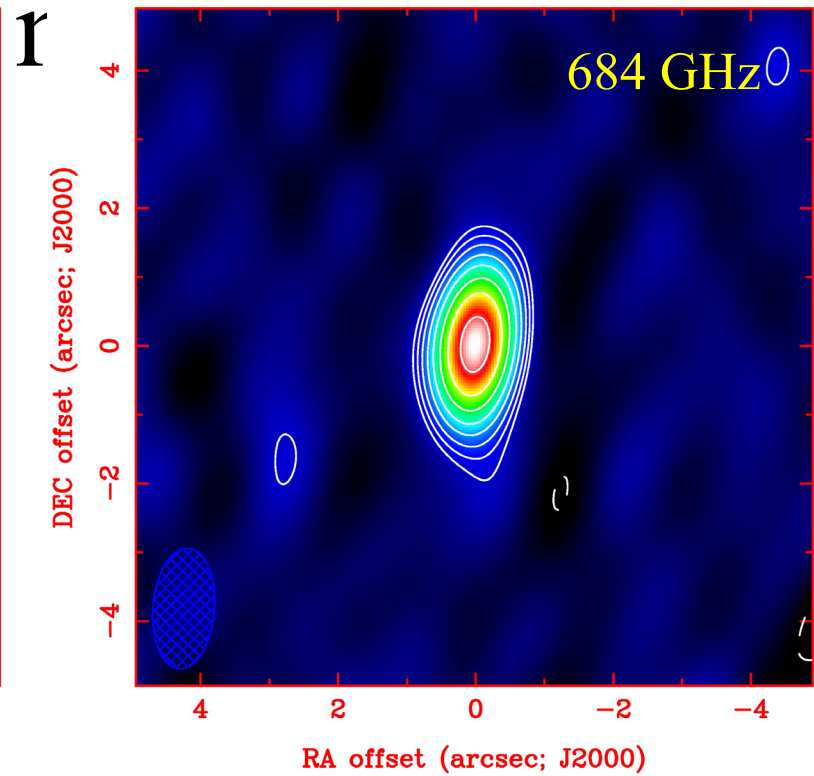
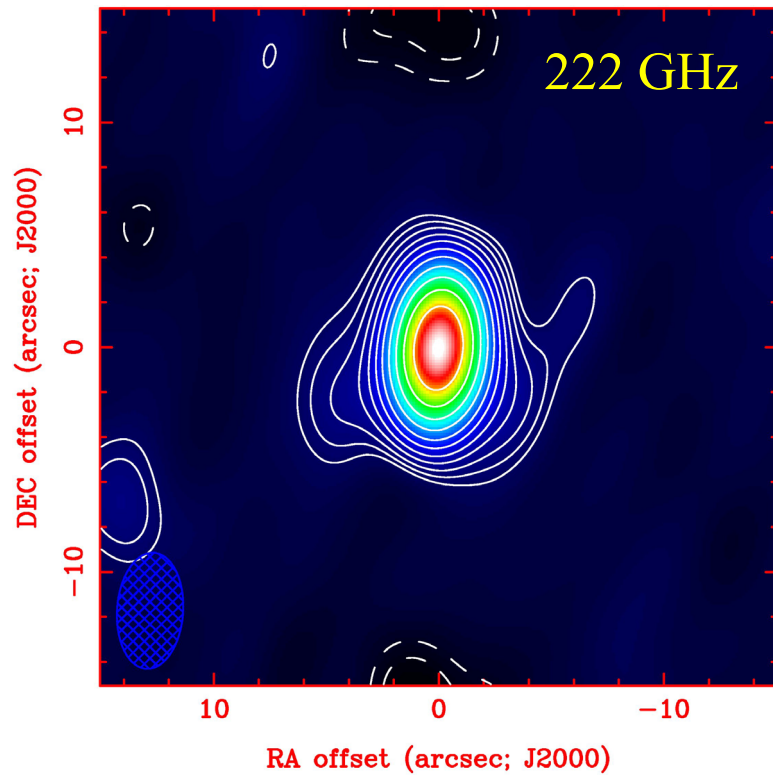
SMA/VE configuration, 220 GHz, May 2005

Sgr A* Polarization at 340 GHz

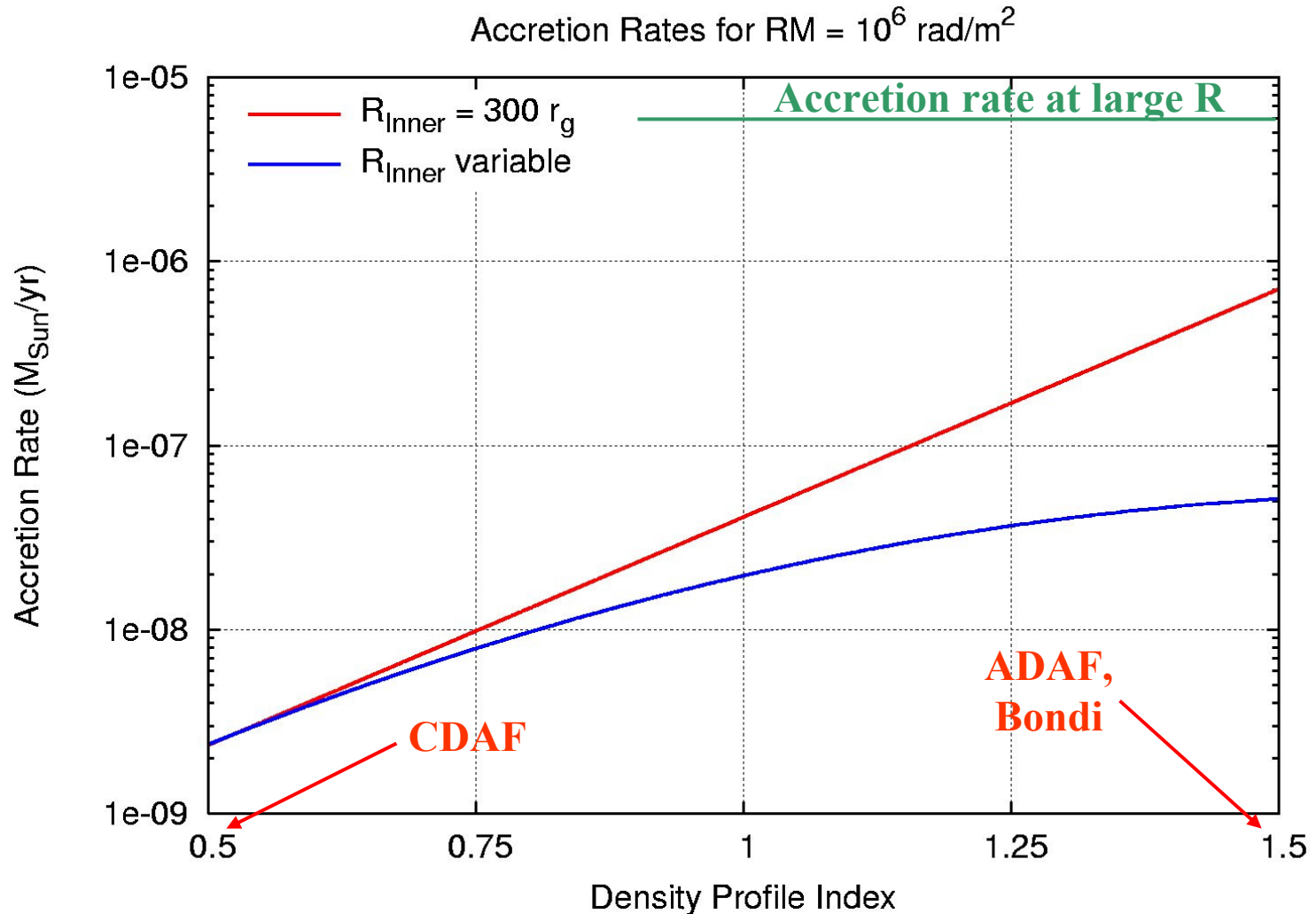


Marrone et al
2005

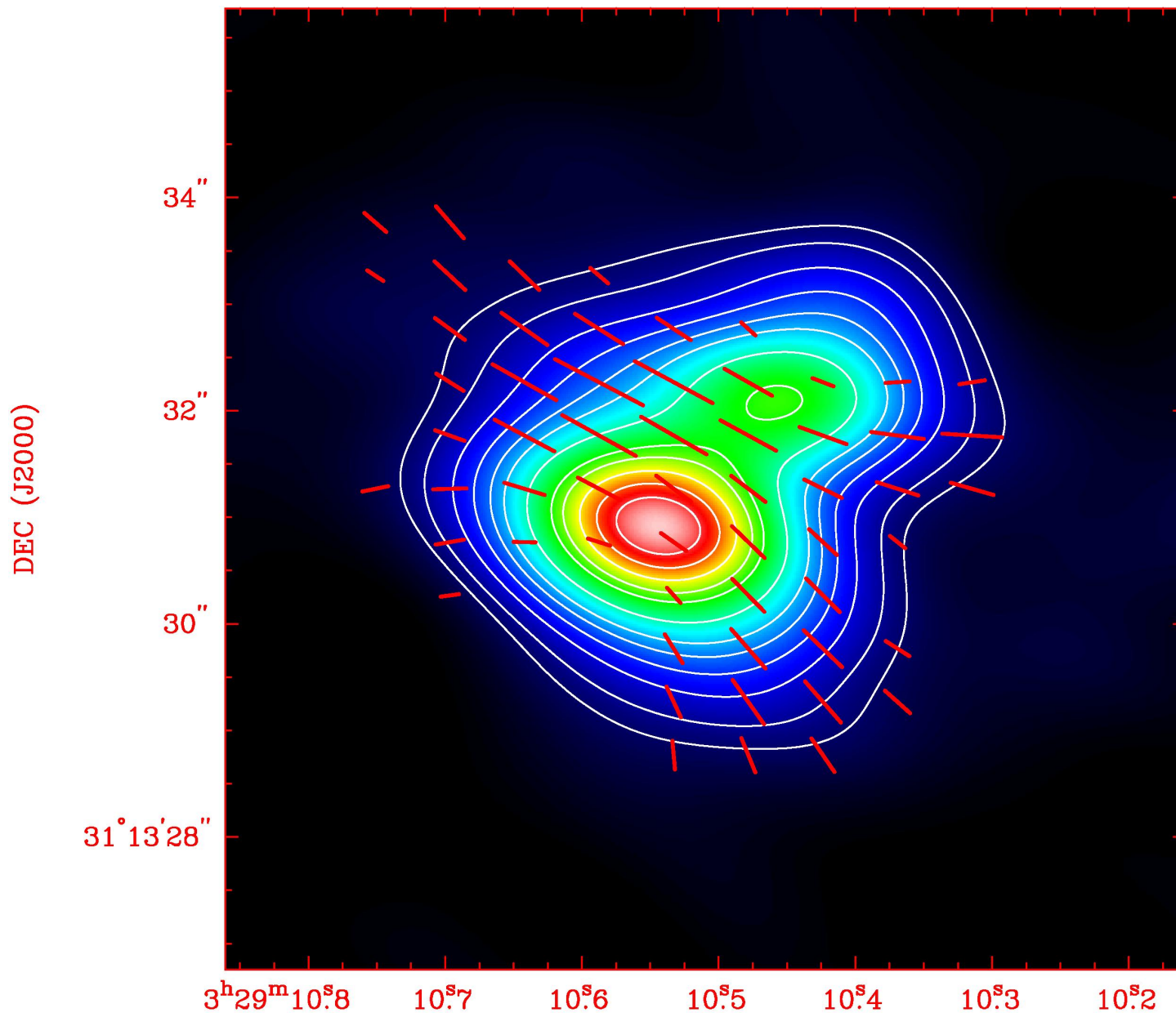
Sgr A* 230/690 GHz



Accretion Rate Limits



NGC1333/IRAS4A 345 GHz Total Intensity and linear polarization (B field)



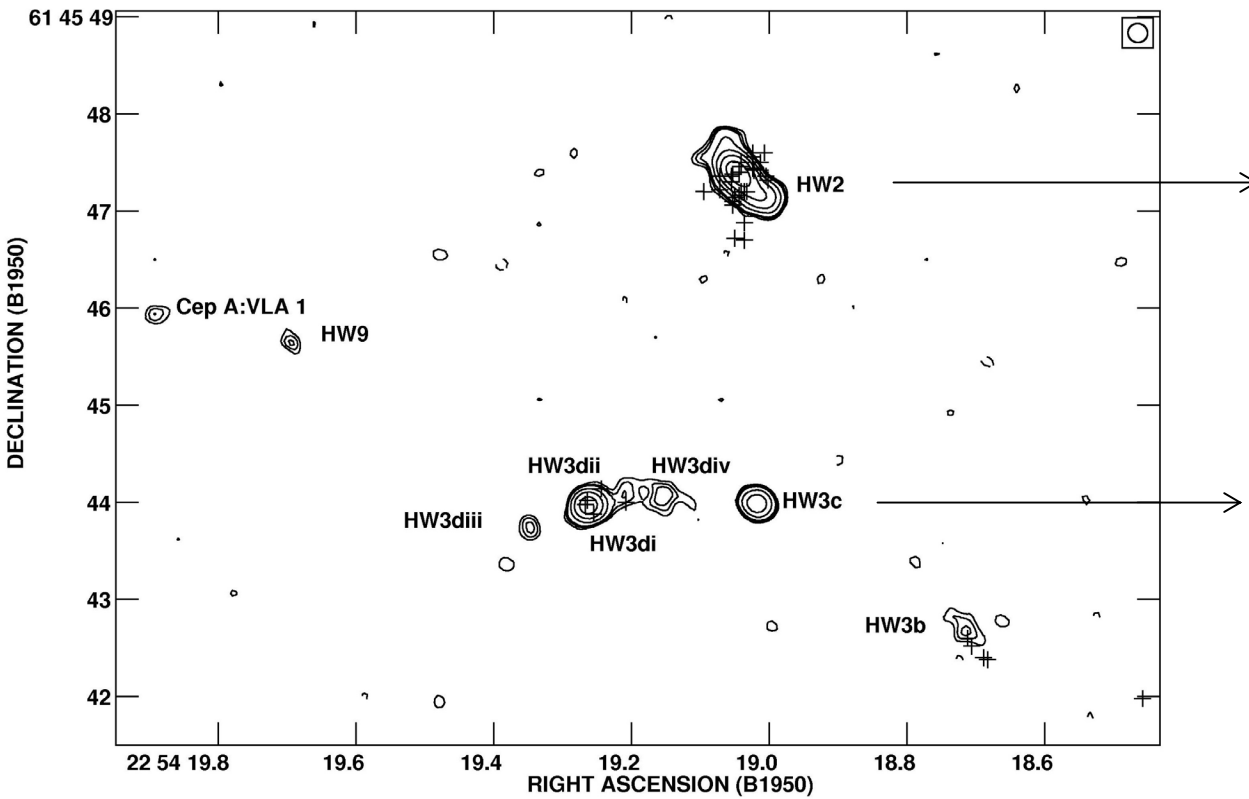
Rao, Girart and Marrone

RA (J2000)

Cepheus A Star Formation Region

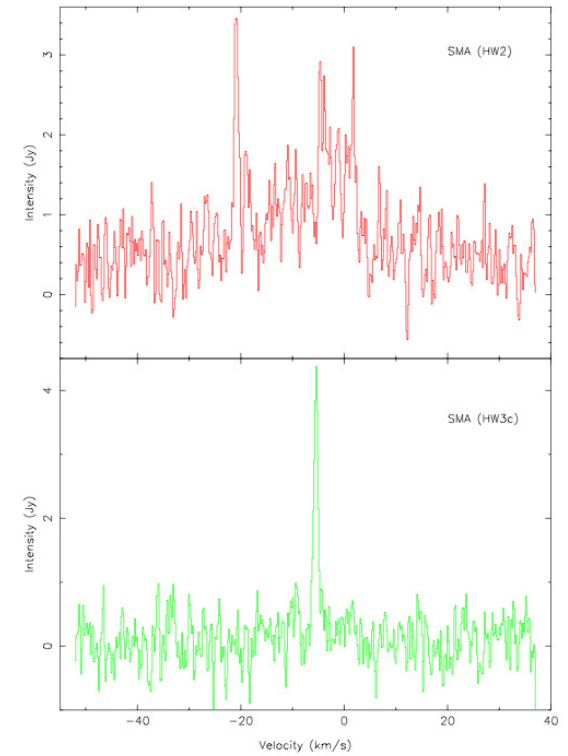
VLA continuum (contours and 22 GHz Masers)

Torrelles et al 1996

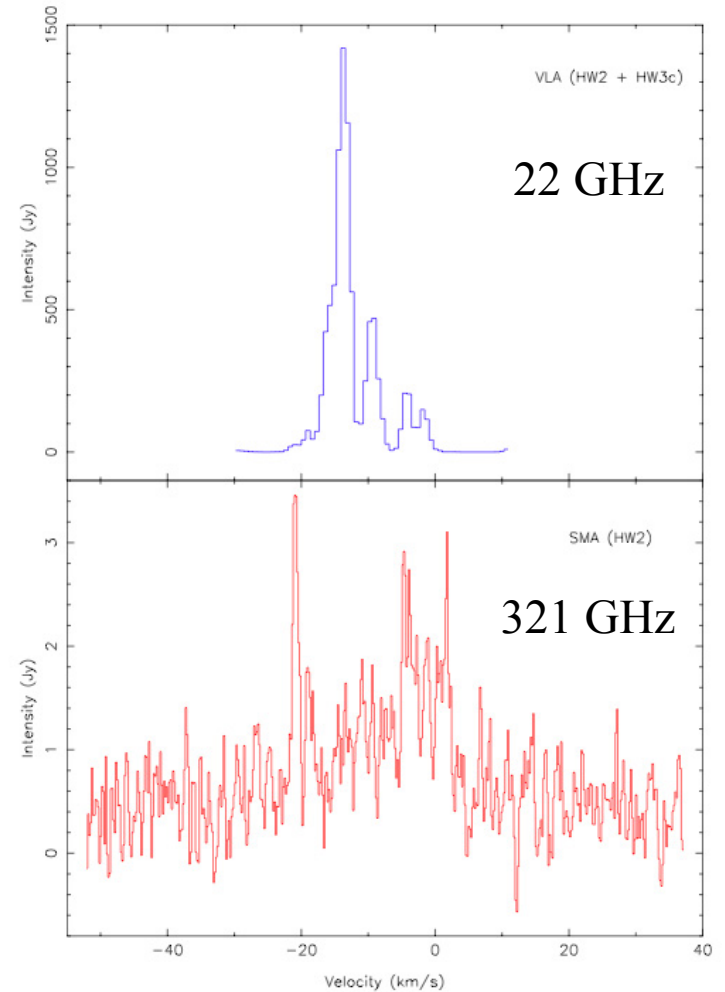
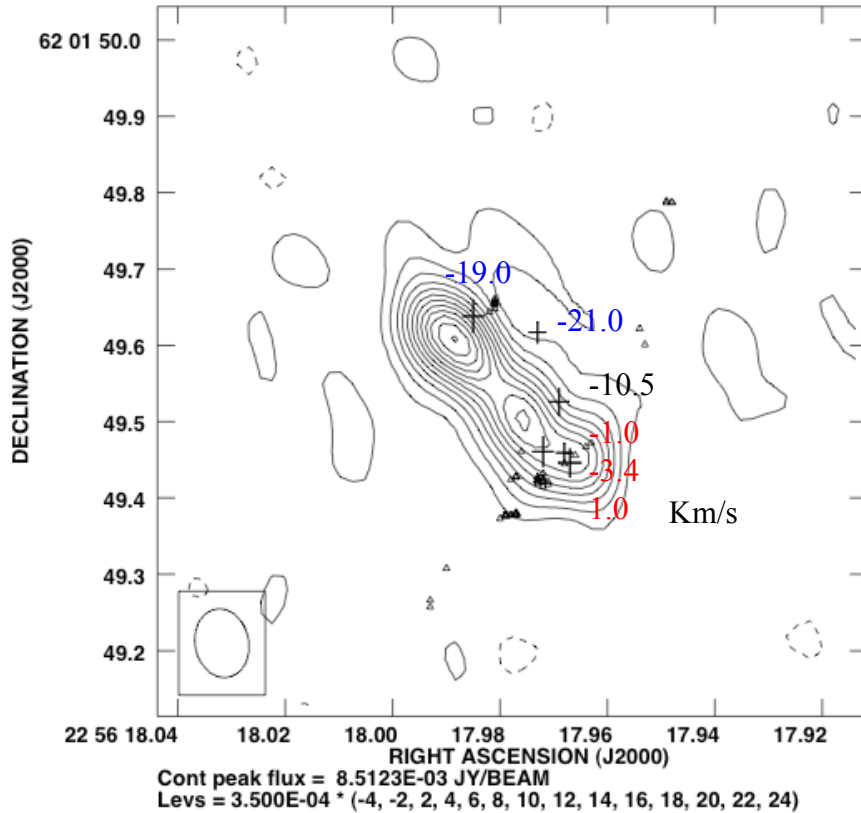


SMA 321 GHz masers

Patel et al 2005

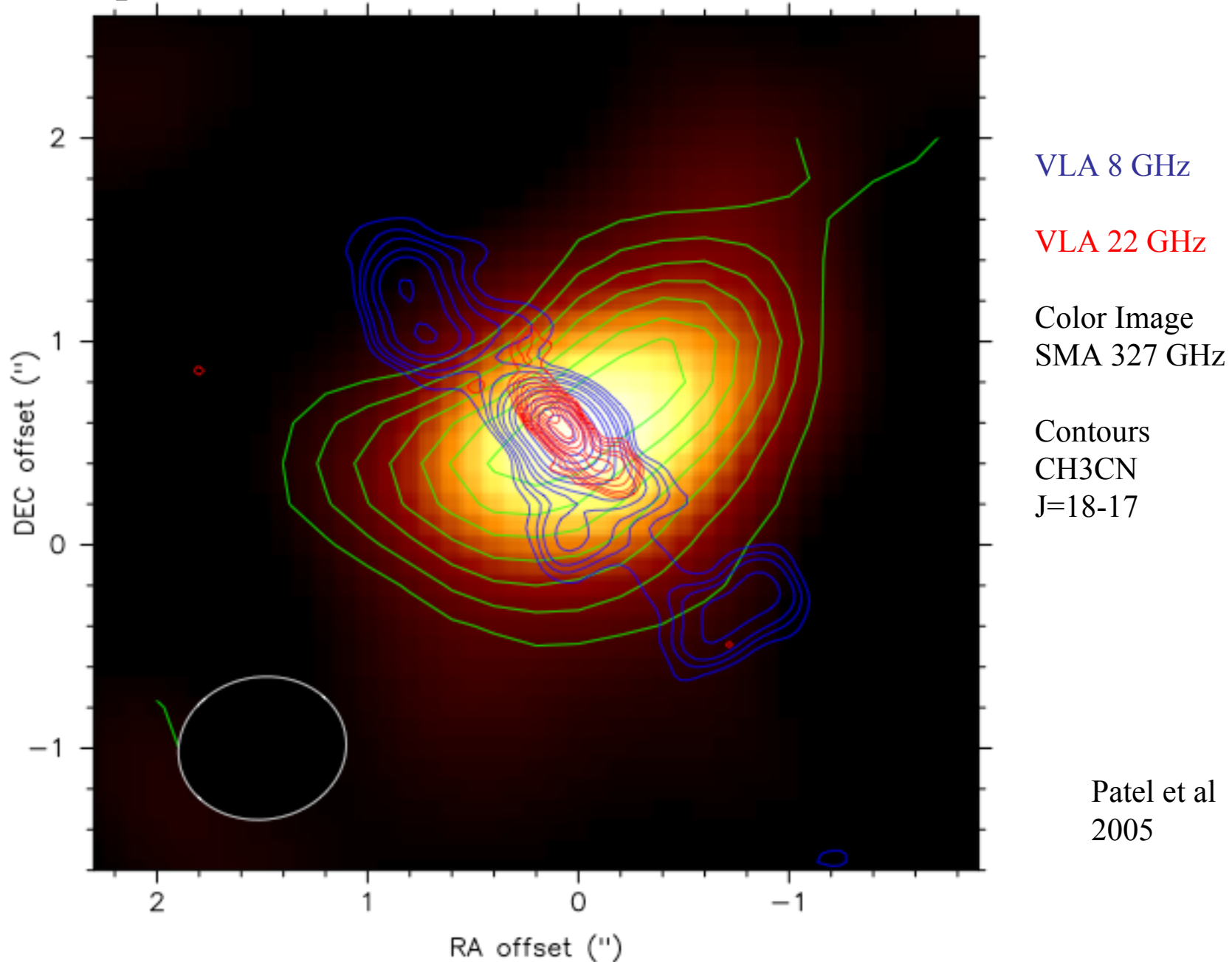


321 GHz and 22 GHz water masers

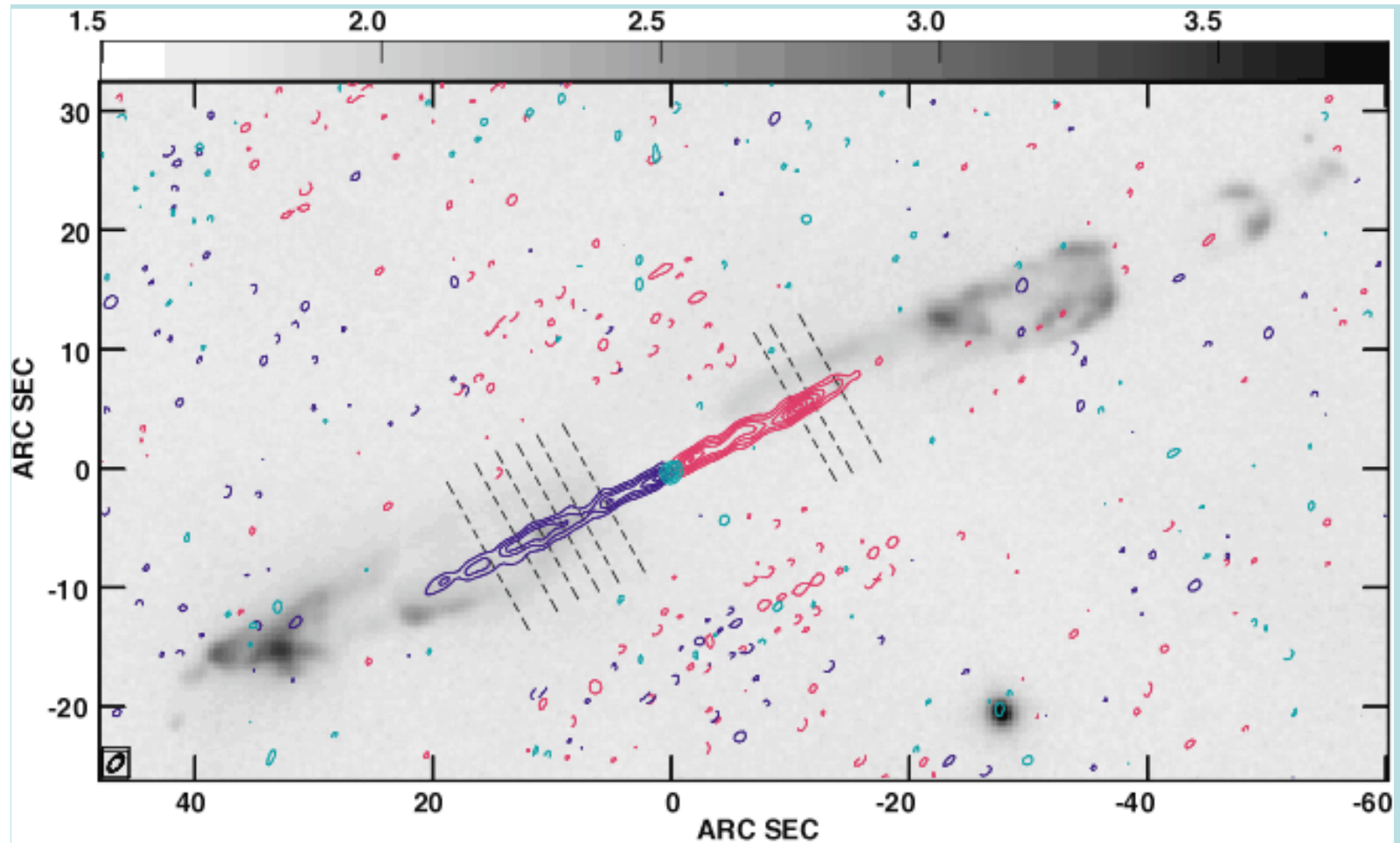


HW2
1.3cm Continuum Jet
(sep '04)

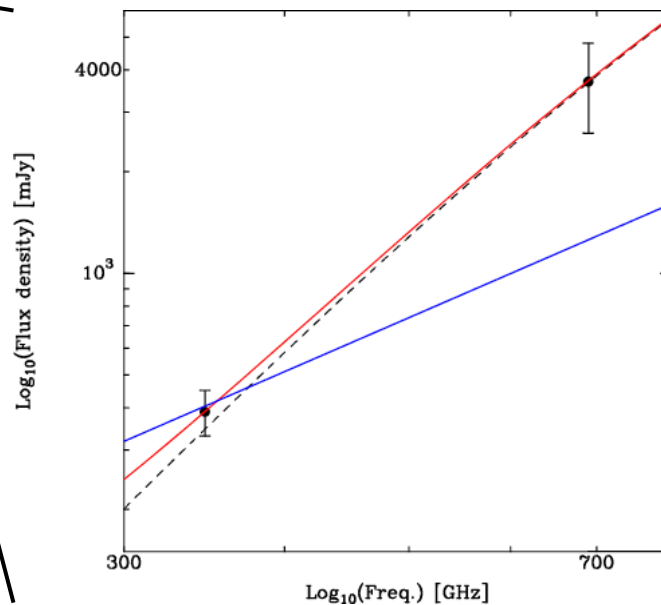
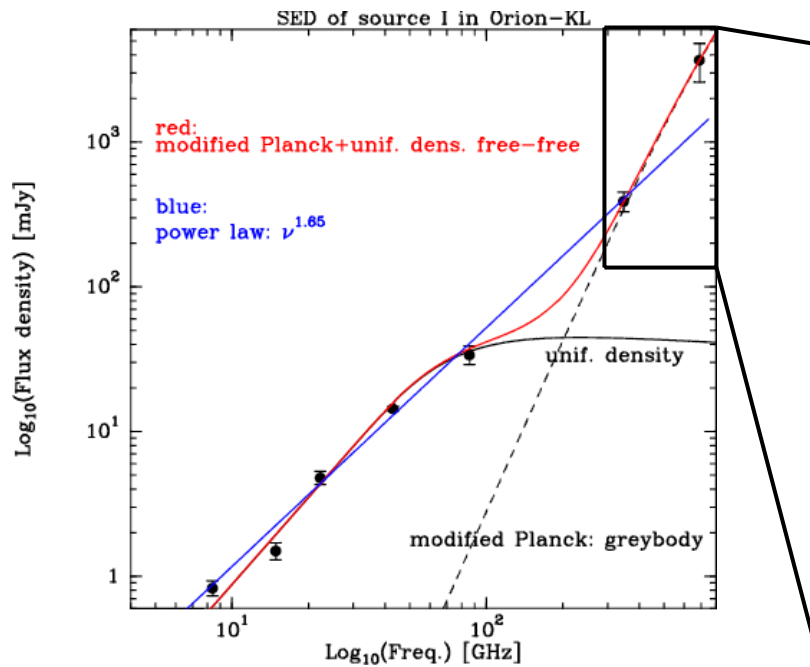
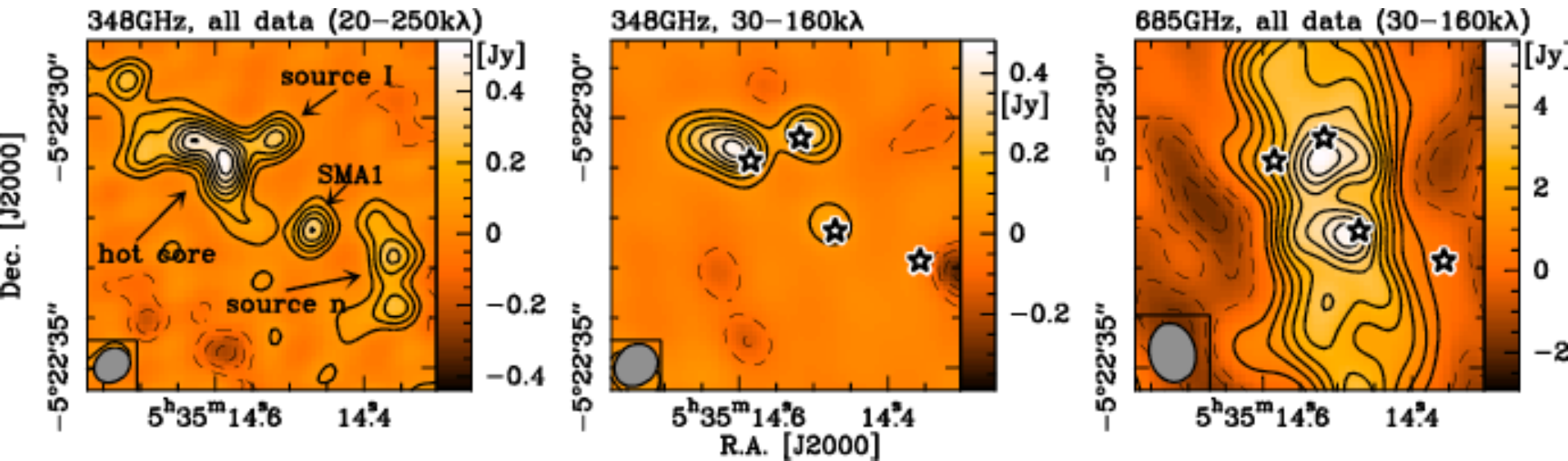
Cepheus A/ HW 2 12 Solar Mass Protostar



SMA Image of SiO (5-4) in HH211

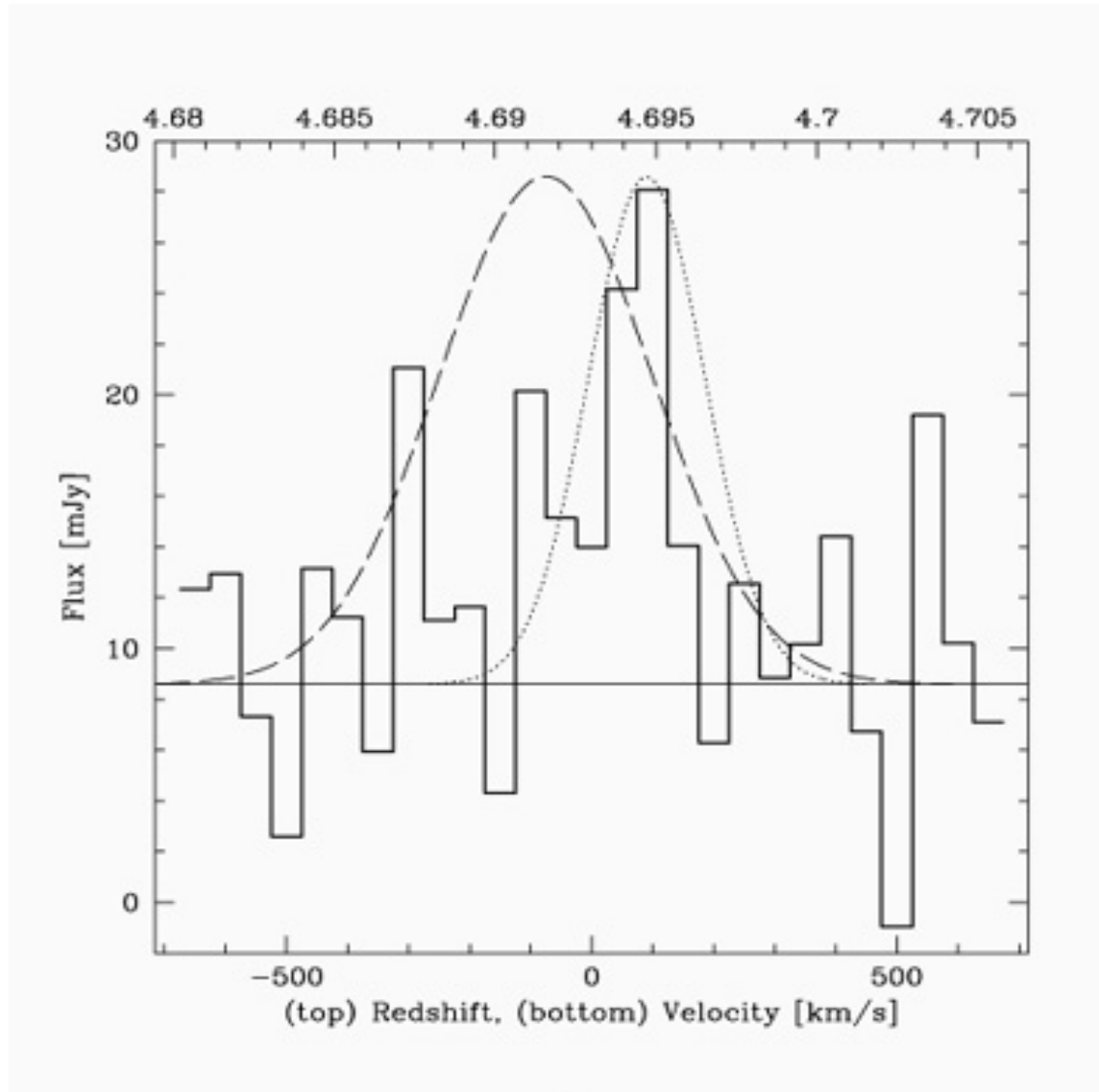


beam: $1.60'' \times 0.88''$ P.A. -40.7 deg.



Beuther et al
2005

CII line at $z = 4.7$ in BR1202-0725 (334 GHz)



Advice from Chairman Jack

1989 SMA Advisory Committee Report

- **“The original proposal pays inadequate attention to some important areas such as extragalactic science . . . Can distant or protogalaxies be detected in the 158mm CII lines?”**
- **“The array is being built at just at the right time to focus on polarimetry . . . [which will help] to provide a key to understanding magnetic accretion disks.**
- **“A long approval process for either site [Mt. Graham or Mauna Kea] must be anticipated.”**
- **“We should emphasize that the receiver problem is likely to exist throughout the lifetime of the project and receiver development plans should have highest priority.”**
- **“Marian Pospezsalski at NRAO has an active bandwidth design for 1-2 GHz which looks promising.”**
- **“The reliability of SIS receivers appears sufficient to justify putting many in the same cryostat.”**
- **“A general caution is to avoid getting into the situation most of us are in, where the loss of one key individual could cripple the project.”**
- **“It will not be easy to obtain an affordable price for the antennas.”**

More advice from Chairman Jack

- **“The pointing specification of 1 arc second is going to be particularly difficult to meet.”**
- **“The first far IR polarization maps with 10” resolution (e.g., SOFIA) will probably begin to appear before first light on the Array.”**
- **“The choice of six antennas each of 6 meter diameter has much to recommend it.”**
- **“It is very important to consider how to solve the short spacing problem.”**
- **“Reduce the number of spectral channels by at least a factor of two A large number of channels poses unnecessary burdens on the computing requirements.”**
- **“It is very important that a separate wide band continuum correlator be included for maximum continuum sensitivity.”**
- **“All telescope projects located on remote, high sites have found that equipment installation and checkout proceed more slowly than expected.”**
- **“It is also very important to try to interest young astronomy and physics students in the project. These are the scientists who should grow with the project.”**

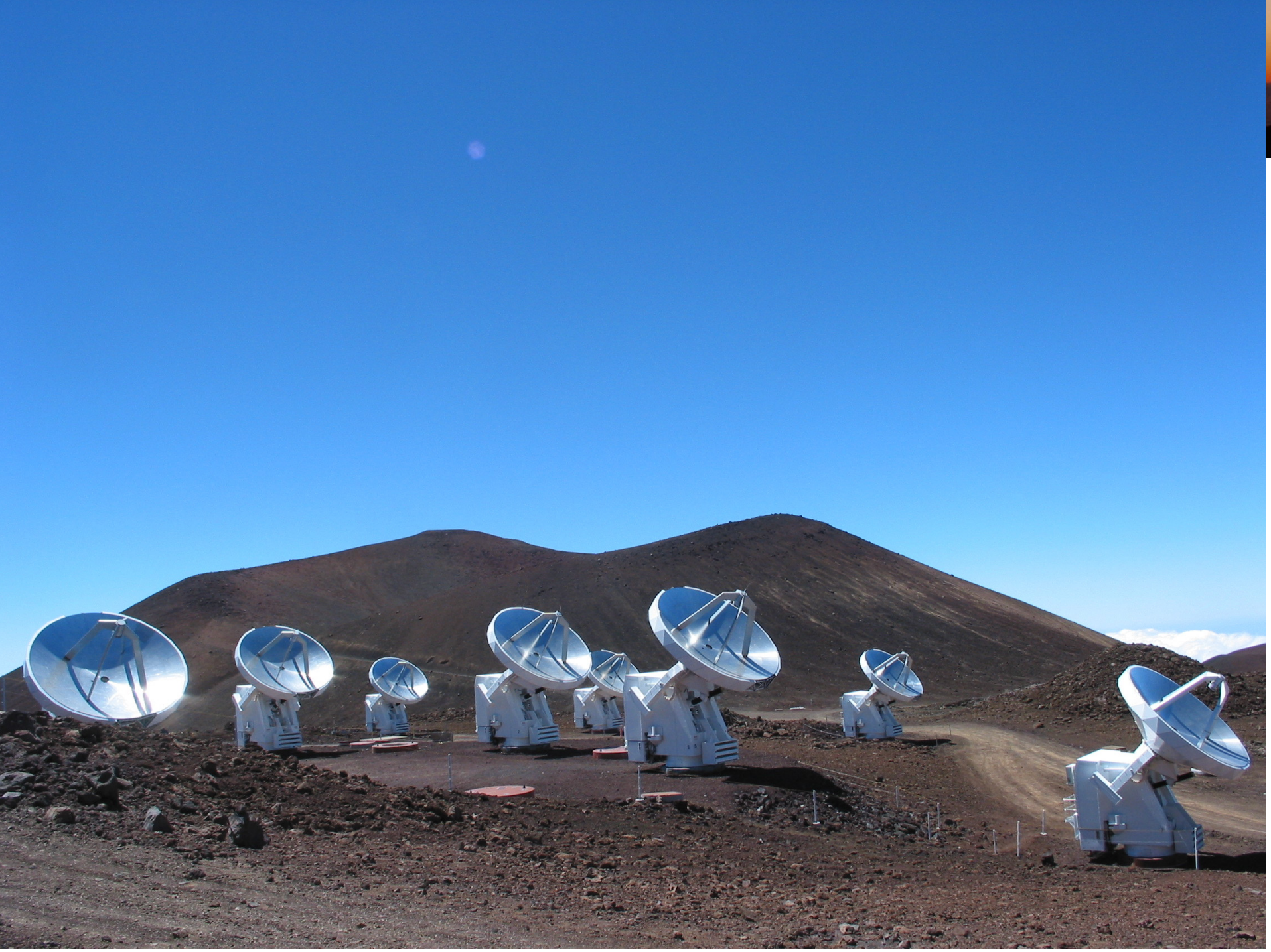
More advice from Chairman Jack

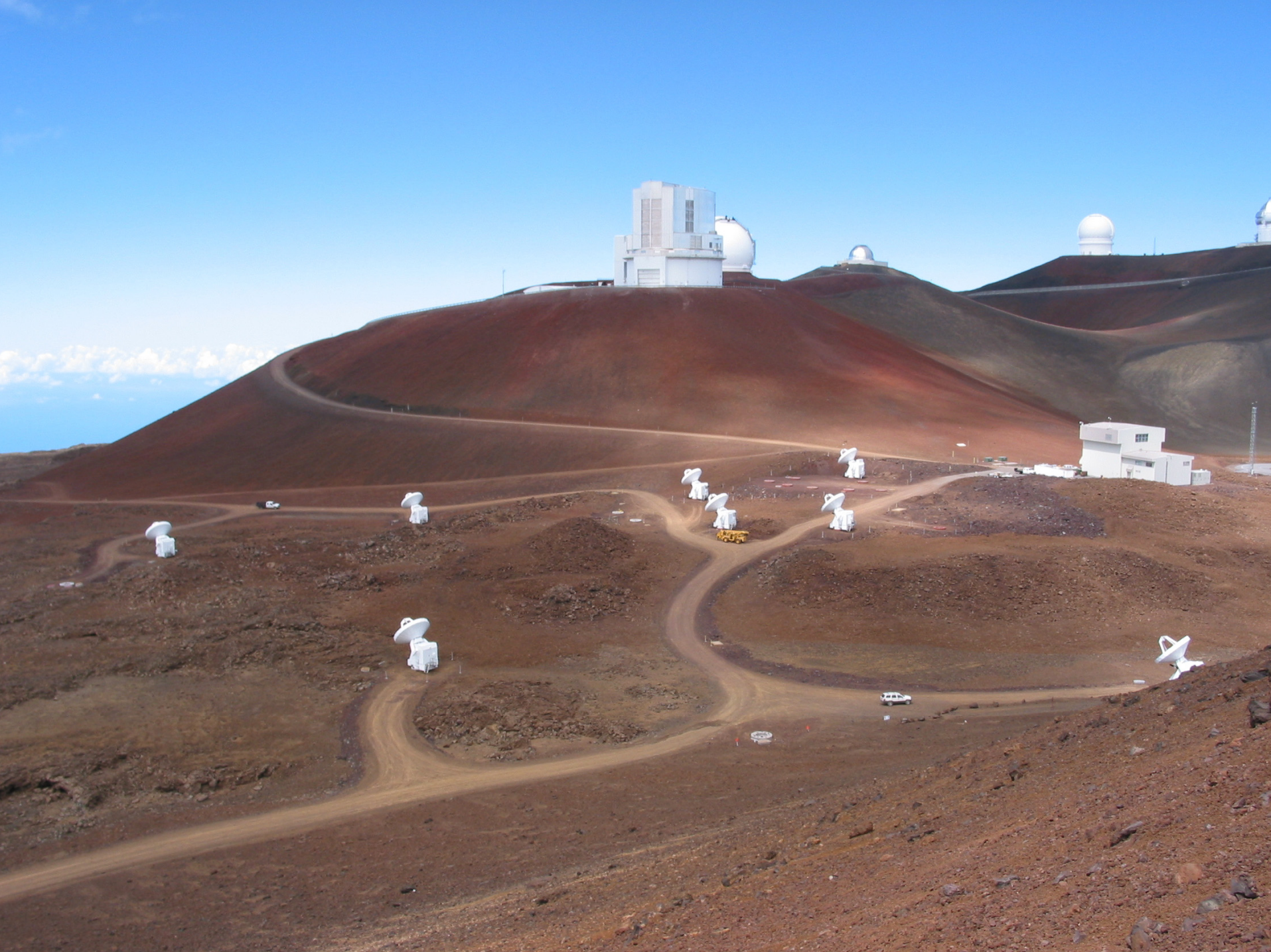
1990 SMA Advisory Committee Report

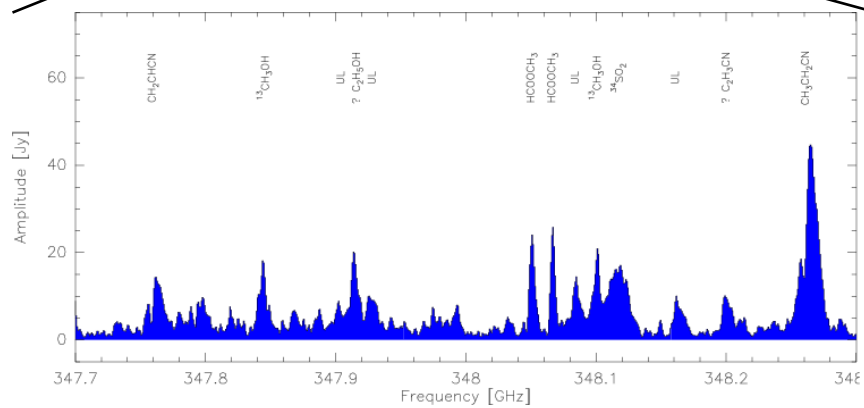
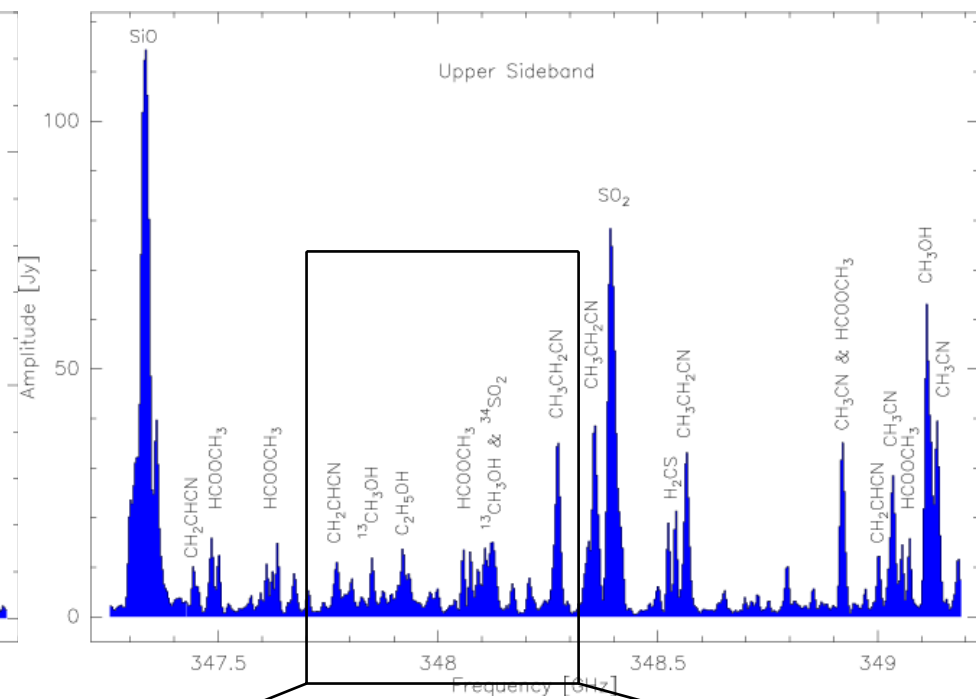
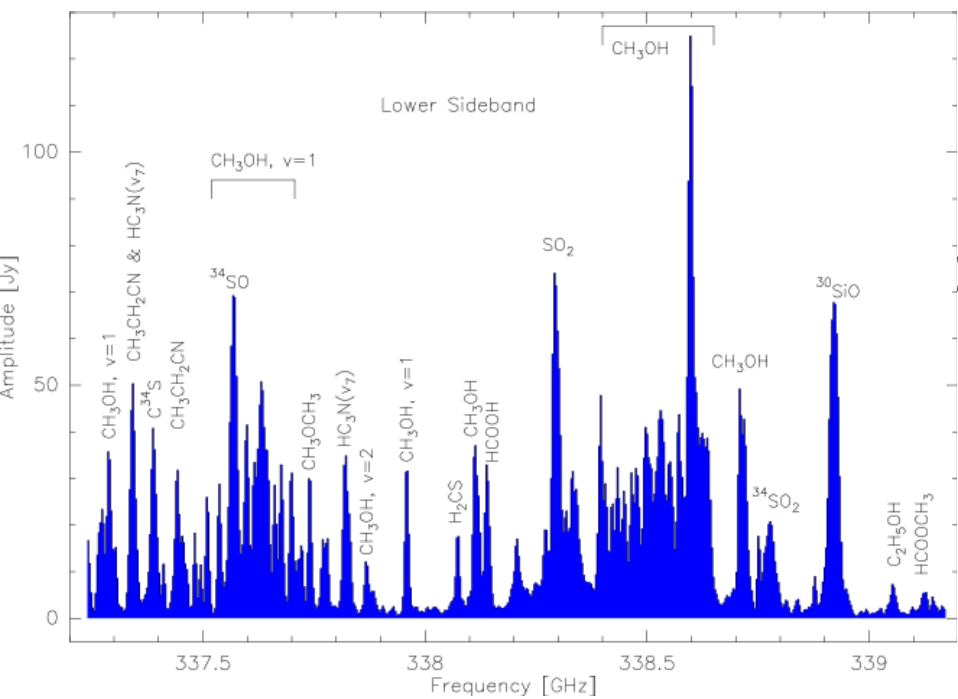
- **“The weight is unbalanced on the elevation axis. This is an unconventional approach . . .”**
- **“It is important that the astronomers spend more of their time on the instrument.”**

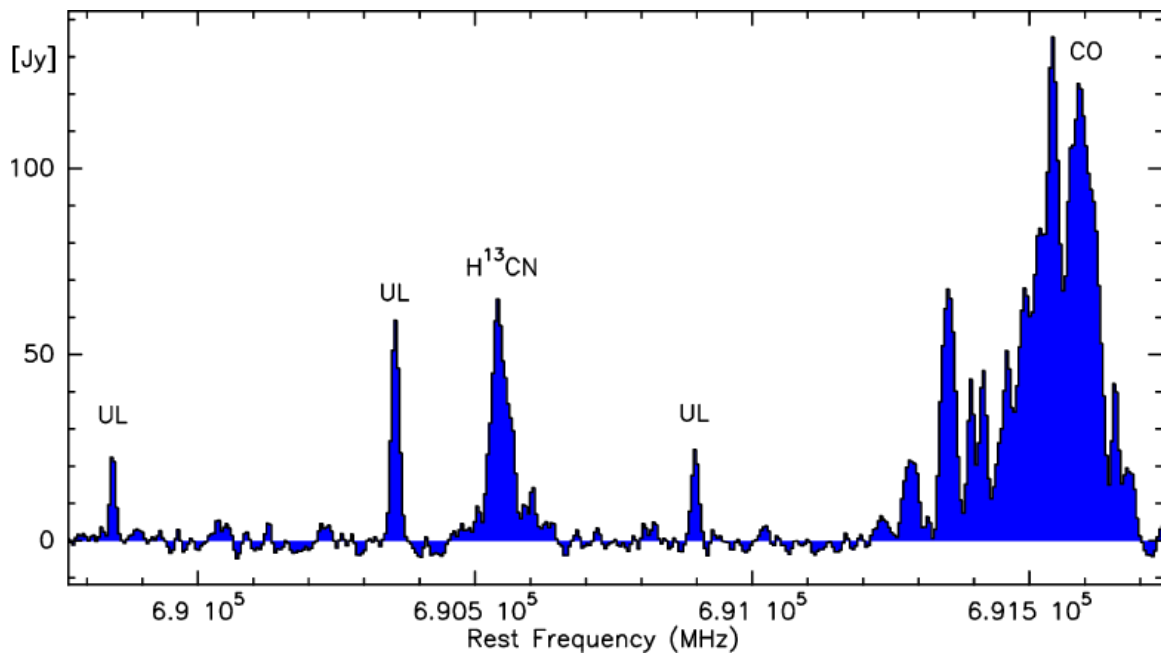
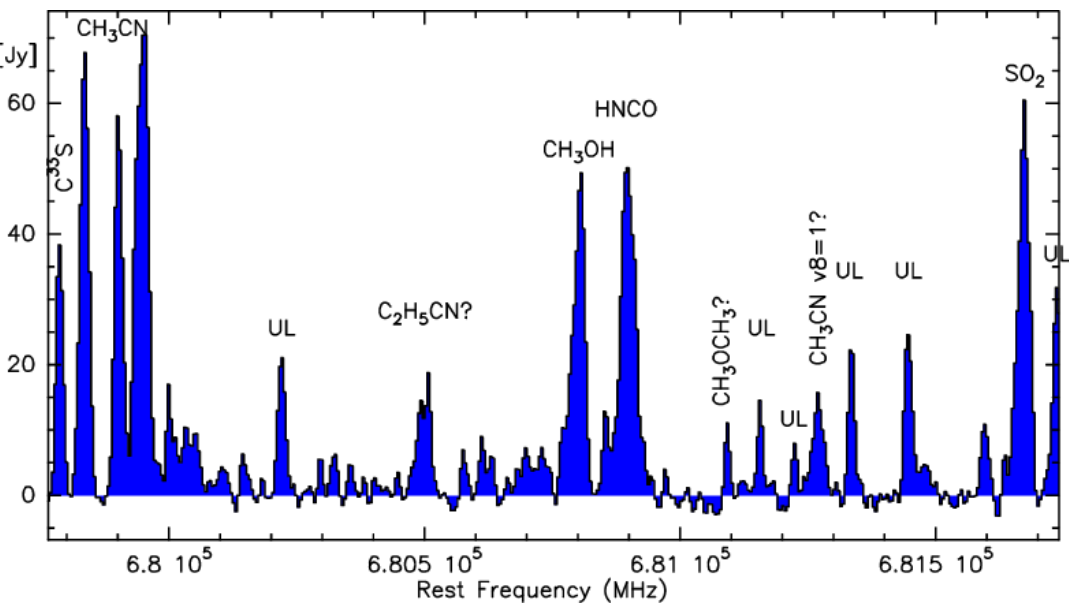
1992 SMA Advisory Committee Report

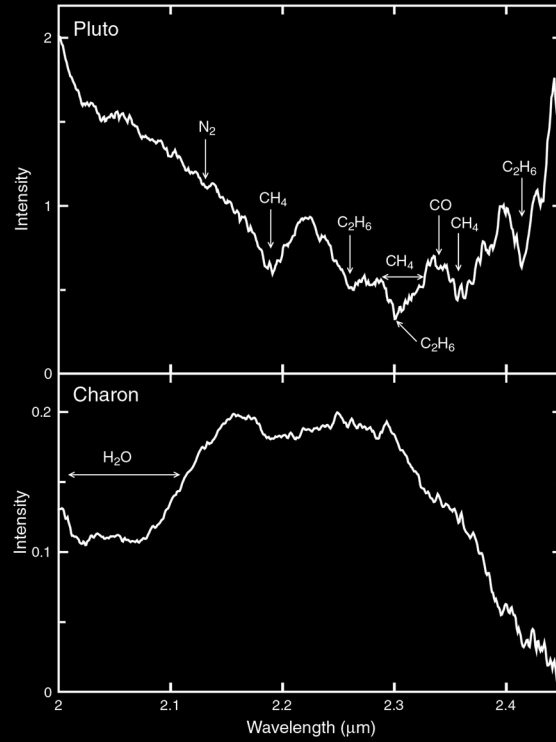
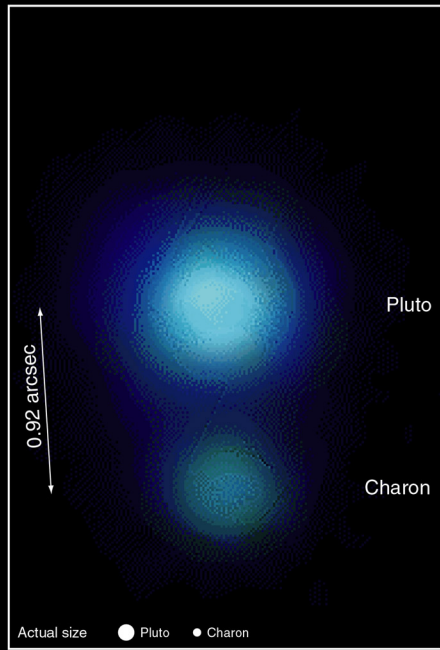
- **“With 35 subcontracts for antenna components it will be difficult to maintain a tight time schedule.”**
- **“The development of a new independent image processing cannot be justified. It is hoped that AIPS++, which is being developed by an international team coordinated by NRAO will become the system of choice.”**
- **“Focal plan arrays will considerably accelerate the data acquisition . . . The spectrometer group should consider this possibility.”**
- **“The schedule for developing the Mauna Kea site is too optimistic.”**
- **“Abandon the principle that all of the arrays should be concentric”**











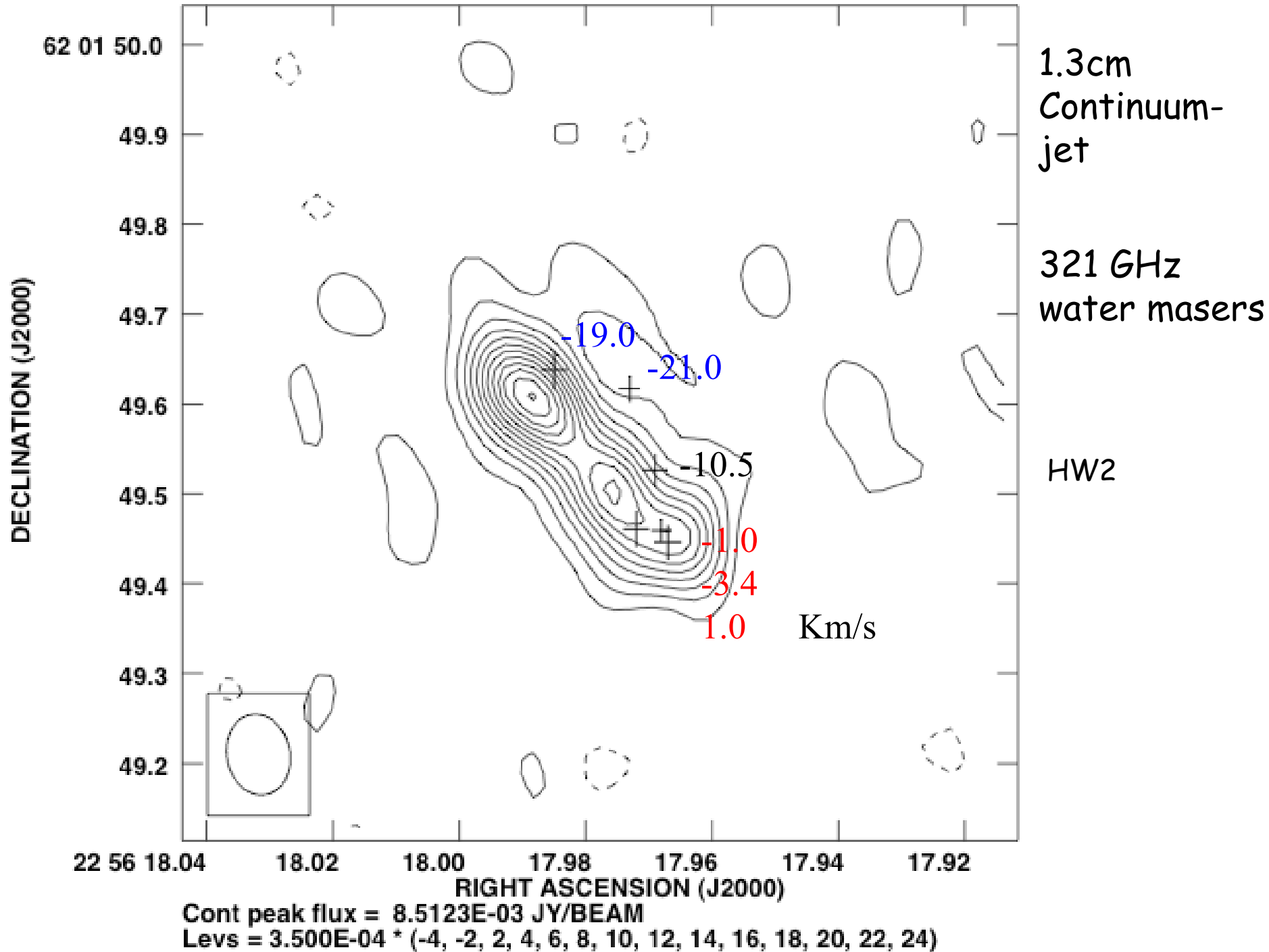
Pluto and the Satellite Charon

Subaru Telescope, National Astronomical Observatory of Japan

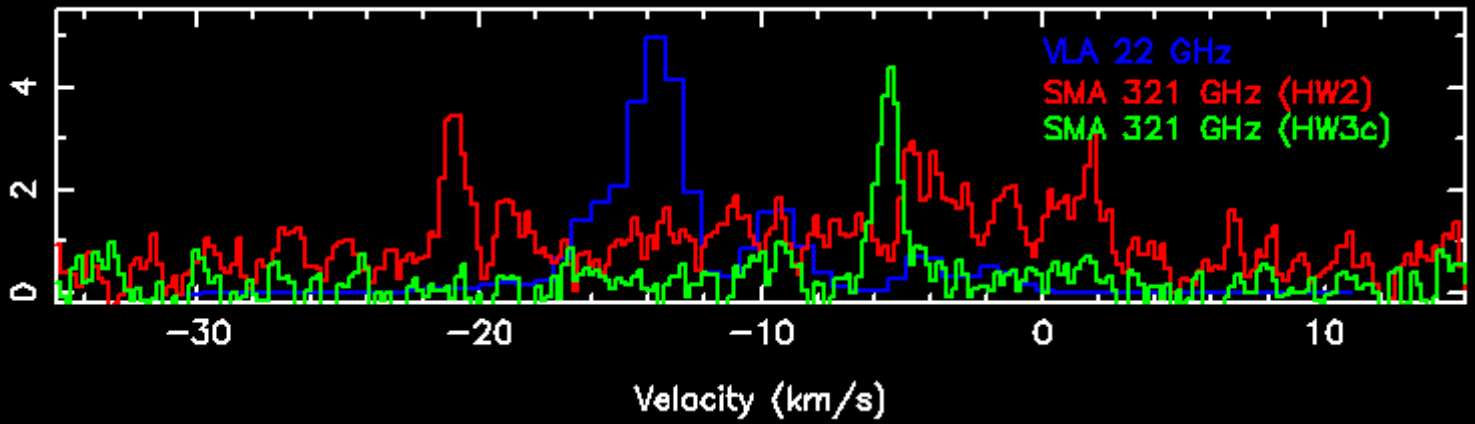
CISCO (J, H, K')

July 19, 1999

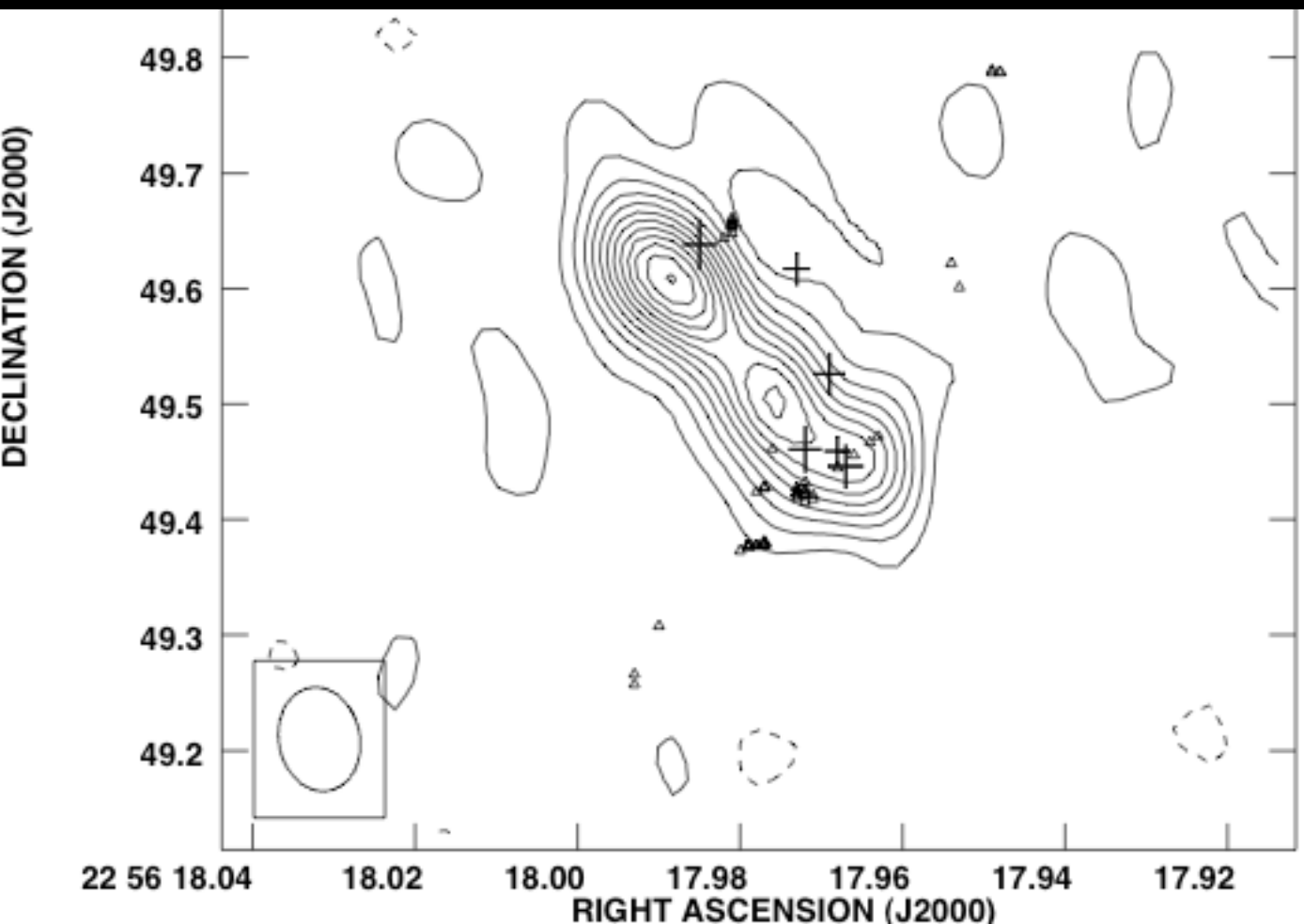
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VLA: x300 Jy, SMA: Jy



HW2
1.3cm
Continuum-
Jet (sep '04)



321 GHz and 22
GHz water masers

Poor agreement
between positions
and velocities of
22 GHz and 321
GHz
water masers in
HW2.

Detection of the 321 GHz H₂O maser line

