INSTITUTO DE ESTRUCTURA DE LA MATERIA

DPTO FÍSICA MOLECULAR

Atacama Large Millimeter Array

TEST OF THE SEMITRANSPARENT VANE CALIBRATION SCHEME

J. Martín-Pintado

Design and construction of the device: S. Navarro, M. Carter (IRAM)
Implementation : W. Brunswig and A. Sievers (IRAM)
Tests: J. Martín-Pintado, J. Cernicharo, J.R. Pardo, A. Rodríguez (IEM-CSIC)

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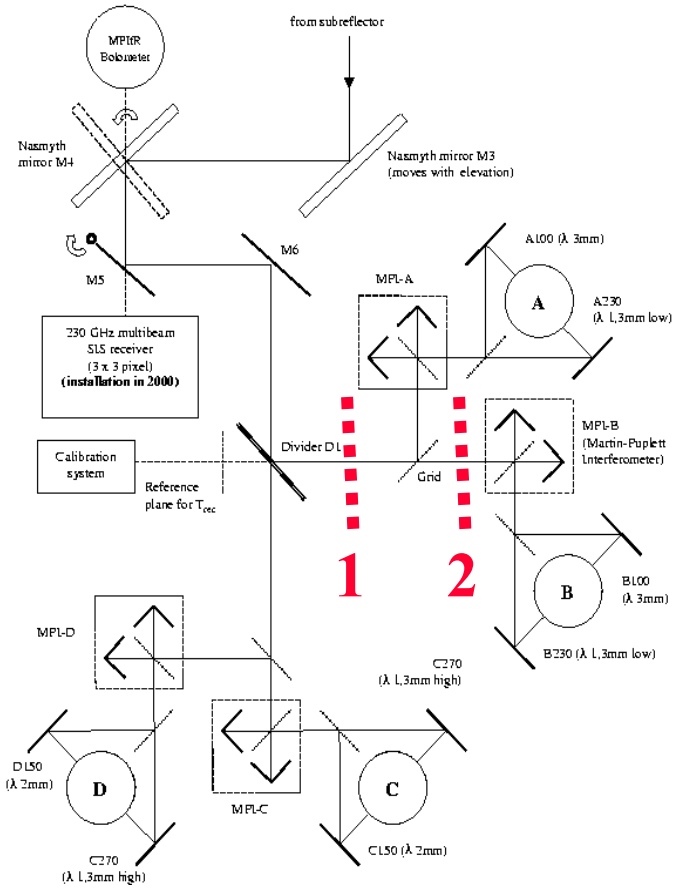
IRAM 30m telescope receiver cabin schematic



Device

Rotary actuator (switch time 1 s)

90 and 230 GHz observations

Standard calibration system

Position 1

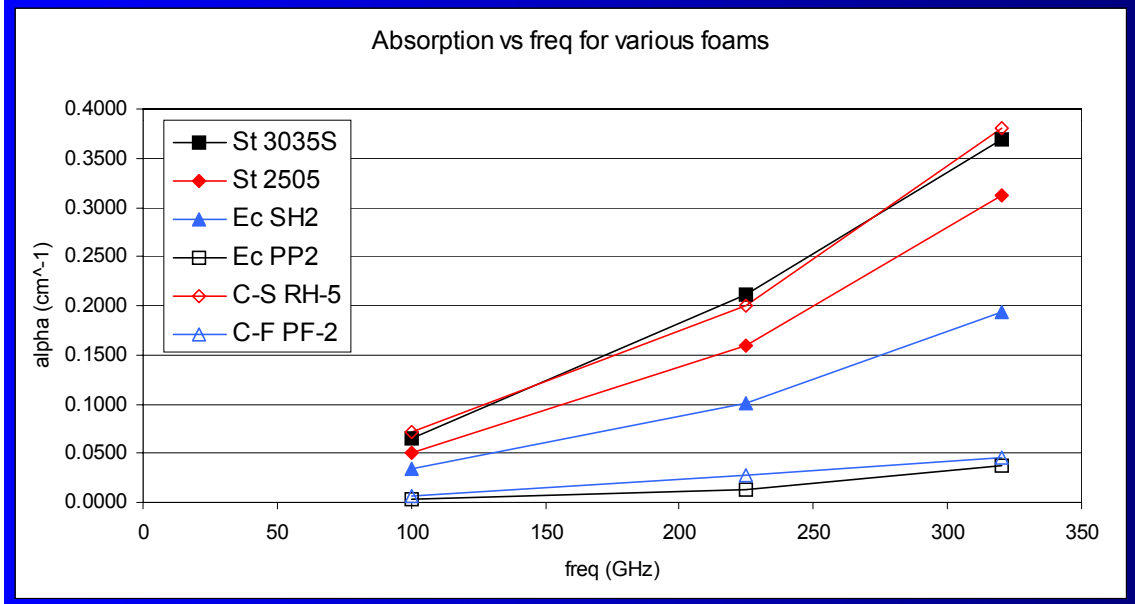
* 1.5 m from the receiver
* Orthogonal linear polarizations

Position 2

* 10-15 cm from the receiver
* No polarization

Vane material

(B.Lazareff and F.Mattiocco, IRAM, June 2001)



Polymer foams

1 cm thickness

Transmission 0.9 at 100 GHz

Testing the main hypothesis (Position 1)

$T_{vane} = f' * T_{amb} + (1-f) * T_{N2}$ f'=f

Measurement of the transmission (1-f) of the S/T vane

- Continuum sources using beam switching with vane-on and off
- 0.5% accuracy in 30 s for a 6 Jy source at 100GHz
- Polarization effects (0.3% ?)

Measurement of Tvane

- Calibrated with N2 and ambient loads
- Accuracy: <3%: 1.5% saturation of 10% on the ambient load
  1.2% for 1 K in the N2 load
  1.8% for 0.5% in the transmission coefficient

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Effects of standing waves (Position 2)

Tilt the semitransparent vane:

Measurements of the stable ambient load (bandpass) calibrated with the semitransparent vane-N2 load

Accuracy: <3%

IF THE MAIN ASUMPTION OF THE S/T VANE CALIBRATION SCHEME IS FULFILL TO BETTER THAN 3%?

Comparison of the accuracy of the S/T vane calibration relative to the dual-load and chopper wheel calibration systems

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Comparison of calibration schemes (Position 2)

Measurements of the intensity of astronomical sources at different elevations calibrated with:

Dual-load with atmospheric opacity from ATM+sky emission

Semitransparent vane with 2nd order correction ATM+water

Chopper wheel with 2nd order correction ATM+water

Check the relative accuracy of the three schemes to correct for elevation effects