1.3cm double beam secondary focus receiver (18000-26000 MHz)

This is a two horn system especially for continuum, spectroscopy and VLBI observations.

Overview

RX Name	Band	Frequency range [GHz]	Polarisation	Nr. of Horns	Horn position relativ to center of focus cabin
S14mm	K	18.0-26.0	dual-circular	2	Horn 1: Az: -95.6 arcsec, Elv: 734.2 arcsec, Horn 2: Az: 95.6 arcsec, Elv: 734.2 arcsec

Calibration Information

Frequency [GHz]	Channel	Polarisation	Tcal [K]	Tsys [K]	Sensitivity [K/Jy]	SEFD [Jy]	Aperture Eff. [%]	TMB/S [K/Jy]	Main Beam Eff. [%]	FWHM [arcsec]	Last update
19.25	1/2	LCP/RCP	13.1	47	1.09	43	38	1.56	67	40.4	Jul 2024
21.15	1/2	LCP/RCP	9.2	67	1.05	64	37	1.74	61	37.8	Jul 2024
22.85	1/2	LCP/RCP	9.0	74	1.03	72	36	1.41	79	36.8	Jul 2024
24.75	1/2	LCP/RCP	8.0	72	1.01	71	36	1.57	71	34.5	Jul 2024
22.25	1/2	LCP/RCP	8.4	72	1.05	71	36	1.57	71	36.8	Jul 2024
23.77	1/2	LCP/RCP	8.0	72	1.03	71	36	1.57	71	35.2	Jul 2024

normalized Gain curve (G = A0 + A1·Elv + A2·Elv2)			Observed in	confirmed
A0 = 0.981	A1 = 1.08E-3	A2 = -1.52E-5	Jul 2024	Jul 2024

Comments:

- Note that the system temperature at this frequency depends strongly on weather conditions!
- Zenith tau values can range from 0.05 to more than 0.2.

The receiver delivers the data by default in four 2.5GHz-wide IF-subbands:

Band	Frequency Range
4	18.0-20.5 GHz
3	19.9-22.4 GHz
2	21.6-24.1 GHz
1	23.5-26.0 GHz

Additionally, there are several receiver versions (see below) which allow to observe two 300 MHz-wide

bands, e.g. for 22.25 GHz (i.e., the water line) and 23.77 GHz (NH3 (1,1)-(3,3)).

Available receiver versions (for OBSINP)

Version	Description	Usage
BB_continuum	standard continuum backend with internal polarimeter	continuum observations
EDDPOL_MULTIFIBA	spectro-polarimeter backend	continuum observations

Below here: Information is currently updated.

Receiver Bands

Channel assignment in the MBFITS data files

Note that the narrow line and VLBA IF channels are usually only available when the specific line version of the receiver was selected. In addition for most receivers with narrow line channels the cables at the patch board need to be connected by the receiver group.

To select different channel numbers in OBSINP, the online plot, or the toolbox the numbers have to be specified like c(1)+c(2) to add channel 1 and 2. E.g. channel 1 and 2 contain the LCP and RCP broadband channels, then "OnlPlot pen='c(1)+c(2)'" or "toolbox use='c(1)+c(2)'" will select these channels. In OBSINP the pen can be directly specified in the receiver selection menu.

Abbreviations:
SB: narrow band channel (Schmalband-Kanal), 100 MHz band width
BB: digital broad band channel (Breitband-Kanal), band width varies for different receivers
VLBA: VLBA IF, 500 MHz band width
BW: band width
TP: total power

1.3cm SFK single horn receiver			
Channel	**IF**	**Pol.**	**Comment**
1	BB	LCP	TP A
2	BB	RCP	TP B

Spectroscopy modes and resolution

Low-res mode (4 basebands for each of 2 feeds and 2 polarizations)

Note, that due to technical reasons the LSR correction has to be applied via software (regridding). This will decrease the effective spectral resolution to some degree.

BW	nchan	nu	Df	Dv	dv
MHz		MHz	kHz	km/s	km/s
2500	16384	18000	152.6	2.541	2.948

BW	nchan	nu	Df	Dv	dv
MHz		MHz	kHz	km/s	km/s
2500	16384	20000	152.6	2.287	2.653
2500	16384	22000	152.6	2.079	2.412
2500	16384	24000	152.6	1.906	2.211
2500	16384	26000	152.6	1.759	2.041
2500	32768	18000	76.3	1.271	1.474
2500	32768	20000	76.3	1.144	1.327
2500	32768	22000	76.3	1.040	1.206
2500	32768	24000	76.3	0.953	1.105
2500	32768	26000	76.3	0.880	1.020
2500	65536	18000	38.1	0.635	0.737
2500	65536	20000	38.1	0.572	0.663
2500	65536	22000	38.1	0.520	0.603
2500	65536	24000	38.1	0.477	0.553
2500	65536	26000	38.1	0.440	0.510

BW ... band width
nchan ... number of spectral channels
nu ... center frequency
Df ... Channel separation (in frequency)
Dv ... Channel separation (in velocity)
dv ... Velocity resolution (dv=1.16*Dv)

Hi-res mode (28 basebands for 1 feed and 1 polarization only)

BW	nchan	nu	Df	Dv	dv
MHz		MHz	kHz	km/s	km/s
300	16384	18000	18.3	0.305	0.354
300	16384	20000	18.3	0.274	0.318
300	16384	22000	18.3	0.250	0.289
300	16384	24000	18.3	0.229	0.265
300	16384	26000	18.3	0.211	0.245
300	32768	18000	9.2	0.152	0.177
300	32768	20000	9.2	0.137	0.159
300	32768	22000	9.2	0.125	0.145
300	32768	24000	9.2	0.114	0.133
300	32768	26000	9.2	0.106	0.122
300	65536	18000	4.6	0.076	0.088
300	65536	20000	4.6	0.069	0.080
300	65536	22000	4.6	0.062	0.072
300	65536	24000	4.6	0.057	0.066
300	65536	26000	4.6	0.053	0.061

BW ... band width
nchan ... number of spectral channels
nu ... center frequency

Df ... Channel separation (in frequency)
Dv ... Channel separation (in velocity)
dv ... Velocity resolution (dv=1.16*Dv)

Tcal measurements

February 2019

Tcal and Tsys

Opacity and Tebb (WVR+AATM)

T0

April 2014

Note, that in April the Tcal was changed in the receiver. Gaps in the curves are entirely due to measurement uncertainties. T0 and Tsys were deduced from spectroscopic skydip measurements and are subject to fitting errors caused by the low signal-to-noise ratio in the spectral bins.

Tcal and Tsys

Opacity and T0

Januar 2014

Tcal and Tsys

Opacity and T0

Antenna model

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