A New 4–8 GHz Receiver for Kunming Station

© **Wen Chen**[1], **Longfei Hao**[1], **Zhixuan Li**[1,2], **Yonghua Xu**[1,2], **Min Wang**[1]

[1]Yunnan Observatories, China
[2]University of Chinese Academy of Sciences, China

Yunnan Astronomical Observatories (YNAO) is located in Kunming, Yunnan province, has a 40 m Radio Telescope which is part of the Chinese VLBI Network (CVN). Kunming station have installed a new C-Band receiver, so we can carry on more international VLBI observations in C-band, and will soon to be one of EVN stations. We got the first fringes with EVN fringe-test experiment in C-band last month. The Kunming station shows its good compatibility to work with the EVN in C-band.

Keywords: VLBI, Astrometry, C-Band.

1 Introduction

The Kunming 40 m Radio Telescope was constructed on June 2005 to May 2006, located at 10 km east of Kunming city, Yunnan province, Phoenix mountain, Yunnan Observatories. The longitude of the station is $102°47'42''$, latitude is $25°01'33''$, and the altitude is 1985 m.

Here are some specifications of the telescope:

Items	Specifications
Prime dish Diameter	40 m
Mounting	Azimuth-Zenith
Surface(< 26 m)	Solid aluminum panel
Surface(26–40 m)	Stainless steel welded wire mesh
Surface r.m.s (< 26 m)	< 0.259 mm
Surface r.m.s (26–40 m)	< 3 mm
Pointing accuracy	$< 30'$
Slew rate (Zenith)	0.5 deg s^{-1}
Slew rate (Azimuth)	1 deg s^{-1}
Optics	Cassegrain focus, $f/D = 0.35$

2 Present VLBI Observations and Terminal

The Kunming station is one of a few VLBI stations in the world which located at lower latitudes. The low latitude gives the Kunming telescope the ability to observe most southern sky sources ($\delta > -60°$). Because of its location, the Kunming station plays an important role in domestic and international VLBI observations.

The Kunming station has installed the Chinese data acquisition system (CDAS) which was developed at Shanghai Astronomical Observatory. The MK5B recorder was also installed to support the CDAS with a recording data rate of up to 2 Gbps.

The Kunming station carried on some VLBI observations of Crustal Movement Observation Network of China. And it's the member of IVS and EAVN, we expect Kunming station can join the EVN as a routine station.

3 New C-Band Receiver and S/X Band Receiver

The Kunming 40 m Radio telescope has installed a new C-band receiver last month. It is a low-noise amplifier, C-Band receiver. This cryogenically cooled system covers the frequency range of 4–8 GHz with a nominally measured noise temperature of $\leq$20 K, for both channels. The dual channels provide the right and left circularly polarized signals from the sky.

Here are some specifications and schematics of the receivers:

Receiver	C-Band	S-Band	X-Band
Input frequency range	4–8 GHz	2.15–2.45 GHz	8.1–9 GHz
Noise temperature	$\leq$20 K(All range)	$\leq$40 K	$\leq$50 K
System temperature	35 K	70 K	80 K
Overall gain of Receiver	65$\pm$3 dB	–	–
IF bandwidth	70–512 MHz	0–512 MHz	0–1 GHz

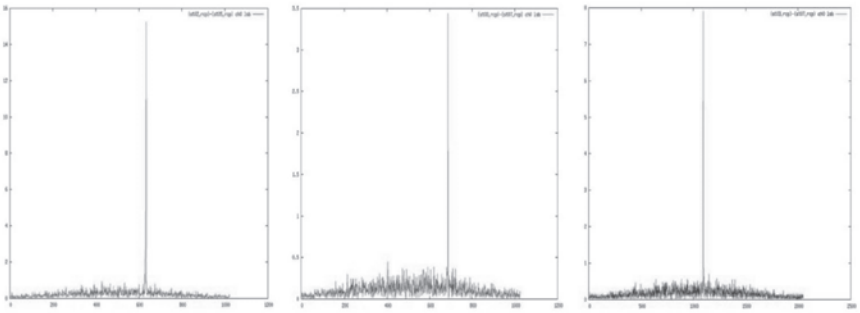

Fig. 1. The first image is the fringe in 5 cm wave length, the second one is the fringe in 6 cm and the last one is the fringe in 6 cm with 2 Gbps. All of them were between Effelsberg and Kunming

4 Fringe-test with EVN in C-Band

We attended network monitor experiments with EVN in C-band on October 20 and 21, the code was N16M3 and N16C3. We got the fringes nicely and successfully, even with 2 Gbps(N16C3). It's the first time we got fringes from EVN in C-band. Fig. 1 shows the fringes and the complete results of experiments are shown below:
http://www.evlbi.org/tog/ftp_fringes/N16M3/scan08_Km/index.html
http://www.evlbi.org/tog/ftp_fringes/N16C3/

5 Pulsar observations in C-Band

We also did some pulsar observations in C-band with 300 MHz bandwidth, and got some good phase of pulsar. The result of PSR J0835-4510 and PSR J0358+5413 are shown by Fig. 2.

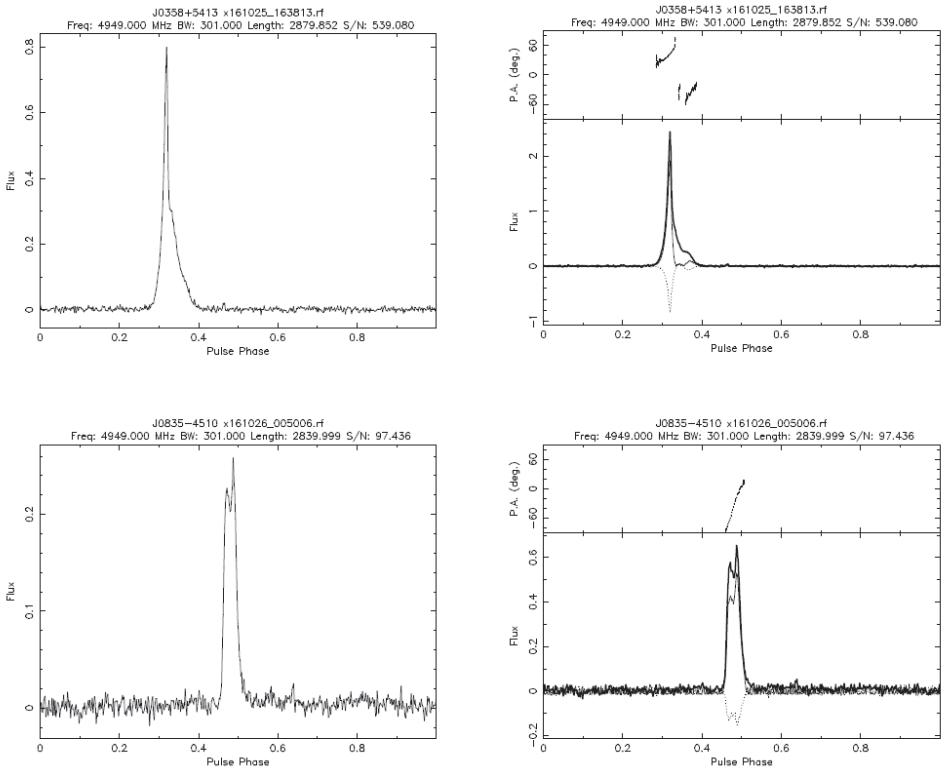

Fig. 2. The profile of PSR J0835-4510 and PSR J0358+5413

6 Future Observations

We can do more EVN and other international VLBI observations after the C-band receiver working normally. So we are looking forward to be EVN routine station.

References

1. *Longfei Hao, Min Wang, Jun Yang*. VLBI observations with the Kunming 40-meter radio telescope // Research in Astronomy and Astrophysics. — 2010. — Vol. 10(8). — P. 805–814.