**J012-P002** Time: May 30 17:00-18:30

# Development of observation system for Jovian synchrotron radiation; new radio telescope at the Iitate observatory

# Takuo Watanabe[1], Hiroaki Misawa[1], Fuminori Tsuchiya[2], Yoshizumi Miyoshi[3], Riichi Kudou[2], Akira Morioka[4], Tetsuro Kondo[5]

[1] Planet. Plasma and Atmos. Res. Cent., Tohoku Univ., [2] Planet. Plasma Atmos. Res. Cent., Tohoku Univ., [3] Planet. Plasma and Atmos. Res. Cent., Tohoku Univ., [4] Planet. Plasma and Atmos. Res. Cent.,Tohoku Univ., [5] KSRC,CRL

The radio telescope for planetary synchrotron radiation has been constructed in the Iitate village, Fukushima prefecture.

The first target of the observation is the Jupiter synchrotron radiation (hereafter, JSR). JSR is a radio wave emitted from the relativistic electrons in the Jovian radiation belt. It has been known that the flux of the JSR is about 5 Jy in decimeter wavelength including variation of about 1 Jy coming from change of viewing geometry due to the Jovian rotation. JSR has information on dynamics of high energy particles and electromagnetic disturbances in the Jovian inner magnetosphere. The intensity variation of JSR, however, has been less understood in its timescale and origin because of the lack of observation. The purpose of JSR observation is to detect the intensity variation of several days or weeks by means of the continuous observation.

We report the newly developed system for JSR observation, focusing on,
1) antenna and pick-up part,
2) low noise amplifier part,
3) signal synthesise part,
4) calibration system for derivation of absolute flux.

1) The antenna consists of two offset-parabolic antennas which are rectangular of 31 m X 16.5 m, and works as an antenna whose physical aperture area is approximately 1000 m^2 using phased-array method. The antenna is set on a fully steerable platform. Parabolic reflector surface is made of stainless stele mesh with spacing of 20 mm, which enables to observe polarized radio wave whose wavelength is from meter to decimeter. Radio waves reflected at parabolic reflector are converted to electrical signal using half wave dipole antenna with plain reflector at focuses. The aperture efficiency of antenna comes to 0.6 by using the dipole pick-up. We are developing the method to concentrate dipole antenna beam to the rectangular parabolic reflector using additional reflective element to increase aperture efficiency.

2) We developed low noise amplifier(LNA). The noise figure(NF) of the LNA is about 1 dB(75 K). Using this value in addition to aperture efficiency(0.6), integration time(10 sec), and observation bandwidth(10 MHz), we estimate that the minimum sensitivity(SN = 1) of our system is 0.08 Jy, which is enough to detect time variations of JSR.

3) To synthesize signals from two focuses, phase matching between them is necessary. We achieve it by the phase shifting of local signals which are sent to each mixer. By using the digital dynamic synthesizer(DDS) as a local signal generation, the delay time is controlled digitally with a phase resolution of about 2 degree. The antenna has a calibration system so-called loop method to measure phase difference originated from electrical circuit.

4) The front-end part of the antenna is designed to feed a hot load and cold load. Using this hot and cold load measurements in addition to the observation of calibration star, we can derive the absolute flux of radio stars(Y-factor method). Moreover the front ends are put in containers to keep constant temperature within 0.5 degree, which eliminates the gain fluctuation of amplifier.

Furthermore, we report the results of pointing measurements, aperture efficiency measurements, beam pattern measurements, and preliminary observations of JSR.