

Current Status and Future Plans of the Nobeyama Radio Observatory

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The Nobeyama 45-m radio telescope, located at an altitude of 1,400 m in Nagano, Japan, has been a world-leading facility for millimeter-wave astronomy since 1982. Its large aperture provides high spatial resolution (~15" at 110 GHz), while the four-beam FOREST receiver enables efficient wide-area mapping across 86–116 GHz. Several large survey programs have been conducted with this instrument (e.g., FUGIN; Umemoto et al. 2017). In addition to FOREST, the Z45 receiver enables magnetic field studies through Zeeman polarimetry. H22 and H40 receivers can be used to observe 22 GHz band and 40 GHz band, respectively. New instruments are also under development: HINOTORI will enable simultaneous observations at 22, 40, and 86 GHz by implementing frequency-separation filters in the beam transmission system to simultaneously use H22, H40 and TZ receiver which is a SIS receiver capable of observing 86 GHz band. 7-BEE, a seven-beam successor to FOREST, is being prepared for open use. As of April 2026, we have initiated three new receiver development projects supported by three new grants. The first is the development of a 150 GHz receiver based on MMIC-SIS technology. The second is a 230 GHz receiver to be combined with the BHEX satellite project. The third is an extension of HINOTORI by incorporating an additional frequency-separation filter to enable observations up to the 230 GHz band. Observing time is available to the international community at a rate of 33,000 JPY per hour (incl. tax), without scientific proposal screening. In this poster, we present the current status of the Nobeyama 45-m telescope, including outreach activities and future plans.

01. Nobeyama 45m telescope



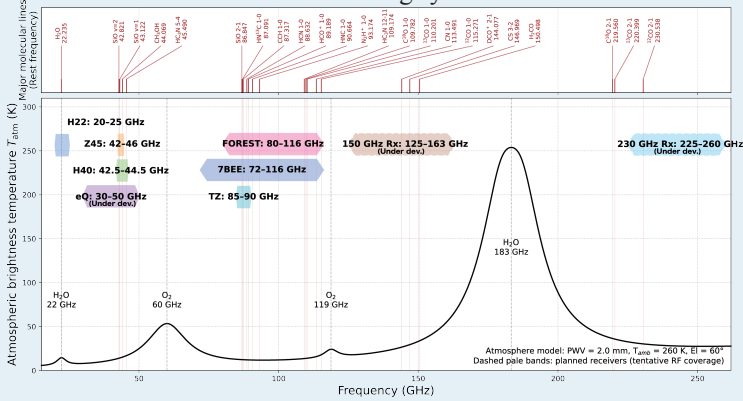
Antenna aperture: 45 m
Antenna surface Accuracy: 0.1 mm
One of the world's largest telescope
Very good summer resort



Active outreach activities by Ms. Madoka Hoshimi

02. Observable frequency range

The observatory holds 6 facility receivers, 3 under development receivers and 1 multi-band observing system



03. Multi-beam receivers

- Current most frequently-used Rx
- 4 Beam, 2-pol, 2SB
- Fast OTF mapping (0.12 deg²/hr)

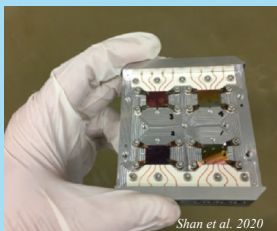


- Successor of FOREST
- 7 Beam, 2-pol HEMT Rx
- Ultra-wideband (72-116 GHz)

150 GHz mul-beam Rx

(Under dev.)

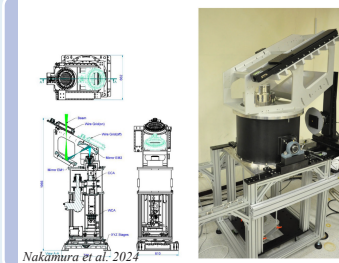
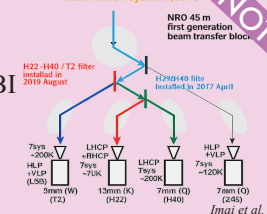
- 4 Beam, 2 pol, 2 SB
- Based on Monolithic Microwave Integrated Circuit
- Grant proposal was accepted in 2026, and production started in Suwa university of Science
- Prototype of the future 100 beam-class Rx



04. Single beam receivers

- H22+H40+TZ simultaneous observation using frequency separation filter
- Planning to merge with mm VLBI

Triple bands (H22+H40+TZ) simultaneous observation system (2019)



Wideband, low-noise Zeeman obs. of CCS and SO
NRO-ASIAA-KASI contract for backend development(2025)

- Able to observe CO(J=2-1) and its isotopes
- Concatenate with EHT & Blackhole explorer
- Grant proposal was accepted in 2026, and production started in Nagoya-city university and Suwa university of Science

05. Backend

Spectrometer with 4096 channels
Frequency resolution: 3.81–488.24 kHz
Band width: 16–2000 MHz
→ Minimum velocity resolution of 0.05 km/s/@115 GHz



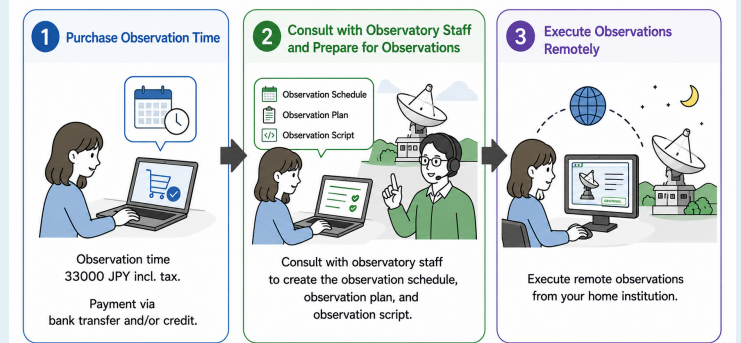
06. Science Case

Like these legacy surveys...

- Wide and/or deep mapping
- Broad frequency coverage
- VLBI observation as EAVN

New science cases are always welcome!

07. How to Use



Next call for proposal for science observation

- Date: 1st July, 2026
- There is no science screening