

Status of Nobeyama Observations 2024

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(Nobeyama Radio Observatory)



Good news

One position (Project Associate Professor or Project Assistant Professor) is now wanted



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We are distributing NRO calendar at entrance of this room

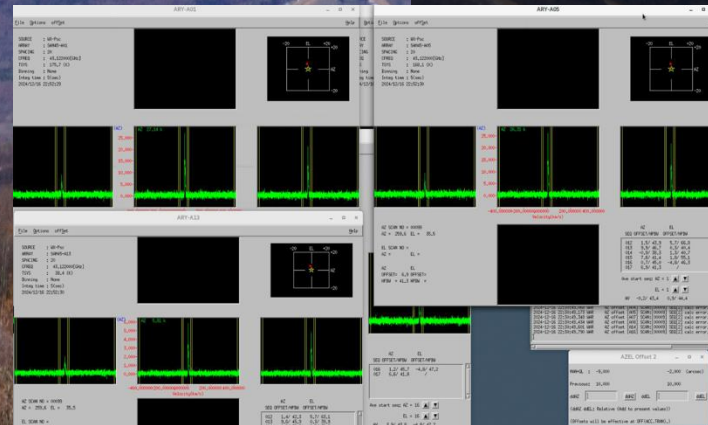


Bad news ...

Operation has been stopped since Nov. 9

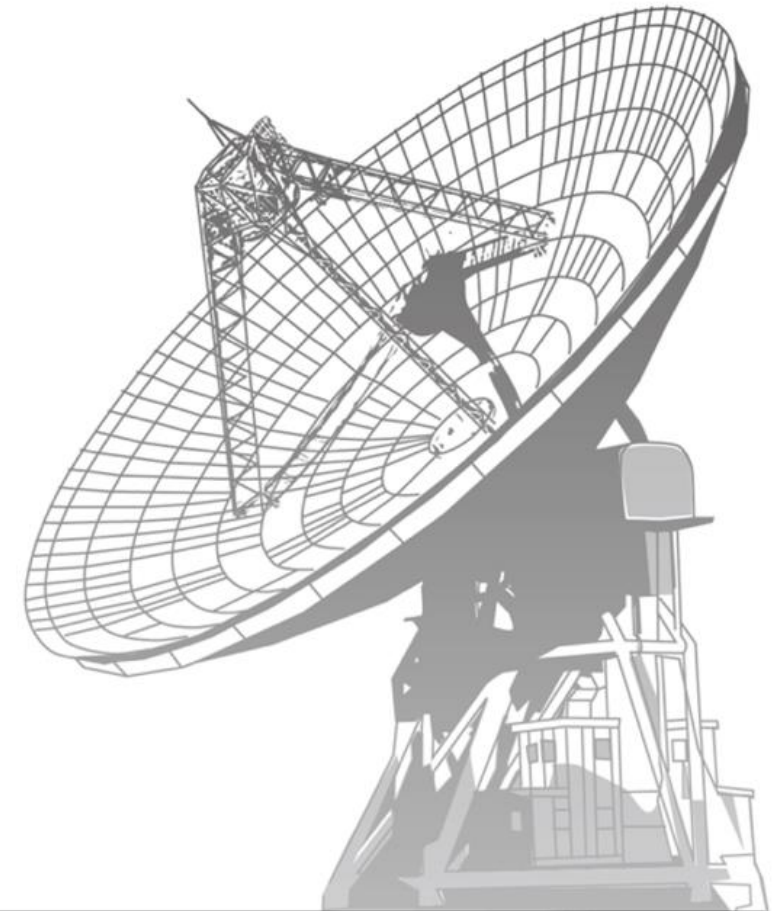


- due to SAM45 spectrometer was broken
- After replacing 22% of boards, now it is almost recovered.
- Within several days, we will start operation with limited capability of 75% after final check.
- During this troubleshooting, ALMA computing people give us great efforts. We really appreciate it.



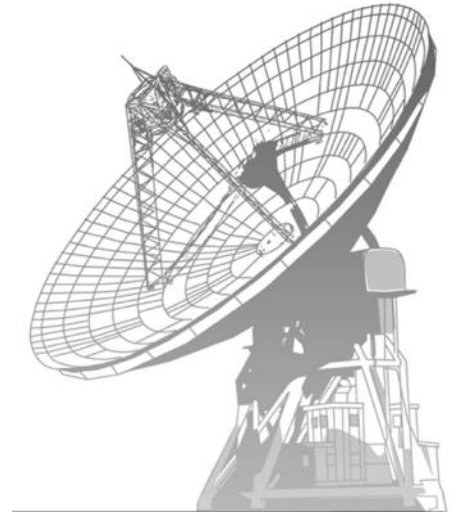
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 - 3. Development activities
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1. Charged Telescope Time Statistics

- Charged Telescope Time
 - 10,000 yen/hour (30,000 yen/hour for foreign users)
 - What will be charged:
 - 45m telescope operation
 - use of facility receivers
 - What will income be used for:
 - annual operation cost (electricity and/or maintenance)
 - repair cost of (future) large breakdown



	Deadlines	Periods	Charged	Scientific Assessment
Regular	B (2024/8/1)	11/1 – 3/31	Yes	No
	C (2024/12/1)	2/1 – 3/31	Yes	No
Development	A (2024/6/1)	9/1 – 10/31	Yes	No
Tutorial	A (2024/6/1)	9/1 – 10/31	Yes	No
New In-kind tutorial	B (2024/8/1)	9/1 – 10/31	No	No
Student	B (2024/8/1)	11/1 – 3/31	No	Yes
New CSV contribution	B (2024/8/1)	11/1 – 3/31	No	No

New in 2024

- In-kind Contribution Hands-on Tutorial Program (type-B)
 - Free-of-charge observation time offered for hands-on tutorial of universities in exchange for providing their human resources to NRO hosting hands-on tutorial for undergraduate will be held in near future.
 - No submission on 2024 deadline.
- CSV Contribution Program
 - Free-of-charge observation time offered for people who contributes CSV activities of the telescope.
 - Four hours of observation time is provided by contributing one night of CSV operation (8 hours duty).

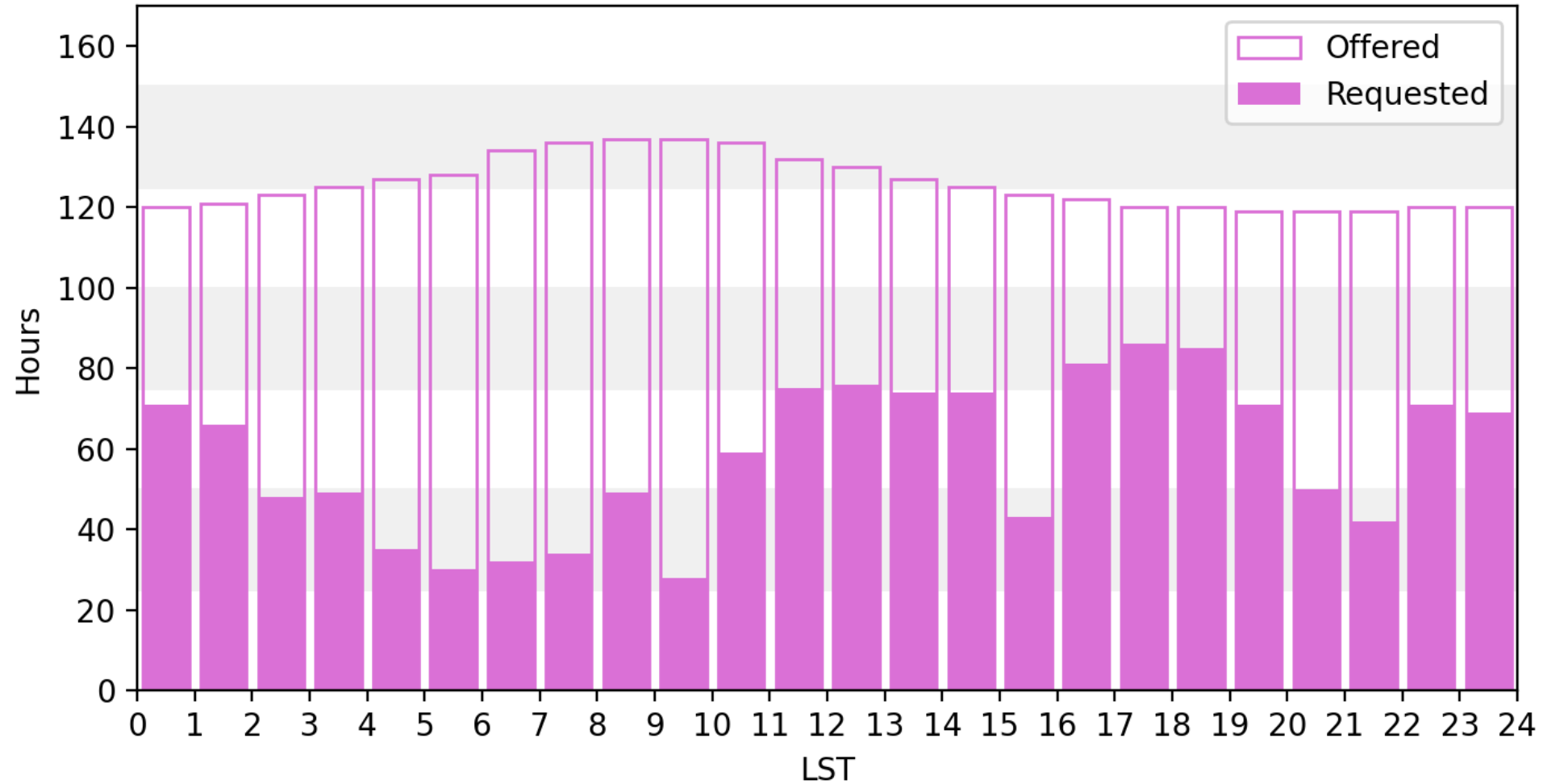
1. Charged Telescope Time Statistics

- 3rd year of Charged Telescope Time
- Statistics 2024
 - Totally 52 proposals, 1603 hours were allocated.
 - (Last year: 37 proposals with 1797 hours requests)
 - Thank you very much for your contribution!

Deadline	Type	Offered [h]	# proposals	Requested Observation Time [h]	Allocated Observation Time [h]	(Allocation for foreign institute [h])	NRO revenue [M JPY]
2024A	Development	550	2	130	130	0	1.430
2024/6/1	Hands-on tutorials		4	38	38	0	0.418
2024B	General	3200	21	995	995	0	10.945
	EAVN (VLBI)		Not offered				
	2024/8/1	Student	5	185	96	N/A	0
		CSV Contribution	96	10	388	96	N/A
2024C	General	1000	10	248	248	0	2.728
2024/12/1	EAVN (VLBI)		Not offered				
	Total		52	1984	1603	0	15.521

1. Charged Telescope Time Statistics

Requested time (Season 2024; Regular, Student)



1.1. Student Time (Free-of-Charge)

- Student Time (free-of-charge)
 - Up to 100 hours (24 hours * 4 days)
 - Scientifically reviewed by part of JSAC members
- Statistics 2024
 - Received: 5 proposals, 185 hours (last season: 4 proposals 142 hours)
 - Accepted: 3 proposals, 67 hours

Please encourage your students to submit!

2. Instrument Status

	Available	Under development
Antenna	Main dish Antenna rail Master collimator	MAO (Tamura et al.)
Frontend	H22, H40, Z45 FOREST H22 & H40 H22 & Z45	eQ (Chiong, Nakamura et al.) 7BEE (Tatematsu et al.) Tsukuba-cam (Kuno et al.) H22 & H40 & TZ (Imai, Niinuma et al.)
Backend	SAM45 Continuum BE VLBI BE	FMLO (Taniguchi, A. et al.) RF SoC Spectrometer (Nishimura et al.)

- **Red**: not recovered yet
- **Blue**: recovered

2. Instrument Status

- Shutter of master collimator room

- Broken shutter of master collimator room has been repaired.
- Now the telescope can move to all El angle (11-90 deg).



- Z45 receiver

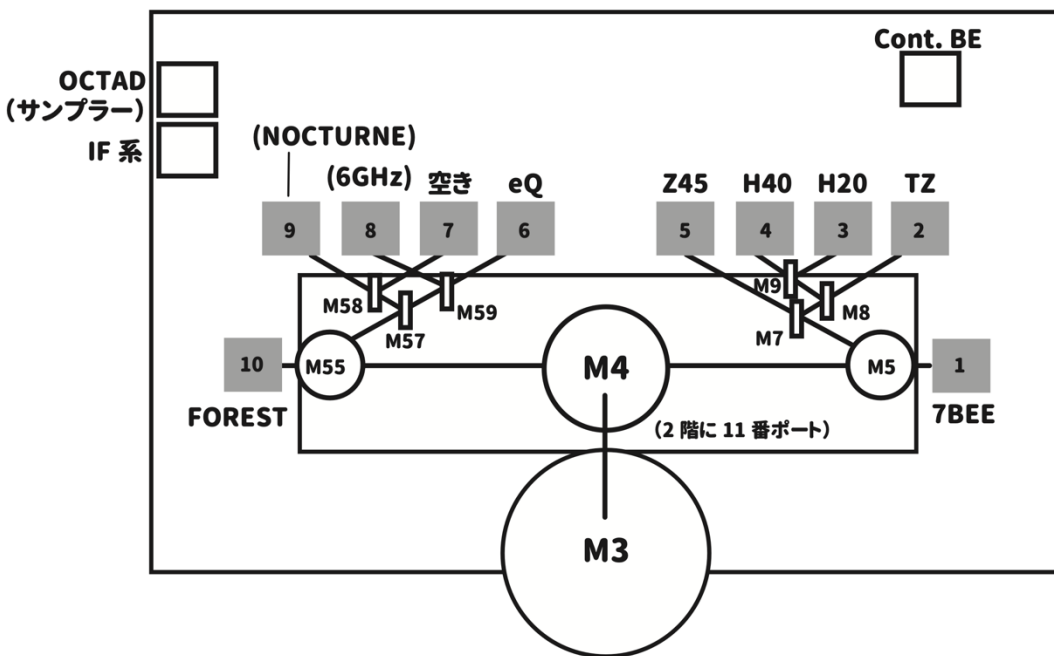
- On Feb. 2024, an observer reported that H polarization of Z45 shows no receiver response (very bad Tsys).
- After the inspections, we identified the cause that cooled isolator was broken in Apr.
- We replaced it in June, and it recovered.

2. Instrument Status

- SAM45 problem 2023
 - Malfunction of DFP#1 motherboard (M/B) was found in Oct. 2023, and repair work was finished in July 2024.
- SAM45 problem 2024
 - Malfunction was detected on 9 Nov. 2024.
 - We conducted investigations and replacement. Finally, 3 motherboards, 3 CIP boards, and 10 FFT boards were replaced.
 - Now, SAM45 is almost recovered except for DFP#2 (corresponding to A9-A12). Repair of DFP#2 motherboard is conducting.
- Hydrogen maser clock problem (owned by NAOJ-Mizusawa, and used at Nobeyama)
 - Due to breakdown of the clock, VLBI operations are suspended 2024 season as well.
 - NAOJ-Mizusawa installed new clock, and its performance is under confirmation.
 - This problem does not affect single dish observations.

3. Development Activities

Receiver cabin



Port	Rx	RF (GHz)	Beam	Pol	PI	Status
1	7BEE	70-116	7	2	Tatematsu (NRO)	under CSV
2	TZ	80-116	1	2	Niinuma (Yamaguchi U)	under CSV
3	H20	20-25	1	2	NRO	Open
4	H40	42.5-44.5	1	1	NRO	Open
5	Z45	42-46	1	2	Nakamura (NAOJ)	Open
6	eQ	30-50	1	2	Chiong (ASIAA)	under CSV
7	(open)					
8	6 GHz Rx	6.5-12.5	1	2	Yonekura (Ibaraki U)	Budget requiring
9	NOCTURNE	20-150	1	2	Imai (Kagoshima U)	Budget requiring
10	FOREST	80-116	4	2	NRO	Open
11	Tsukuba-cam	100	109	N/A	Kuno (U Tsukuba)	under CSV

HINOTORI Filter

H22 & H40	Imai (Kagoshima U)	Open
H22 & Z45	Imai (Kagoshima U)	Open
H22 & H40 & TZ	Imai (Kagoshima U)	under CSV

- 11 receiver ports available
- Development opportunities are opened for universities
- NRO development roadmap is mainly based on proposals submitted
- 9 projects are ongoing

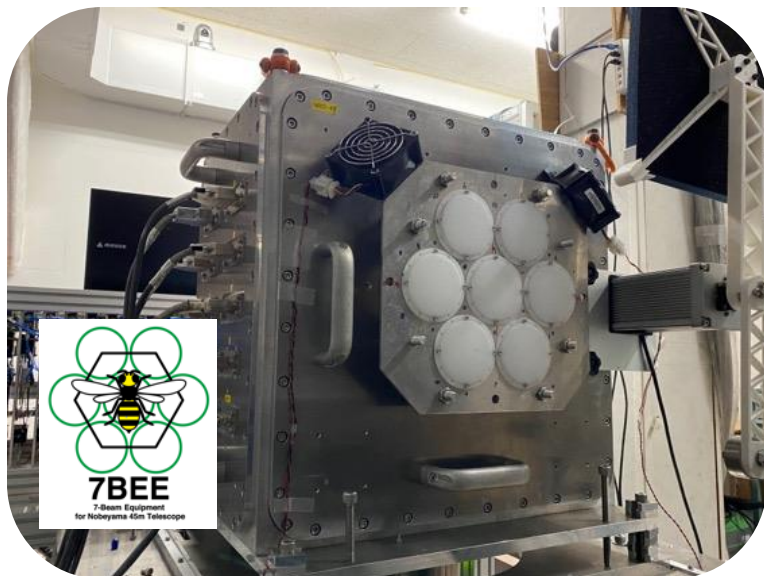


Developer meeting 2023



Developer meeting 2024

3.1. Progress on 7BEE



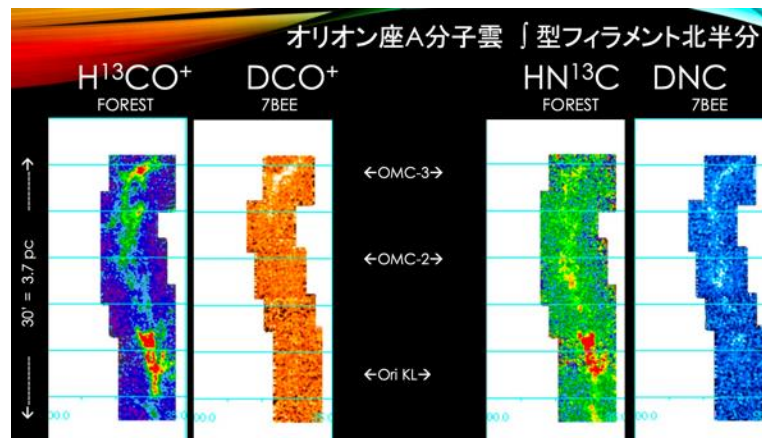
- 7 beam, 2 pol.
- 72 - 116 GHz (corresponding to ALMA Band2+3)

Deuterated mol.
→ x7 faster than T70

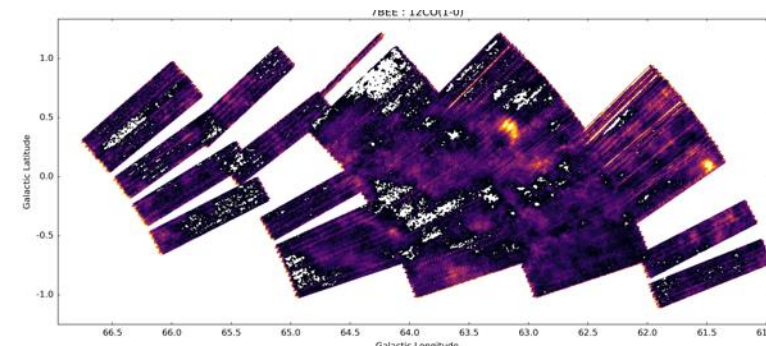
CO
→ x2 faster than FOREST

• Progress

- Installed in Aug. 2022
- First light: Sep. 3, 2022
- CSV
 - Tsys: OK
 - Squint: OK
 - Beam pattern: OK
 - Beam efficiency: OK

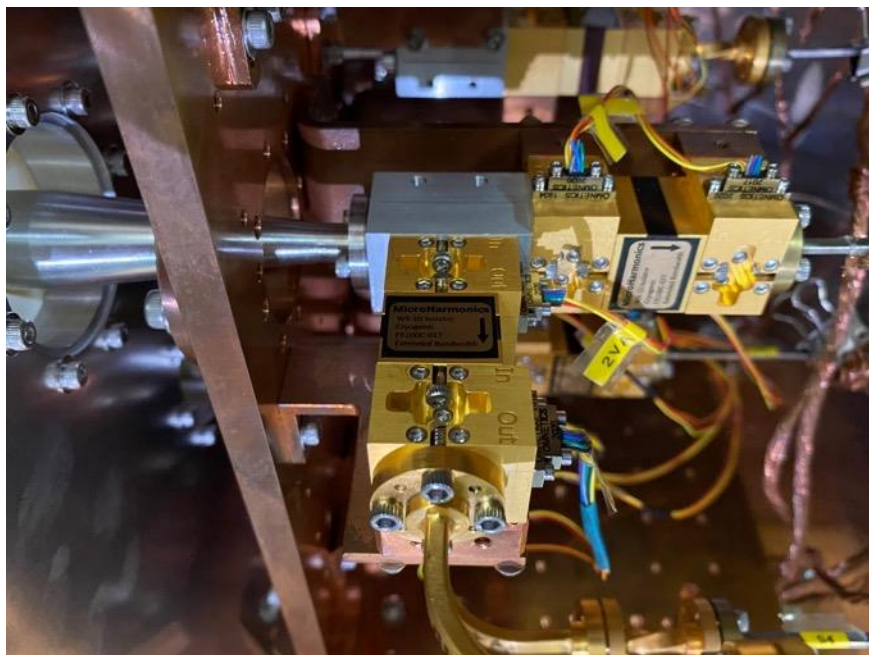


Large scale Deuterated mol. mapping
OMC (Tatematsu+)



CO fast mapping mode was developed
(Nishimura+)

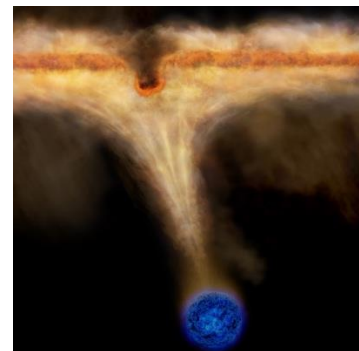
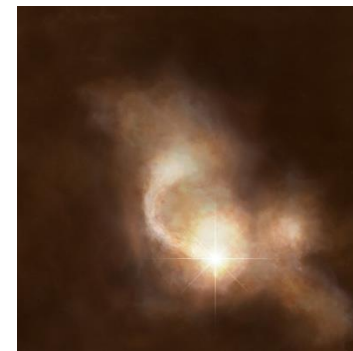
3.1. Progress on 7BEE



- Malfunction on frontend
 - At installation, all IFs were OK for their gain and T_{sys} .
 - However, we found about almost all CLNAs show gain decrease.
 - Repair of CLNAs is on-going, and it will be replaced by next March.

4. Publication & Outreach

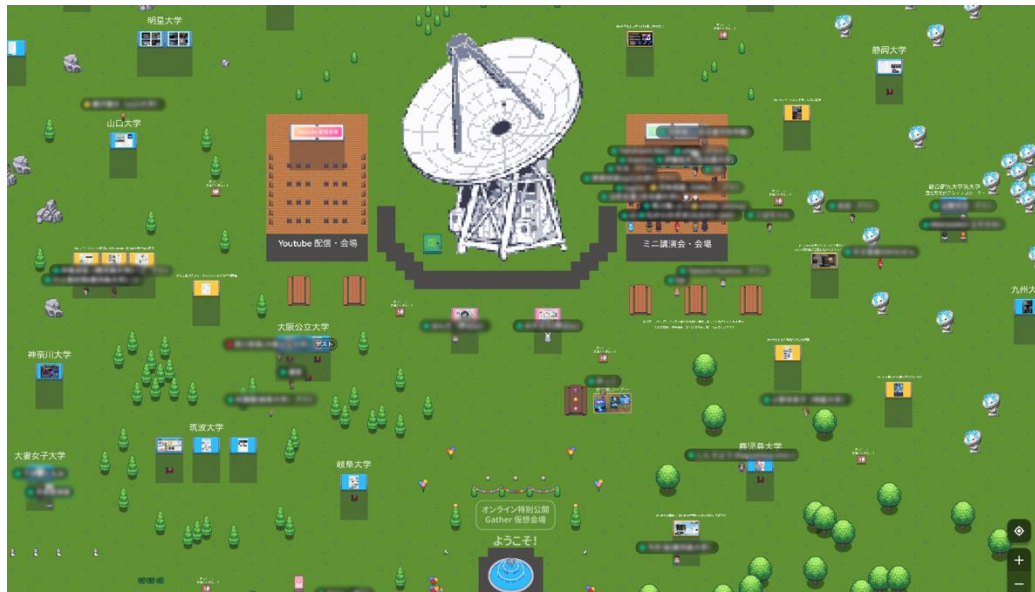
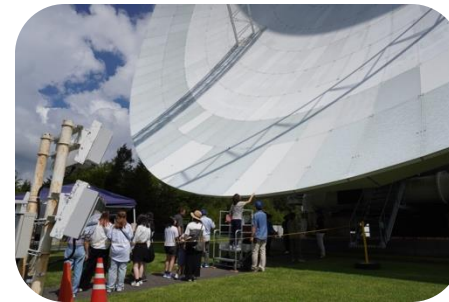
- Publications using NRO45m (Nov 2023 – Oct 2024):
 - 42 refereed papers (ApJ/ApJL/ApJS: 20, PASJ: 8, MNRAS: 7, A&A: 6, AJ: 1)
- NRO News Release
 - 3 releases (Nov 2022 – Oct 2023)
 - 2024-04-18 : Taniguchi et al. “星が生まれているところに直接流れ込む星の材料はどこからやって来たか？…”
 - 2023-05-27 : Yamamoto et al. “マイクロクエーサーSS433に付随する分子雲から近紫外線放射を発見…”
 - 2023-06-03 : Yokozuka et al. “天の川を高速で通過した暗黒物質サブハローの痕跡を発見”
 - Please let us know when your research is published!
 - NRO has some budget to support making illustration for your release



4. Publication & Outreach

- Nobeyama Open Day Online:
 - July 20, 2024
 - Online public lecture
 - From news releases
 - Virtual poster session
 - 電波天文学を学べる大学 (21 Univ.)

- Nobeyama Open Day On-site:
 - Aug 24, 2024, 1183 visitors



- Next year
 - Jul 26, 2025: On-line day
 - Aug 30, 2025 : On-site day

4. Publication & Outreach

- Cooperation with local government (LG)
 - Definite fraction of LG income will send to the NRO
 - Results:
 - (2020) 125 kJPY [COVID19]
 - (2021) 167 kJPY
 - (2022) 468 kJPY
 - (2023) 727 kJPY
 - Nearly 2x increase each year



Daytime tour



Night tour

Starry sky photography event



Calendars were printed using this revenue and delivered to local residents and related people.

Please bring it!

5. User supports

- NRO45 user community

- Discord Nobeyama45 server

- 131 participants

- Invitation code: <https://discord.gg/HtkrmpK5Sw>

- Communication between observers, NRO announcement, user support, etc.

- Proposal Consultation

- Held on July 12, before 2024B deadline on zoom.

- Three graduate students were participated and all of them submitted to the student program.

5. User supports

- NRO45 Science Workshop
 - Held on December 2, 2024
 - 48 people joined, and 16 talks were given
 - Future prospect of NRO45 was discussed
 - <https://nobeyama45.notion.site/45m-2024-13d8d4d4386380a3b313f6f11a0bb586>



Summary

FY2024 statistics

Observation	52 proposals、 1603 hours Observatory revenue: <u>15.5 M JPY</u>
Development	9 projects are in progress https://www.nro.nao.ac.jp/~nro45mrt/html/develprop/
Publications	42 refereed papers (2023 Nov – 2024 Oct) https://www.nro.nao.ac.jp/~nro45mrt/html/publications/#2023
Education	PhD : 2 people/year (5 years average) Master: 6.6 people/year (5 years average)
Press release	3 releases
Visitor	39,217 people (FY2023)
Cooperation with local government	71 daytime tour, 30 night tour, etc. Totally 3,075 people joined paid events Definite fraction of LG income will send to the NRO. Observatory revenue: <u>0.7 M JPY</u> (2023)