



TNRT Users Meeting for Call for Proposals in Cycle 1
Jan 8th, 2025 @Online

Summary for the results of Call for Proposals in Cycle 0 (RSRO)

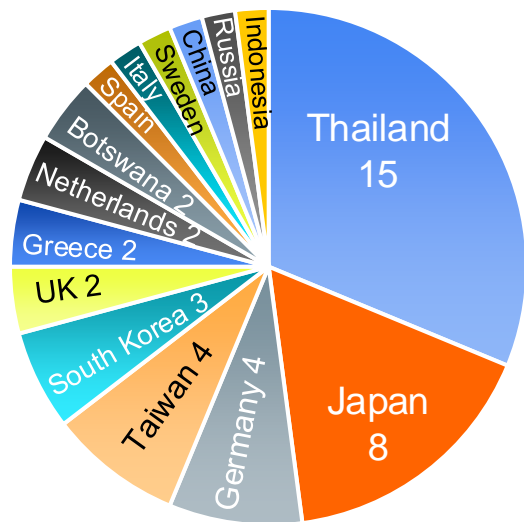
NARIT: National Astronomical Research Institute of Thailand (Public Organization),
Ministry of Higher Education, Science, Research and Innovation, Thailand

Koichiro Sugiyama, Acting Manager of CRAE / Chief Scientist of TNRO

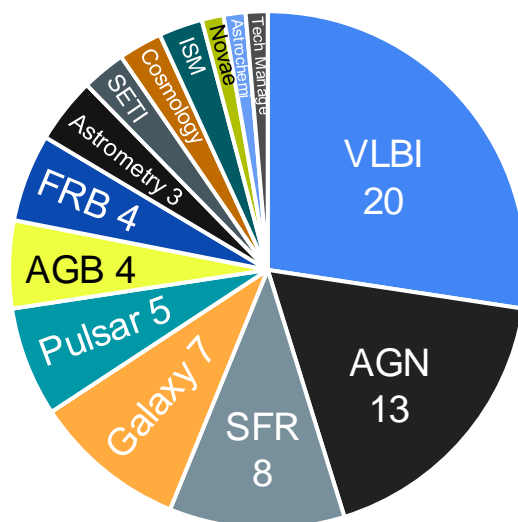
On behalf of: Nobuyuki Sakai, Bannawit Pimpanuwat, Phrudth Jaroenjittichai, Apichat Leckngam, Wiphu Rujopakarn, Boonrucksar Soonthornthum, Saran Poshyachinda (NARIT), Busaba H. Kramer (MPIfR/NARIT), and all the radio center/observatory CRAE/TNRO members.

Welcome **46 Participants** in this TNRT User Meeting!!

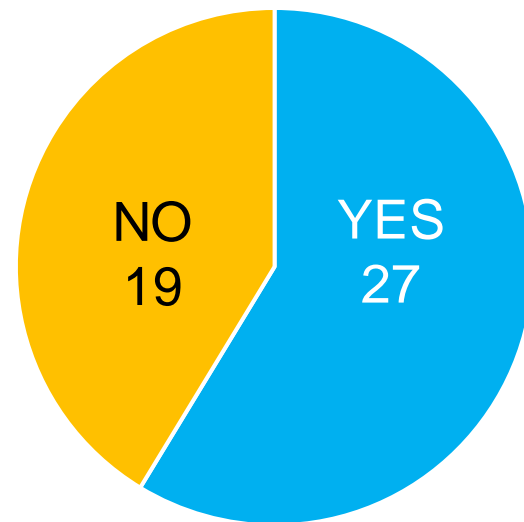
Country / Region



Research/Expertise fields



Currently consider submitting proposals?



NARIT Infrastructure

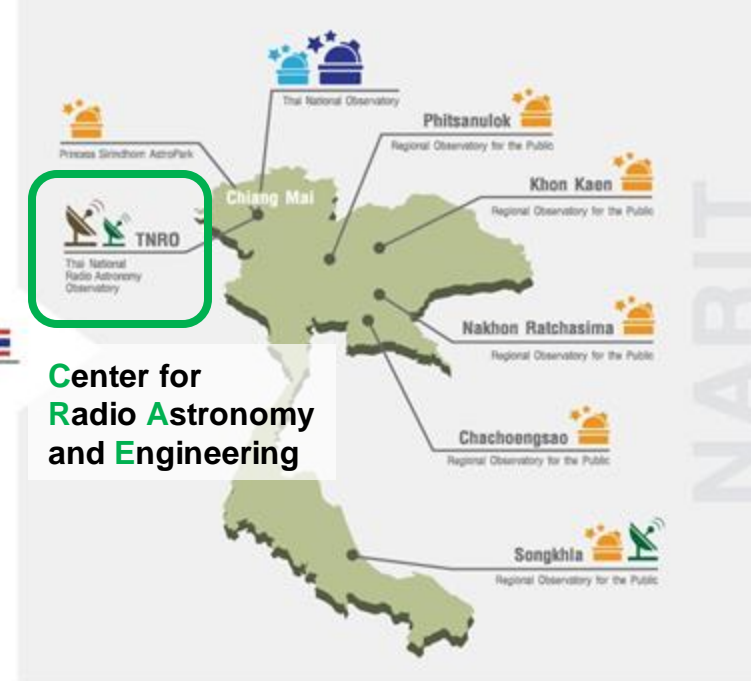


Executive Director
Dr. Saran
Poshyachinda

Founder
Assoc. Prof.
Boonrucksar
Soonthornthum

Deputy Director
Dr. Wiphu
Rujopakarn

Consultant
Dr. Busaba H.
Kramer



 ∅ 2.4 meters
  ∅ 1 meters
  ∅ 0.7 meters
  ∅ 0.4 meters
  ∅ 40 meters
  ∅ 13 meters

National Astronomical Research Institute of Thailand (Public Organization)

Center for **R**adio **A**stronomy and **E**ngineering

Other
Centers/Divisions/GPs



Thai **N**ational **R**adio Astronomy **O**bservatory

Advanced Radio Frequency Laboratory



Thai National Radio Telescope
(TNRT) 40-m



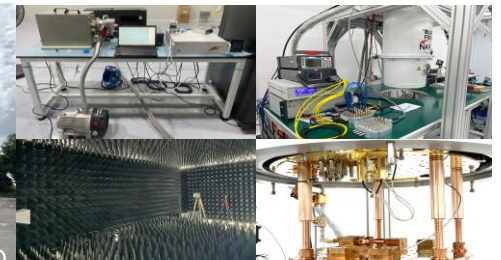
VGOS telescopes



VLBA DiFX correlator
Credit: W. Brisken (NRAO)



@NARIT-HQ



Team Members of CRAE

(RAOC 2017~2021; CROE 2021~2023;
CRAE 2024~)

Directors

Advisors

Ex Project Leaders



S. Poshyachinda; W. Rujopakarn; B. Soonthornthum; B. H. Kramer; P. Jaroenjittichai; A. Leckngam

*“Human Capacity & Technology Developments
Through Radio Astronomy & Geodesy”*

Speaker KS



Acknowledgement



- International Technical Advisory Committee (ITAC) members:
 - Hideyuki Kobayashi (Chair, NAOJ), Busaba H. Kramer (Secretariat, MPIfR/NARIT), Do-Young Byun (KASI), Francisco J. Colomer (JIVE, retired) → Agnieszka Slowikowska (JIVE, new), Michael Garrett (JBCA), Yashwant Gupta (NCRA), Mareki Honma (NAOJ), Kee-Tae Kim (KASI), Jinling Li (SHAO), Zhiqiang Shen (SHAO), Tasso Tzioumis (CASS), Pablo de Vicente (IGN), & Gundolf Wieching (MPIfR).
- International Scientific Advisory Committee (ISAC) members:
 - Michael Bode (Chair, BIUST), Busaba H. Kramer (Secretariat, MPIfR/NARIT), Hideyuki Kobayashi (NAOJ), & Michael Kramer (MPIfR).
- Special thanks to Yebes Observatory, MPIfR, JBCA, and SHAO for constructing the TNRT and VGOS with its receivers developments!

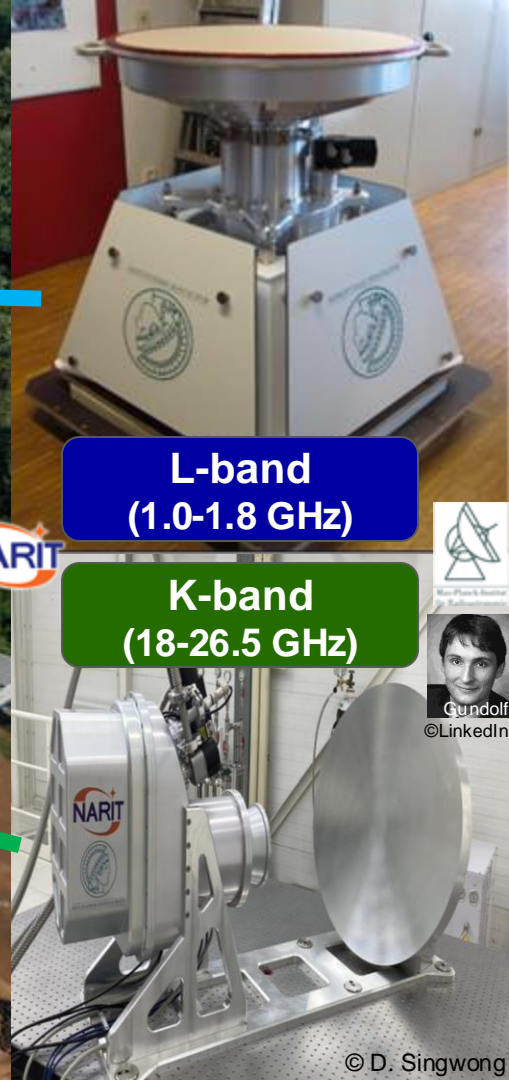
Thai National Radio Astronomy Observatory



- 40 km away toward NE from NARIT head quarters
- Site is a part of Huai Hong Khrai Royal Development Study Center
- Radio Quiet Zone: less RFI, & Relatively lower water vapor area



The 40 m Thai National Radio Telescope (TNRT)



L-band
(1.0-1.8 GHz)

K-band
(18-26.5 GHz)



“Upgraded” version of IGN’s Yebes 40-m Radio Telescope
With Prime-Focus Tetrapod Head Unit (THU)



0.3 – 115 GHz : **P/L/C/X/Ku/K/Q/W**-bands

150 μ m (rms) total surface accuracy Beam size: 13.4 arcsec – 1.43 degree
Pointing: 2" (no wind), 6" (5 m/s wind) Slew: AZ 3 deg/s, EL 1 deg/s



White Paper for TNRT



Sciences with Thai National Radio Telescope

arXiv: arXiv:2210.04926

Editors

on 12 Oct 2022

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Yadav, Ram Kesh¹, Zhang, Bo¹⁹, Zheng, Xing Wu²⁰ and Poshychinda, Saran¹

Pulsar / FRB / GW / SFR / Galaxy / AGN / ES / CP stars / Geodesy, & Forecasting system

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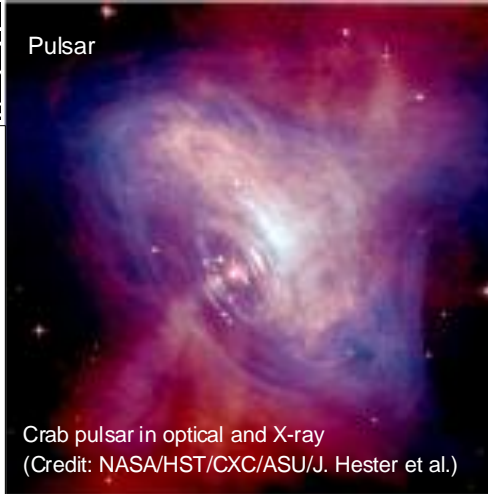
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¹⁹ Shanghai Astronomical Observatory, Chinese Academy of Sciences, Shanghai 200030, China

²⁰ School of Astronomy and Space Sciences, Nanjing University, Nanjing 210093, China

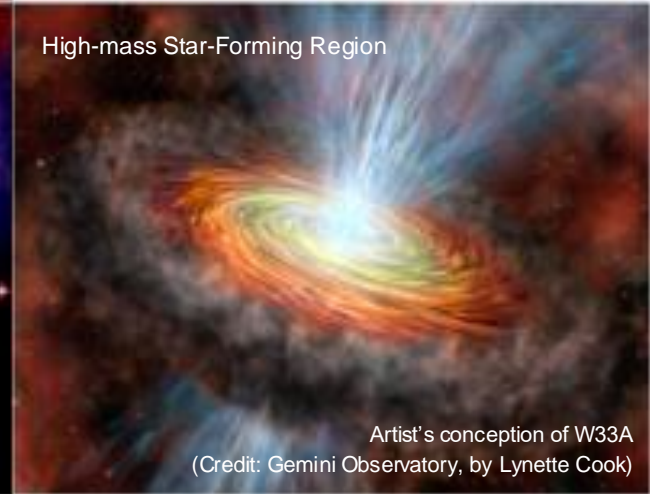
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Pulsar



Crab pulsar in optical and X-ray
(Credit: NASA/HST/CXC/ASU/J. Hester et al.)

High-mass Star-Forming Region



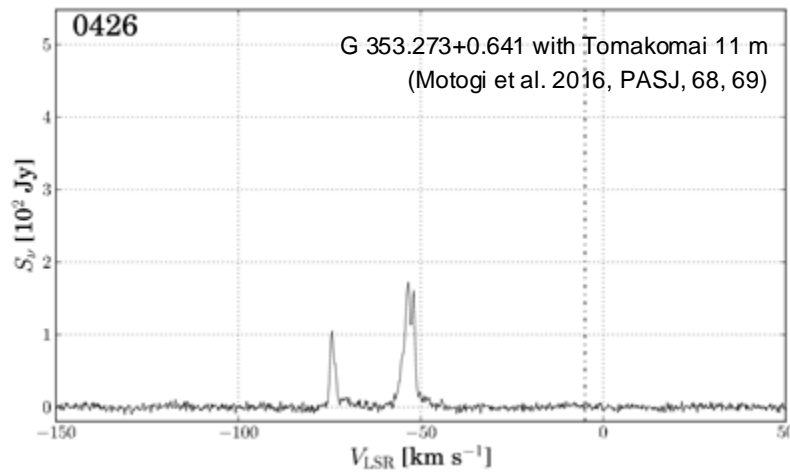
Artist's conception of W33A
(Credit: Gemini Observatory, by Lynette Cook)

Active Galactic Nuclei



Illustration of AGN
©NASA/JPL-CALTECH

Time-Domain Sciences with TNRT



arXiv:2210.04926v1 [astro-ph.IM] 10 Oct 2022

High-cadence & Long-term Monitoring

【Pulsar】

by P. Jaroenjittichai, T. Akahori, R. Dodson, M. Rioja, J. Wongphecauxson, N. Intrarat, et al.

- Monitor known pulsars for unknown variability
- Monitor for known variable sources
- Multi-freq. astronomy for Giant Radio Pulse
- (Statistical parallax measurement)
- (Transverse vel. measurement toward Magnetar)

et al. Illustration of a beamed pulsar ©Olena Shmahalo

【Fast Radio Burst】

by T. Akahori, P. Jaroenjittichai, S. Sanpa-arsa, et al.

- Polarized FRB High-precision Understanding by K-band Experiments with TNRT (PHUKET)
 - Long-term monitoring for linear pol. in K-band
 - Every month
 - Time-dependence of the pol. angle and the rotation measure

2nd repeating FRB with CHIME ©Danielle Futselaar

【Star Formation】

by K. Sugiyama, B.H. Kramer, M.D. Gray, J.A. Green, et al.

- Periodic & Bursting multi-species maser daily/Intraday flux/pol. monitor
- Address accretion mechanism
- Fundamental Maser physics

et al. ...

Orion-KL Source-I ©ALMA (ESO/NAOJ/NRAO)

【Evolved Stars】

by S. Etoaka, A.M.S. Richards, H. Imai, B. Pimpanuwat, M.D. Gray

- Distance by Phase-lag measure
- Find the shape / drive of winds
- Unveil episodic events
- Evolution of the Water Fountain
- SiO & stellar continuum detection

et al.

Artist's impression of water fountain ©Danielle Futselaar, artsource.nl.

【CP Stars】

by E. Semenko & D. Mkrtchian

- Unveil coherence in Optical & Radio
- Address CP Mag.
- Intraday monitor
- Flux, followed by multi-freq. & pol.

Artist's illustration of cataclysmic binary system ©M.Weiss/Center for Astrophysics | Harvard & Smithsonian

Unbiased / Deep Sky Survey

【Pulsar】

by P. Jaroenjittichai, J. Wongpecauxson, N. Intrarat, T. Akahori, et al.

- Blind / Piggyback search
- Address Emission physics
- (Statistical parallax measurement)

et al. Artist's impression of ngVLA. Credit: Sophia Dagnello, NRAO/AUI/NSF

【Masers】

by K. Asanok, S. Breen, K. Sugiyama, N. Sakai, J.A. Green, et al.

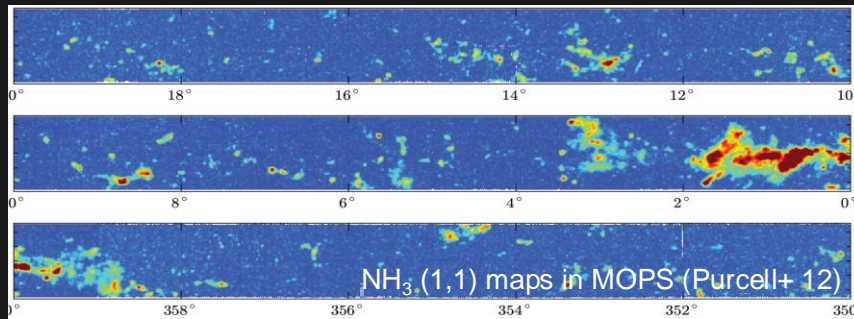
- Northern survey for the Milky Way Galaxy
- Multi-species: OH, CH₃OH, H₂O, SiO, H₂CO, +
- Statistical discussion without any biases
 - How many sources present characteristic var.
 - How long last such var. phenomena
- Machine learning to clarify highly-prior areas

Artist's impression of the Sagittarius Stream. Credit: ESA

【Astrochemistry】

by T. Hirota, R.K. Yadav, B.H. Kramer, K. Sugiyama, et al.

- Northern survey of NH₃ for the Milky Way Galaxy
- Survey of long chains and aromatic molecules
 - Glycine (NH₂CH₂COOH), simplest amino acids
- Pilot survey for the next-gen.'s instruments
 - Synergy with ngALMA, SKA, ngVLA, etc.
- Long-integration by stacking all data in monitor
 - OH in L-, H₂CO / CH₃OH in C/Ku-, H₂O in K-bands



Last Call for Proposals with TNRT, Cycle 0

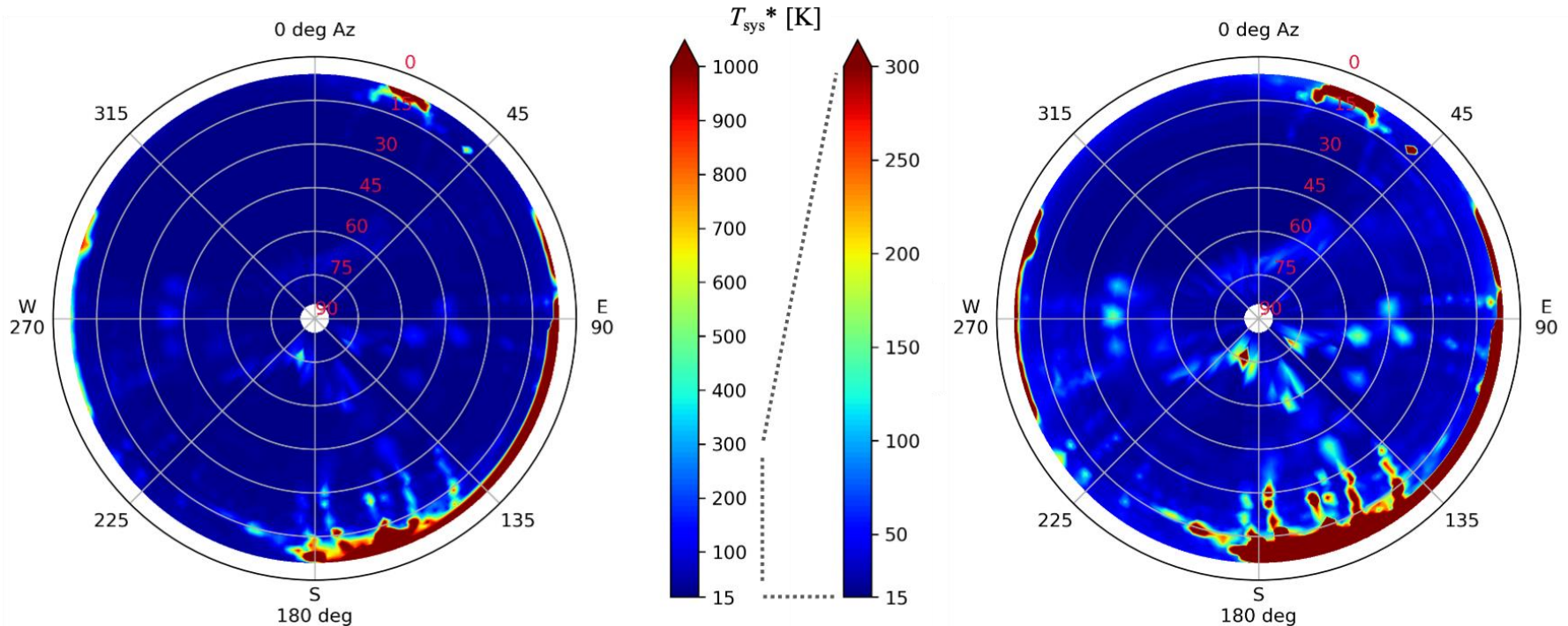
- ❑ Announced on 10th October 2023, 10:00 TST
- ❑ Deadline of Proposals: 30th November 2023, 16:00 UT
- ❑ Open-use obs in Cycle 0: 1st February – 17 July 2024

- ❑ Specifications in L-band (at Cycle 0 CfP timing)
 - Frequency range : 1.63 – 1.67 GHz (stable, includes OH 1665 & 1667 MHz masers)
 - Polarizations : V
 - Observation modes : OH maser lines, and Continuum, with single-point / raster

- ❑ Open-use hours : 500 hrs/semester
- ❑ Note.: Resident Shared Risk Observing (RSRO) Style
- ❑ **Privilege for students**, encouraging science proposals from youth

Limited Observable Zones due to RFI Impacts

Skyline bird's-eye view maps with the 40-m TNRT, L-band, integrated in **1.63-1.67 GHz**



Credit: TNRT CfP web for Cycle 0

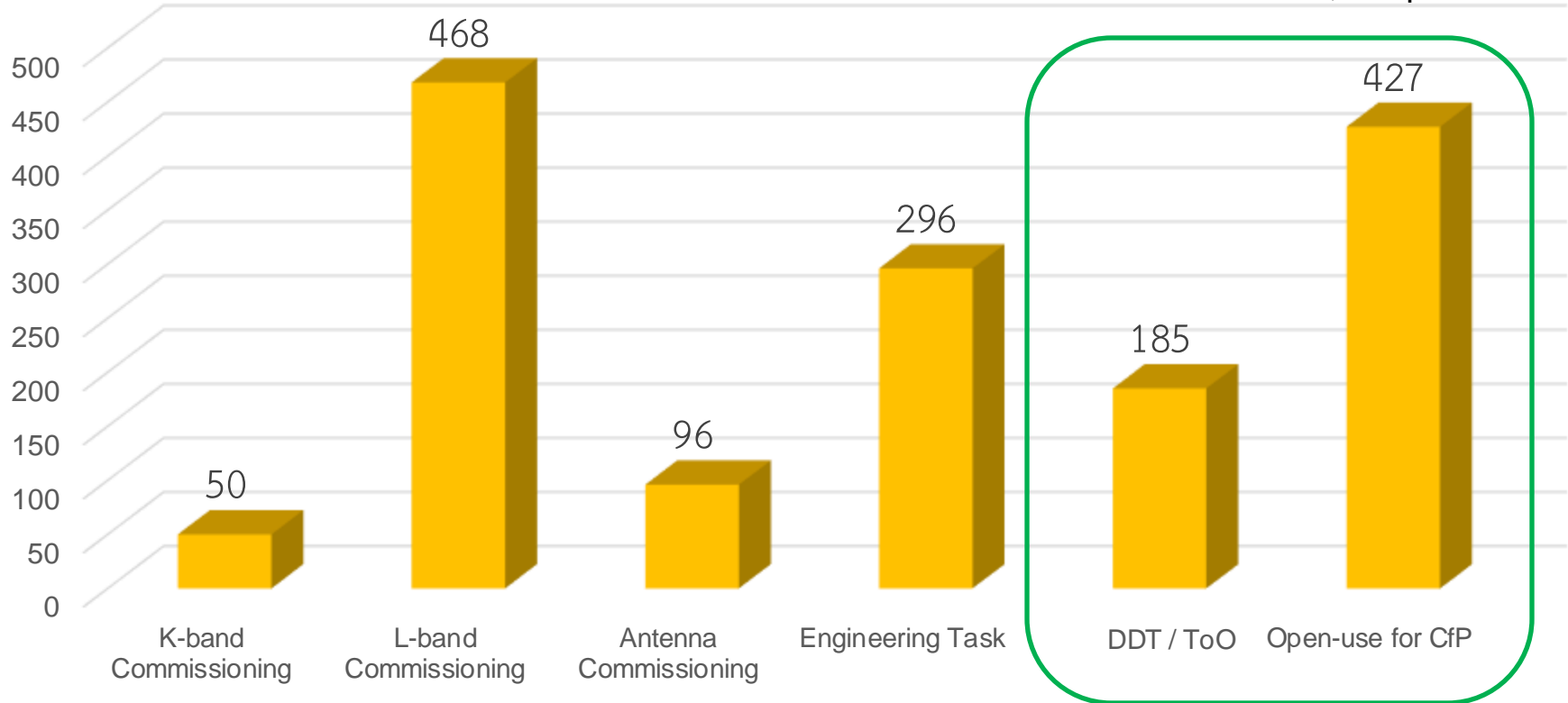
Statistics of the Accepted Proposals in Cycle 0

*** More in detail, see "[Accepted Proposals in Previous Cycles](#)" in CfP Cycle 1 Web-page ***

Number of Accepted Proposals	8 (General: 5, ToO: 2, DDT: 1) , in the submitted 10 proposals
Operated time in total	612 hrs
PI	Affiliation countries: Thai – 7, Japan – 1, Germany – 2 Affiliation: NARIT – 6, Chulalongkorn Univ. – 1, Kagoshima Univ. – 1, MPIfR – 2
Nationality of PI/Co-authors	Thailand, U.K., Japan, Hungary, China, Republic of Korea, Germany
Emission	Maser – 5, Continuum – 1, Pulsar – 2 (under commissioning)
Research field	High-mass SFR – 2, Evolved / AGB star – 2, Galaxy – 1, Comet – 1, Pulsar – 2
Scanning mode	Single pointing – 7, Raster scan – 1

TNRT Operation Time in Oct 2023 – Jul 2024

Credit: Nikom Prasert, & Operators



Review the Results/Progresses in CfP, Cycle 0

TNRTCfP0_5	Validation of circumstellar mass transfer and acceleration scenario using an extreme-OH/IR star NSV17351	<p style="text-align: center;">Akiharu Nakagawa (Kagoshima Univ.)</p>	<ul style="list-style-type: none"> • Tomoharu Kurayama (Teikyo University of Science) • Hiroshi Sudou (Sendai College) • Gabor Orosz (JIVE) • Nobuyuki Sakai (NARIT) • Hiroshi Imai (Kagoshima University)
TNRTCfP0_4	CHIPS1911+4455: Detecting radio emission in the cooling flow of a massive, merging cluster	<p style="text-align: center;">Taweewat Somboonpanyakul (Chulalongkorn Univ.)</p>	<ul style="list-style-type: none"> • Krittapas Chanchaiworawit (NARIT) • Kitiyanee Asanok (NARIT)
TNRTCfP0_7	The publication of the largest OH-maser catalog for off-plane AGB stars	<p style="text-align: center;">Nobuyuki Sakai (NARIT)</p>	<ul style="list-style-type: none"> • Koichiro Sugiyama (NARIT) • Yuanwei Wu (NTSC) • Jaeheon Kim (KASI) • Hiroshi Imai (Kagoshima University) • Akiharu Nakagawa (Kagoshima University)

Credit: "[Accepted Proposals in Previous Cycles](#)"
in CfP Cycle 1 Web-page