

Wetterstein Millimeter Telescope



Science Goals and Project Status

Matthias Kadler (JMU)
for the WMT Science Team

Franci meeting, Würzburg, Jul 20

Working groups involved:

G. Dietl, C. M. Fromm, M. Kadler, H. Kayal, K. Mannheim, T. Ullmann (**JMU Würzburg**)

T. Birnstiel (**LMU Munich**)

U. Hugentobler, A. Neidhardt, F. Seitz (**TU Munich**)

P. Hartogh (**MPS Göttingen**), S. Vegetti (**MPA Garching**), F. Walter (**MPIA**), J. A. Zensus (**MPIfR Bonn**)

Till Rehm (**UFS Schneefernerhaus**)

L. Fuhrmann (**FHR Wachtberg**)

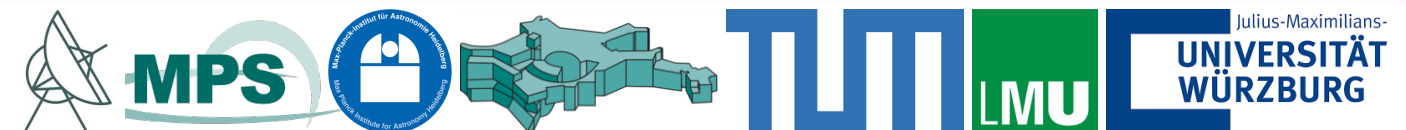
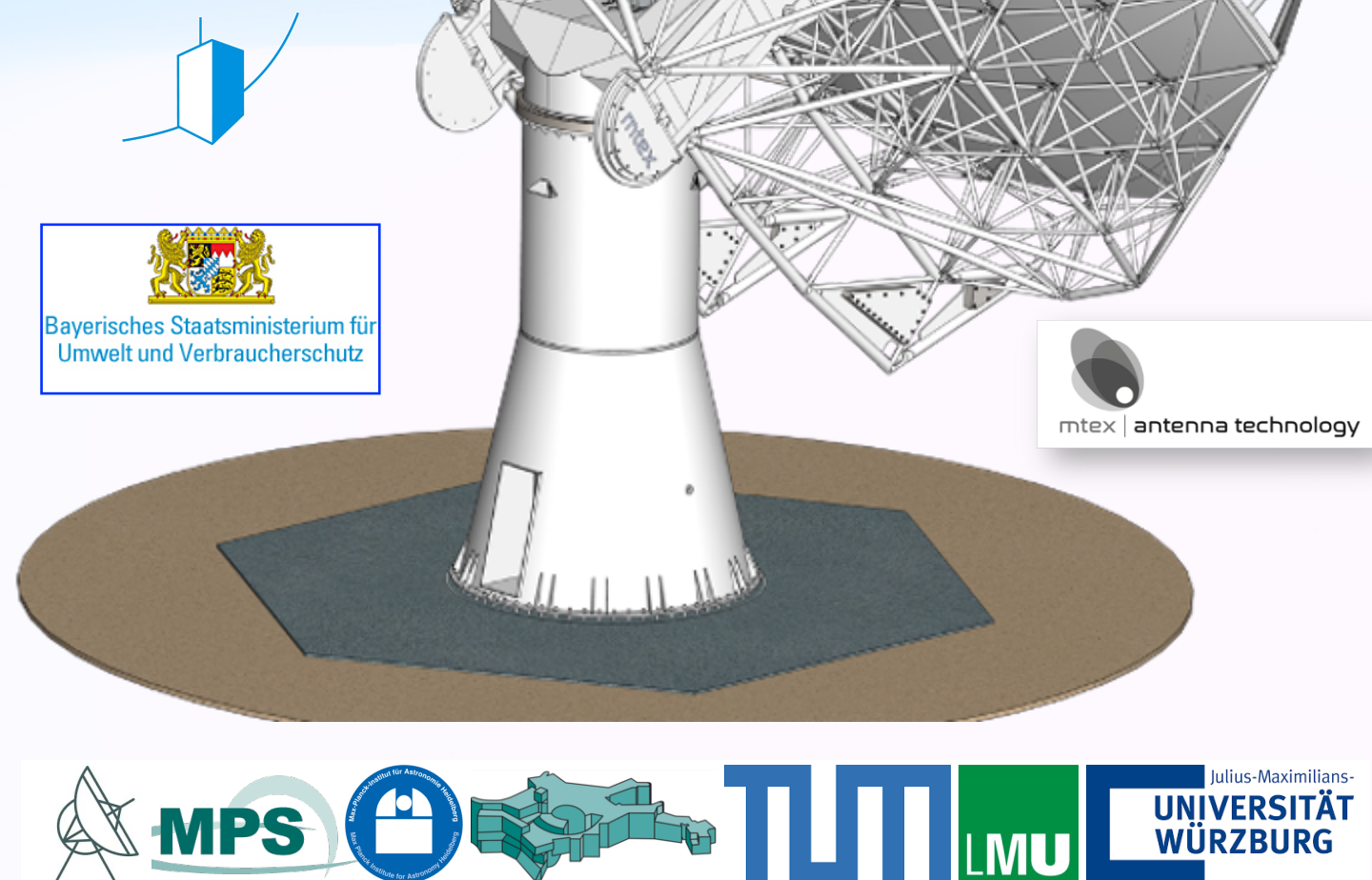
D. Elsässer (**TU Dortmund**)

N. Pohl (**RU Bochum**)

J. Wilms (**FAU Erlangen-Nürnberg**)



Bild: Chianti



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Additional people involved:

J. Wongphechauxsorn (project management), S. Buchelt, F. Eppel (all JMU)

A.P. Lobanov, E. Ros (MPIfR)

L. Schmidt (UFS)

V. Rosero (Caltech)

J.F. Radcliffe (JB, Univ. Pretoria)

A.J. Beasley, E. Murphy, C. Walker (NRAO)

Bild: Chianti

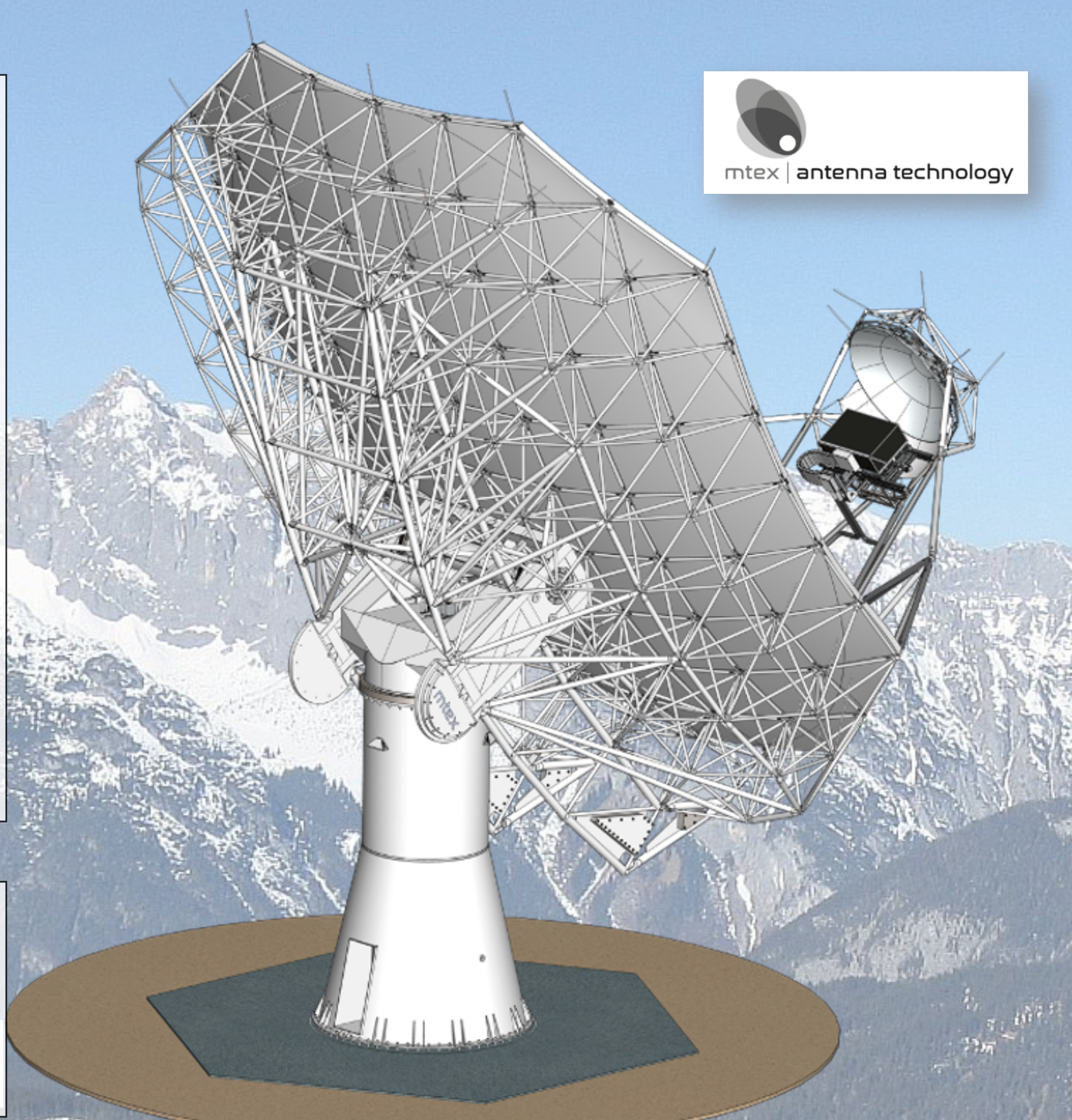


Bayerisches Staatsministerium für
Umwelt und Verbraucherschutz



18m ngVLA Design

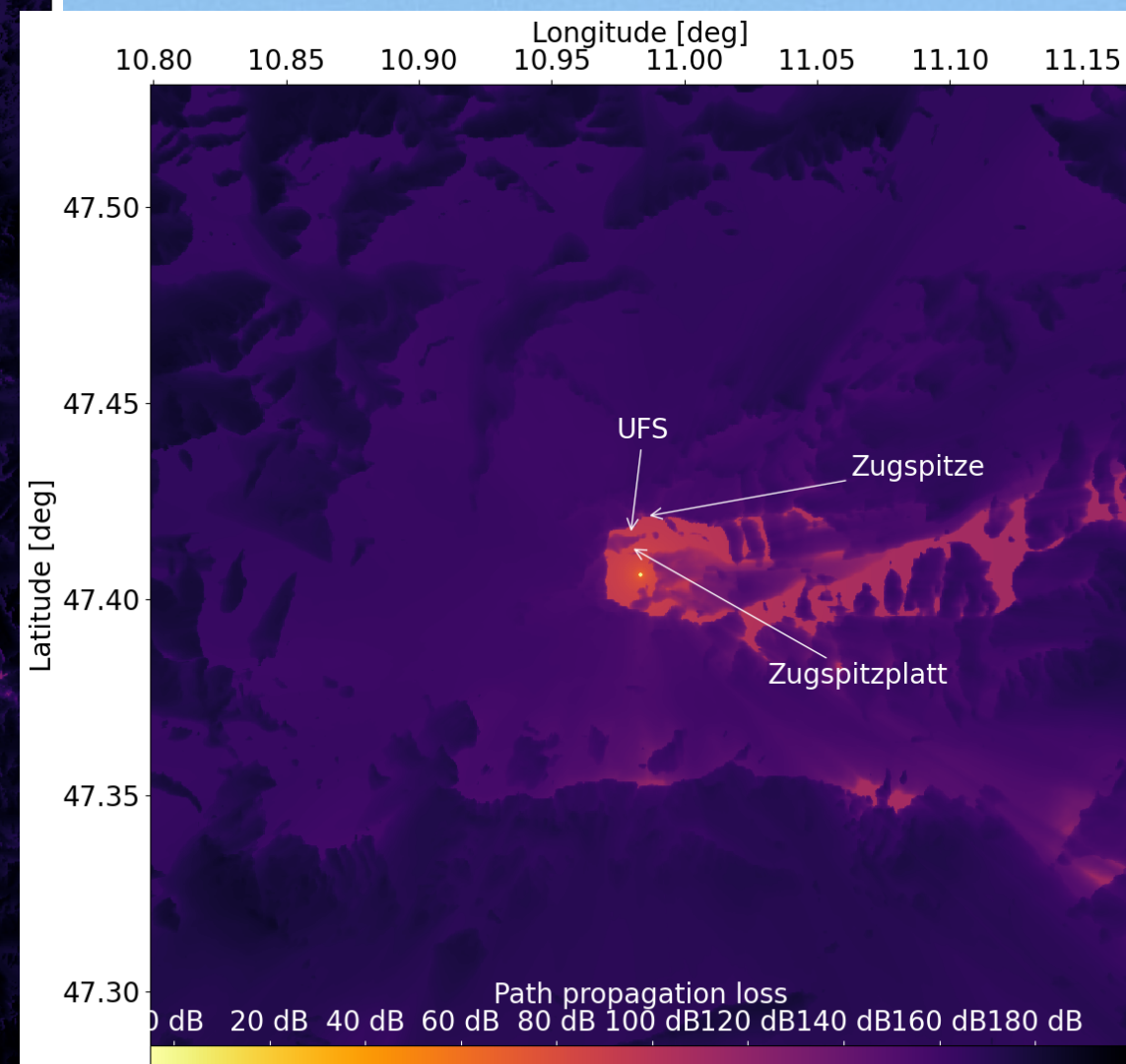
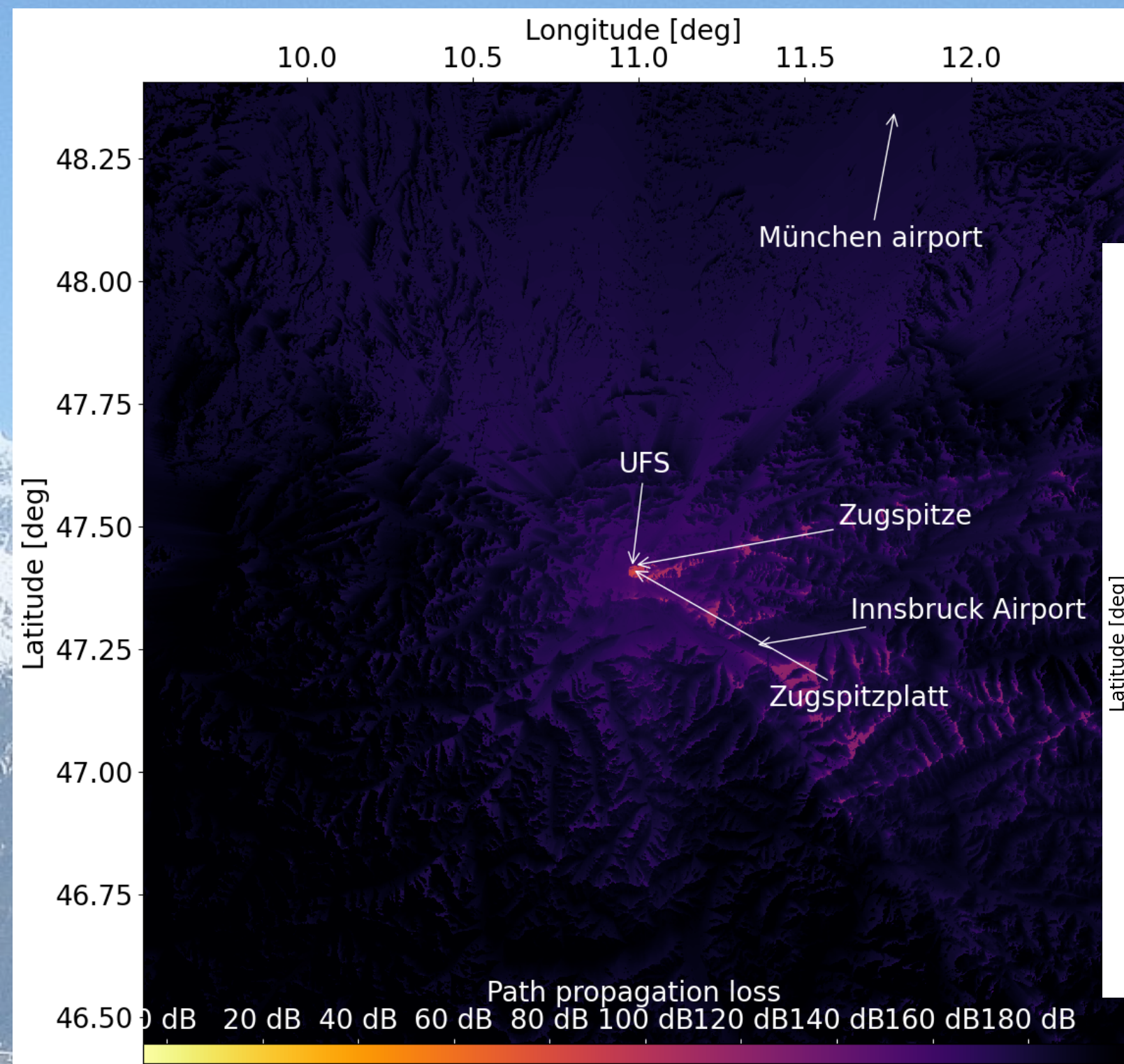
- 1.2-120 GHz (goal 230GHz)
- Single dish and VLBI facility
- Immediate integration with existing VLBI networks, e.g., Global Millimetre VLBI Array (GMVA), European VLBI Network (EVN) and International VLBI Service (IVS)
- First German contribution to ngVLA
- Compatible with SKA-VLBI



The *Umweltforschungsstation* (UFS) Schneefernerhaus



The *Umweltforschungsstation* (UFS) Schneefernerhaus





UFS Infrastructure

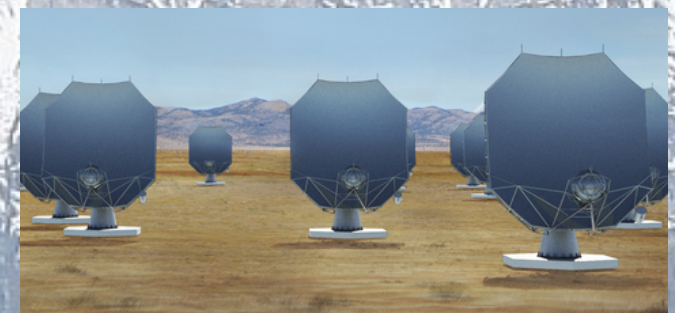
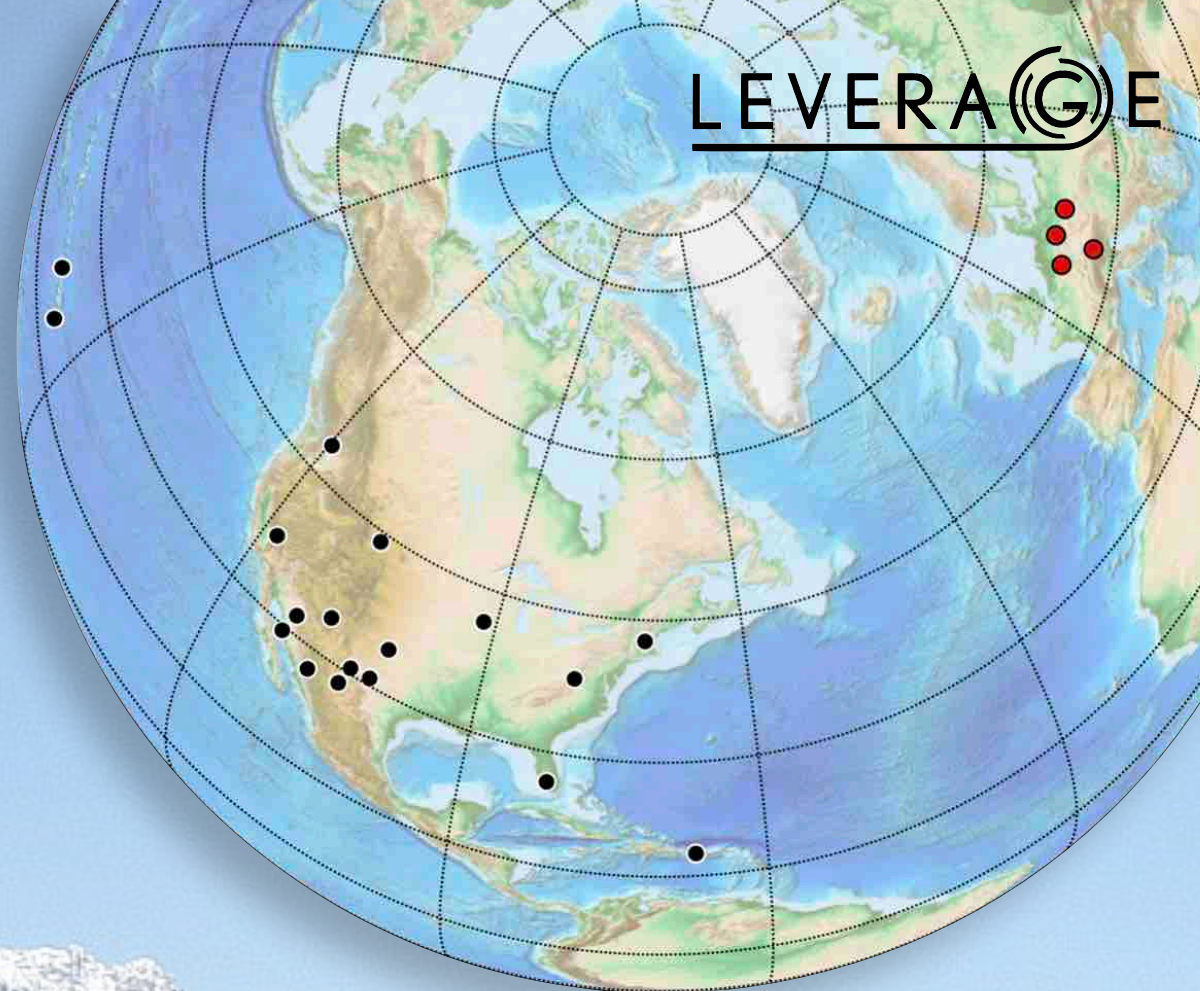
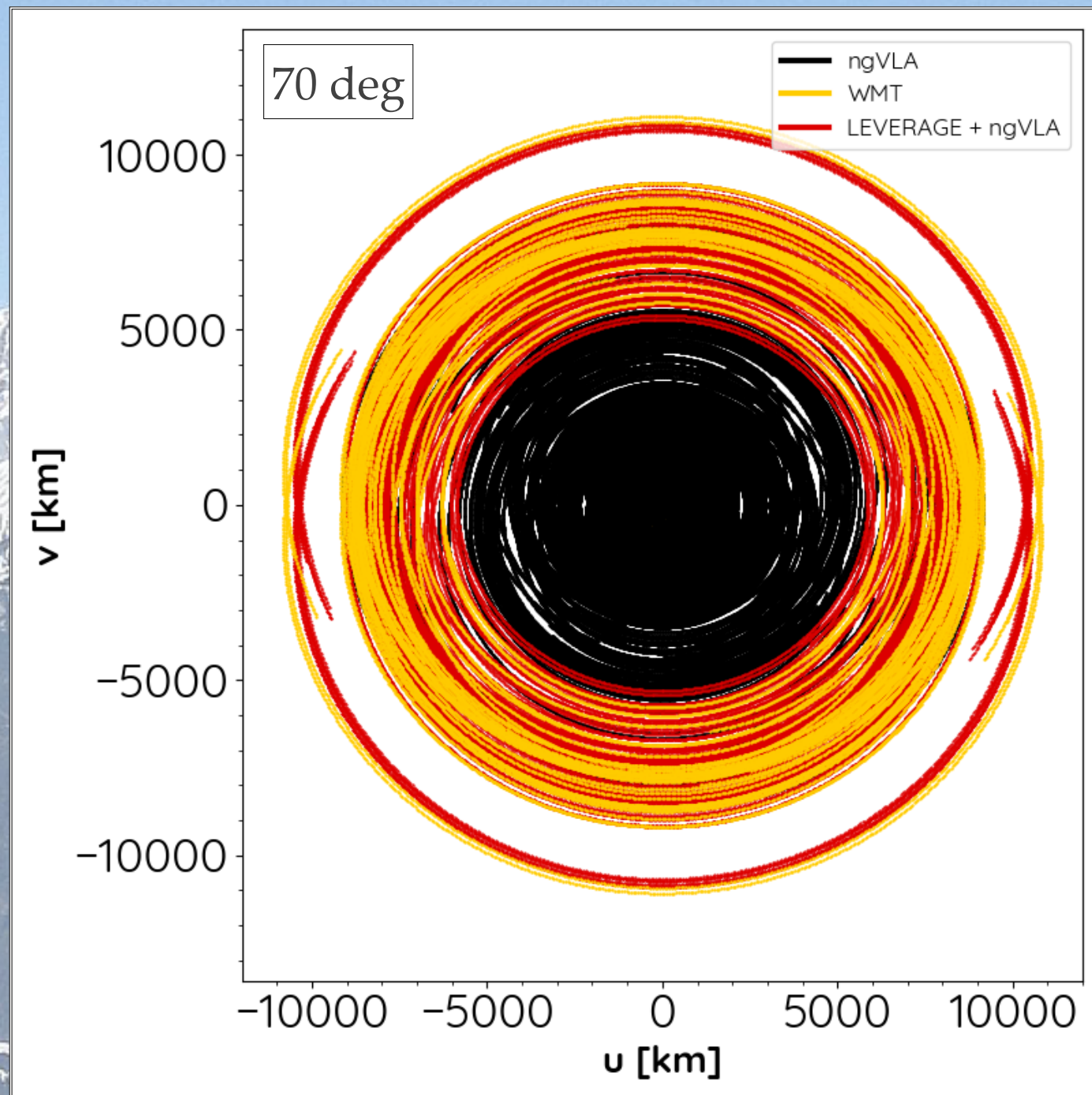
- Experimental terraces: 480m²
- Laboratory and office space: 750m²
- Long-term weather data base
- High-speed internet connection



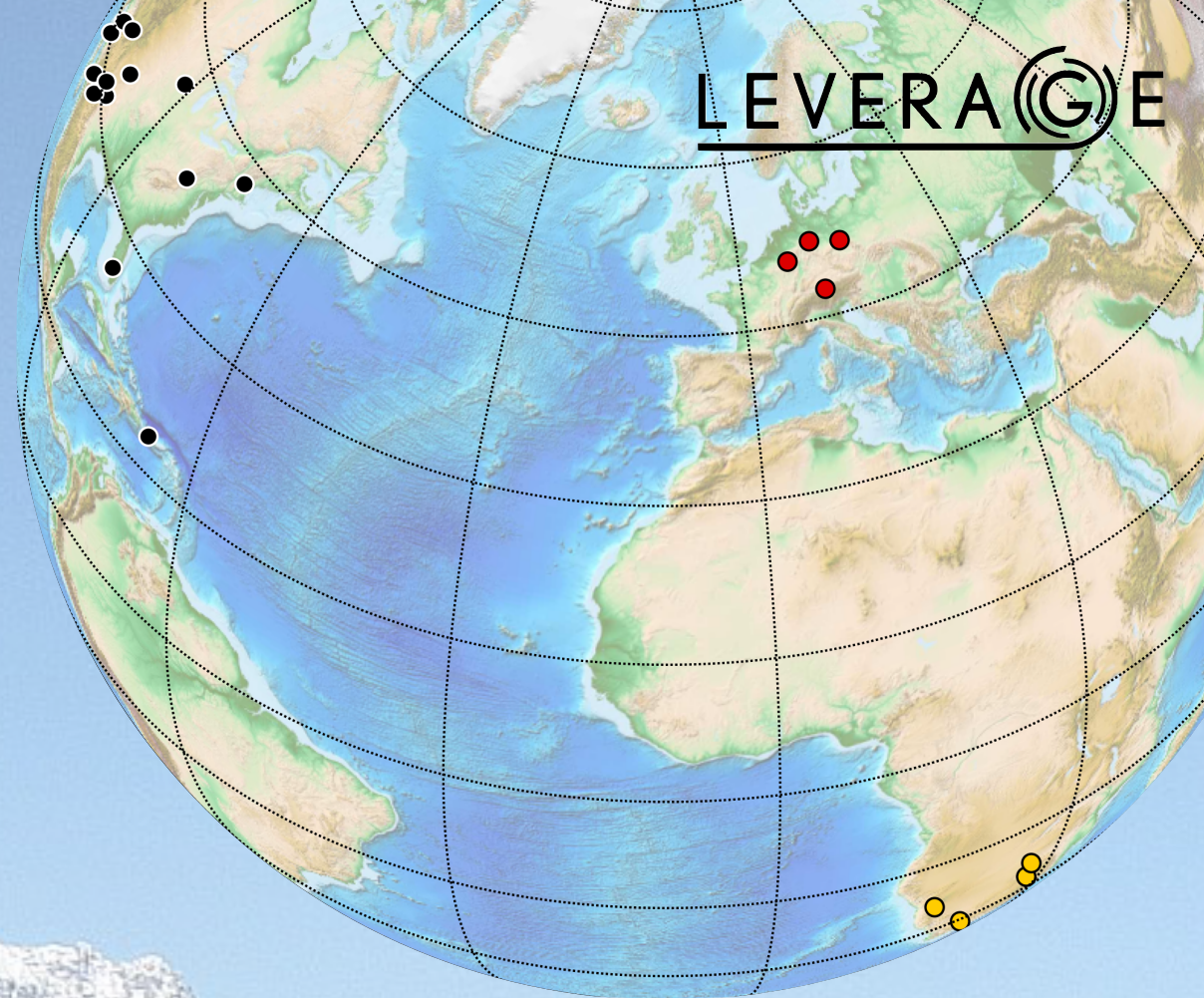
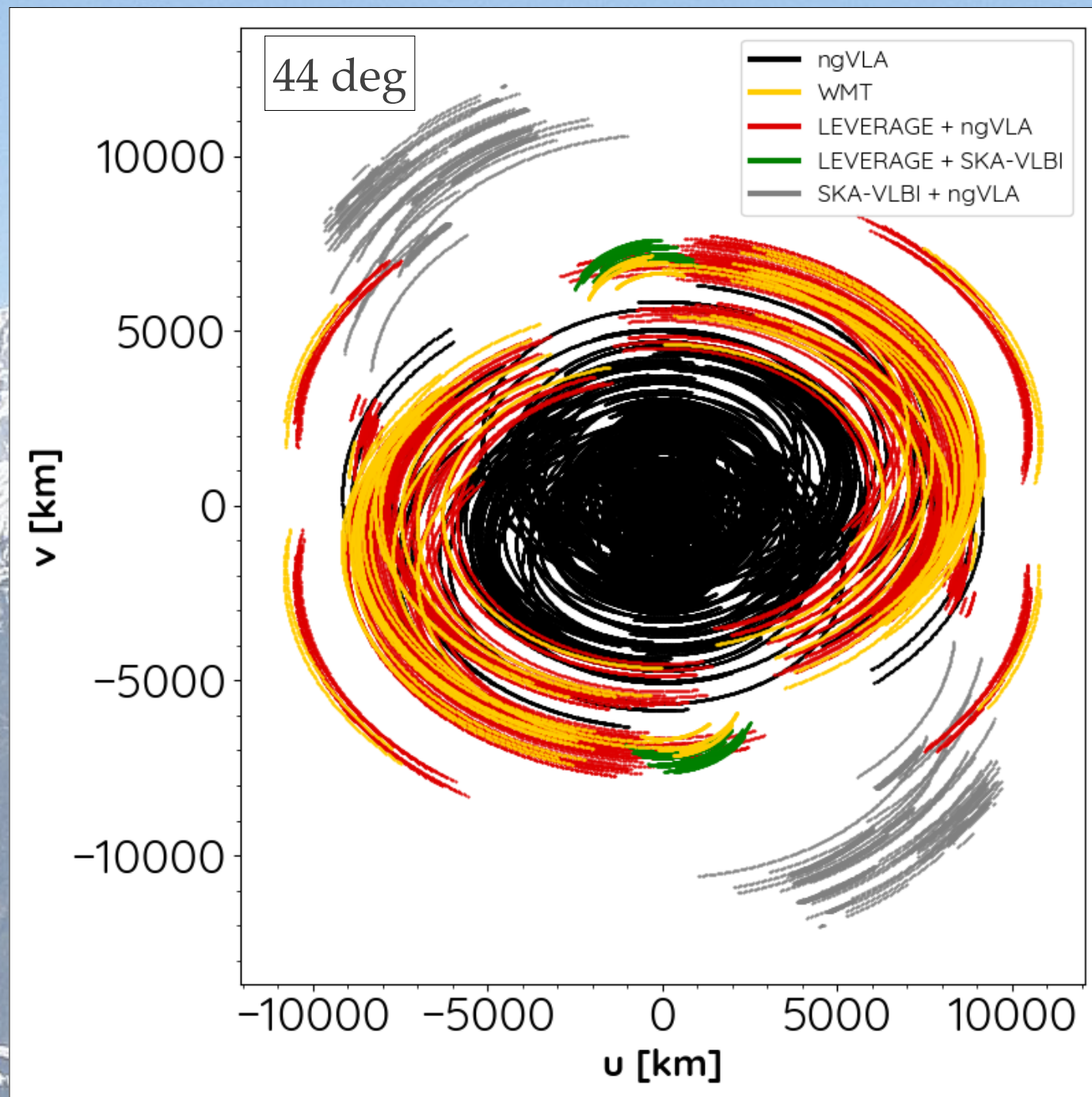




(u,v)-coverage



$\checkmark_{MT}$ (u,v)-coverage



LEVERAGE

SKAO

Astronomy:

- Black Holes and Relativistic Jets
- Protoplanetary Disks
- Dark Matter
- Galaxy Evolution
- Transients

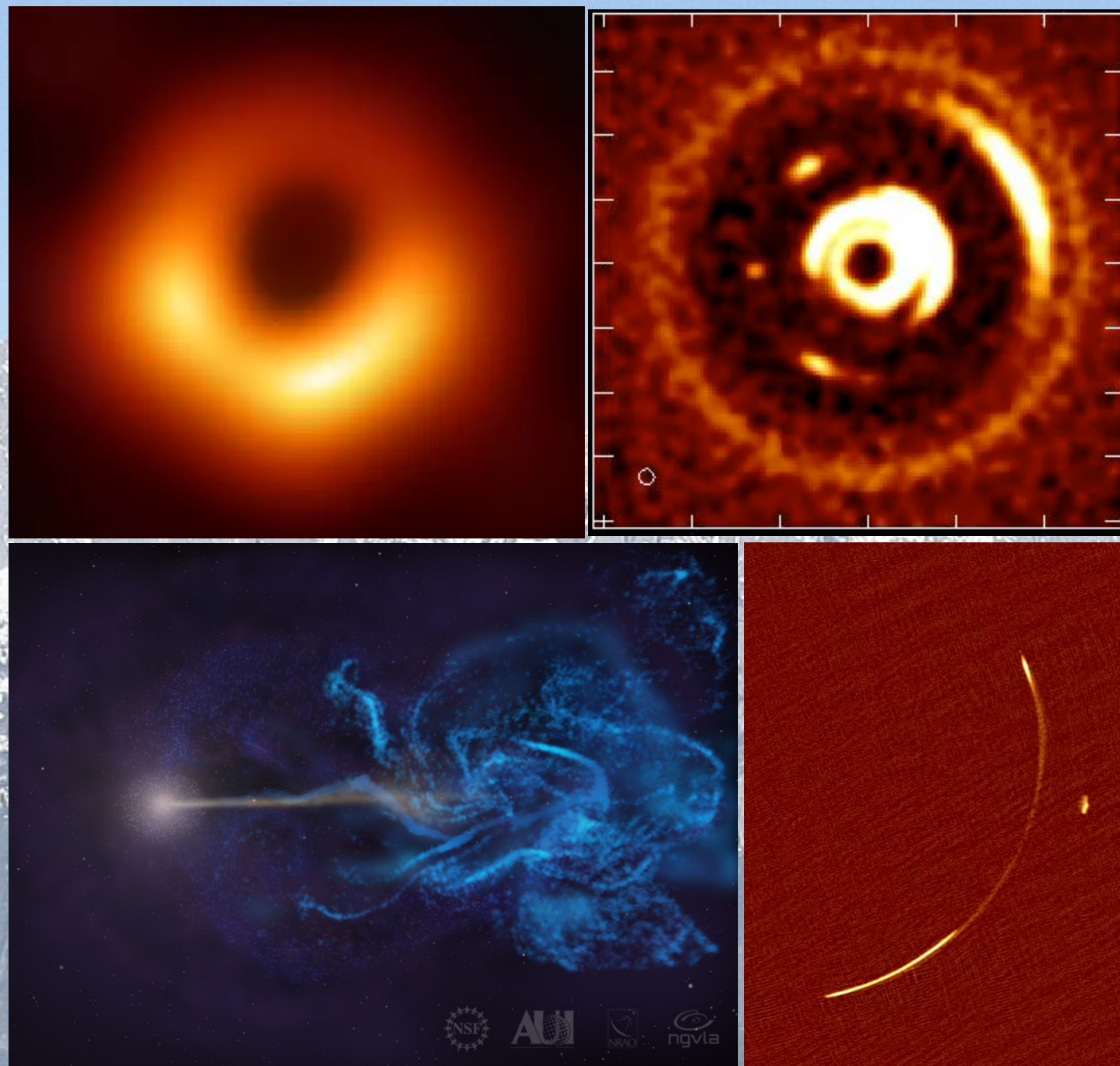
FAU



LMU

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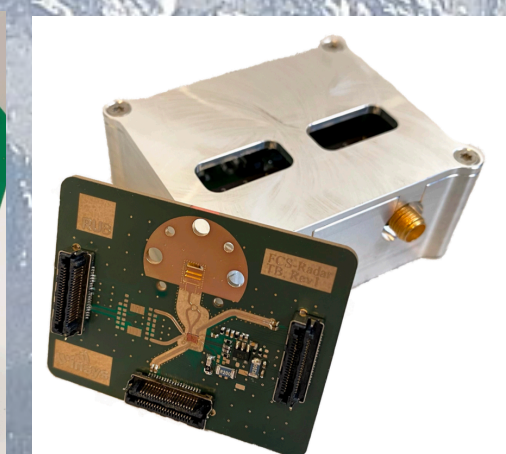
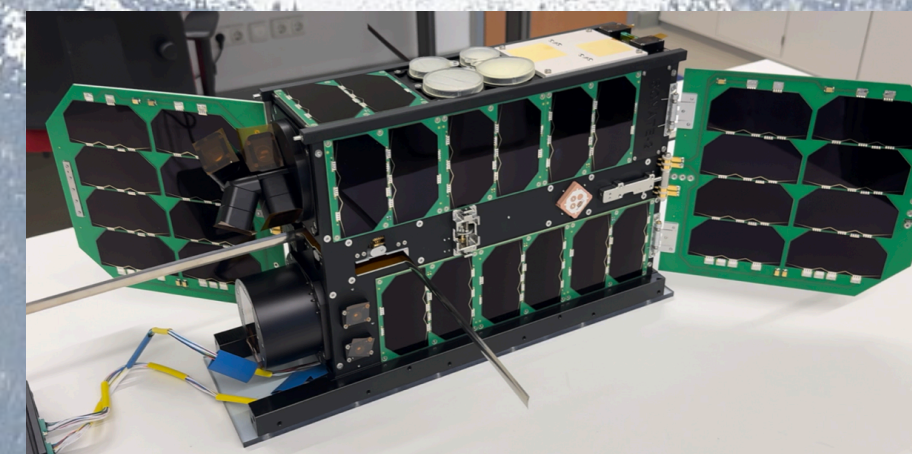
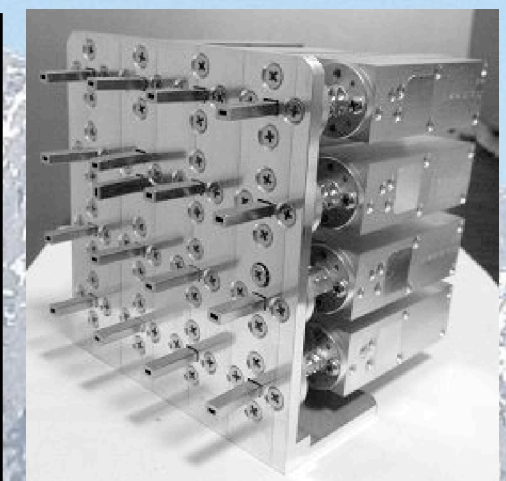
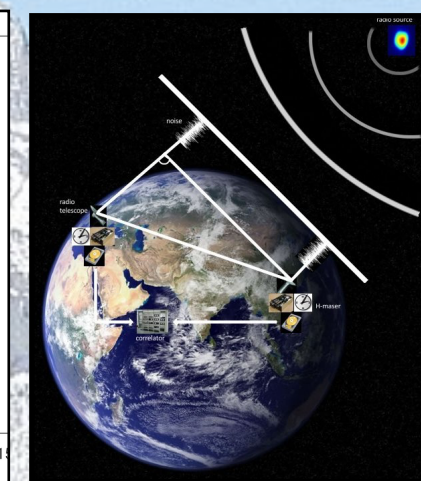
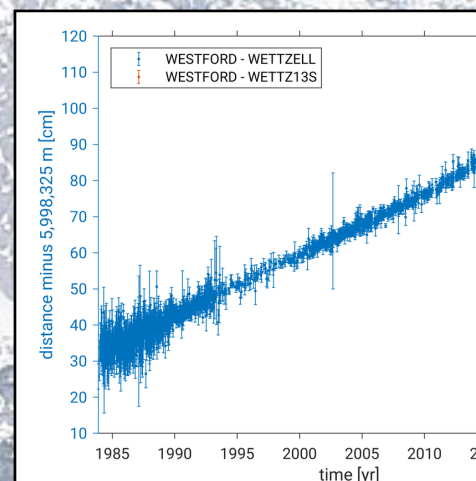
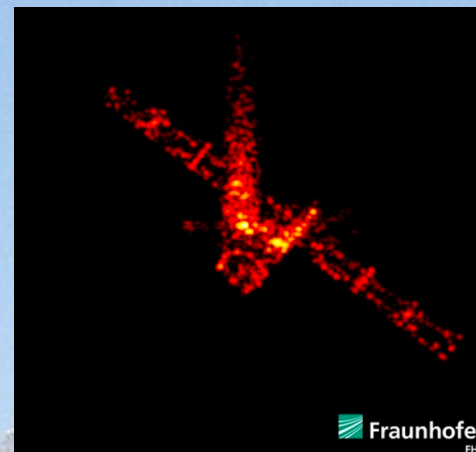
Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG



Images: EHT and SHARP Collaborations, NRAO

Interdisciplinary Topics and Environmental Research:

- Satellite Communication
- Space Situational Awareness
- Geodesy
- Atmospheric Physics
- Tests of novel RF and Receiver Technology
- Data Science, Green IT, etc.



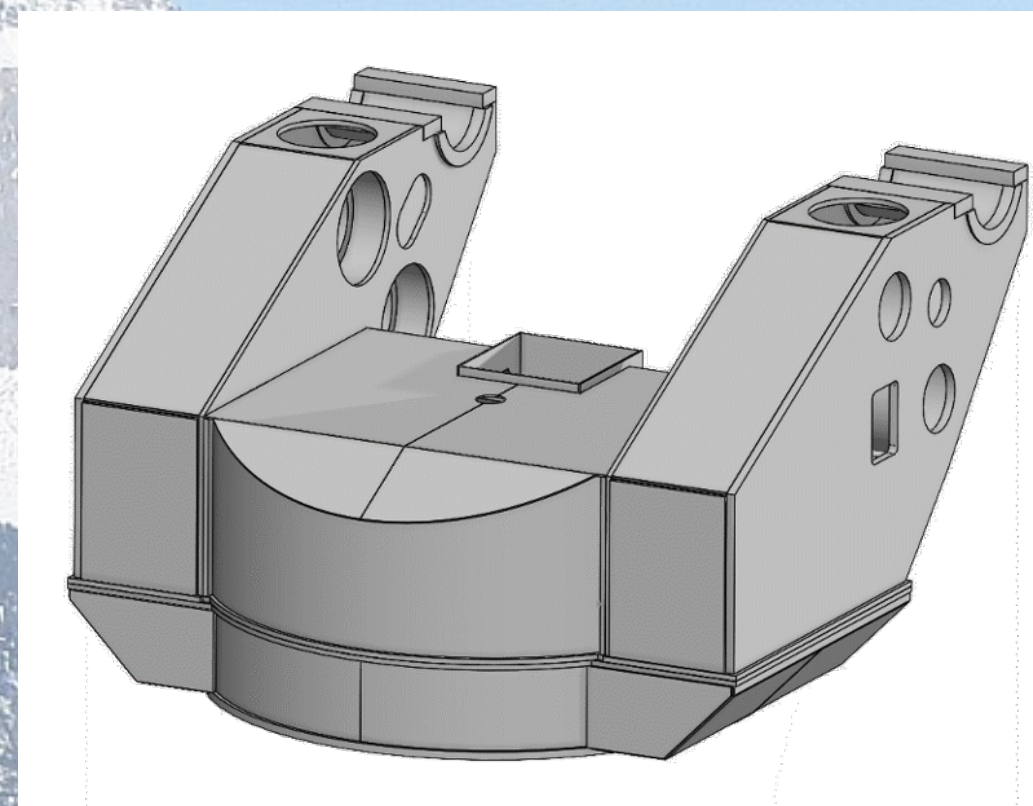
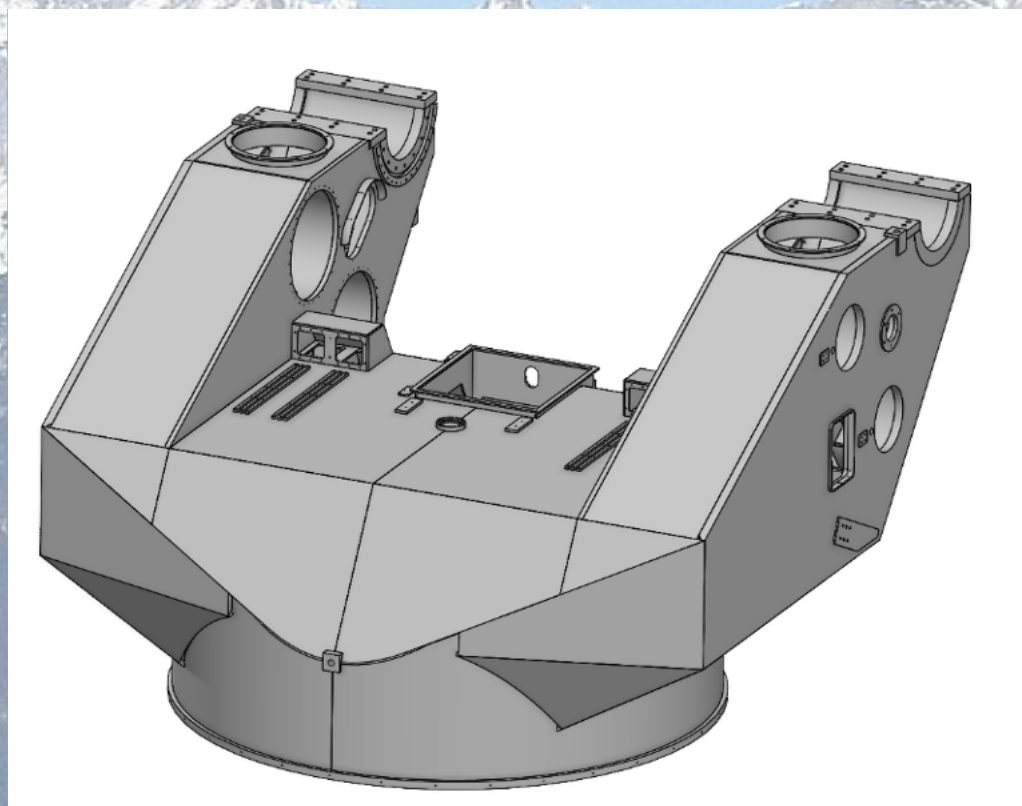
- General framework (environment, safety, tourism)
- Studied 6 candidate sites
- RFI measurements
- Technical feasibility: Construction at the site
- Redesign of largest components to <5t weight
- Steel pedestal -> Concrete pedestal
- Design reflector heating
- Transport & logistics (BW- helicopter for largest components / mountain train for all other pieces)
- Specifications for concrete foundation and pedestal finished – Contact to construction companies established
- Concept for antenna construction on site
- Installation of large components
- Reflector assembly “in the air”
- Crane, Equipment
- Cost analysis



- Turnhead: ngVLA Prototype
 - complete structure
~15000kg

- Turnhead: WMT Re-Design
 - Base segment re-designed
(weight reduced by 1500kg!)

Re-Design für WMT



Feasibility Study



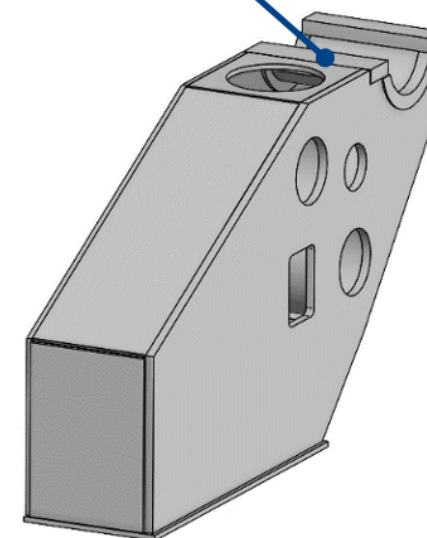
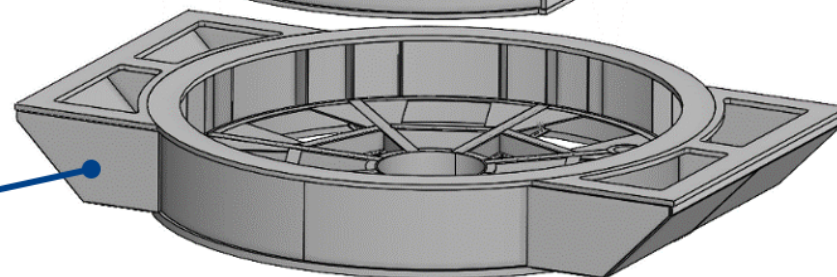
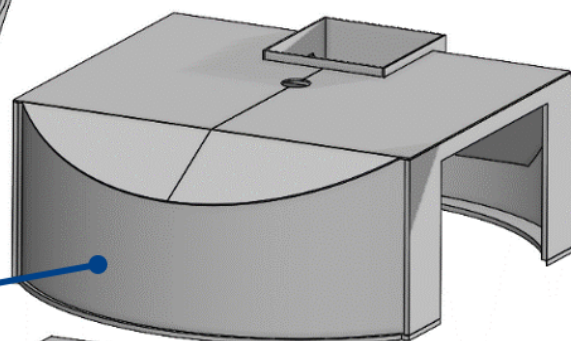
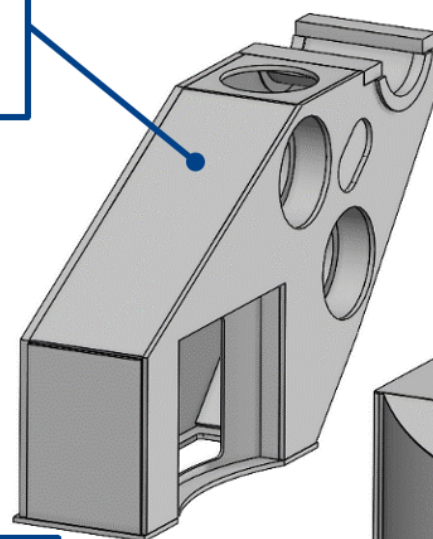
- Planned fly-in of large/heavy parts with BW helicopter

Turnhead Arm (Links)
Ca. 4500kg
3425 x 790 x 1965 [mm]

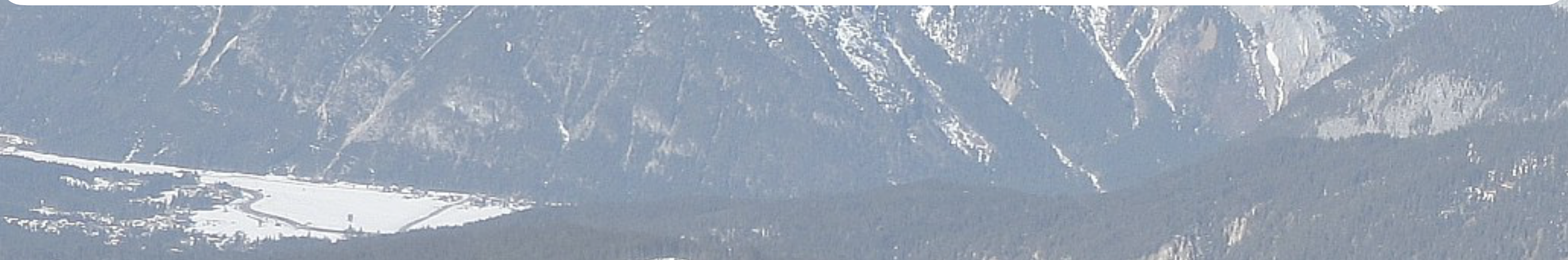
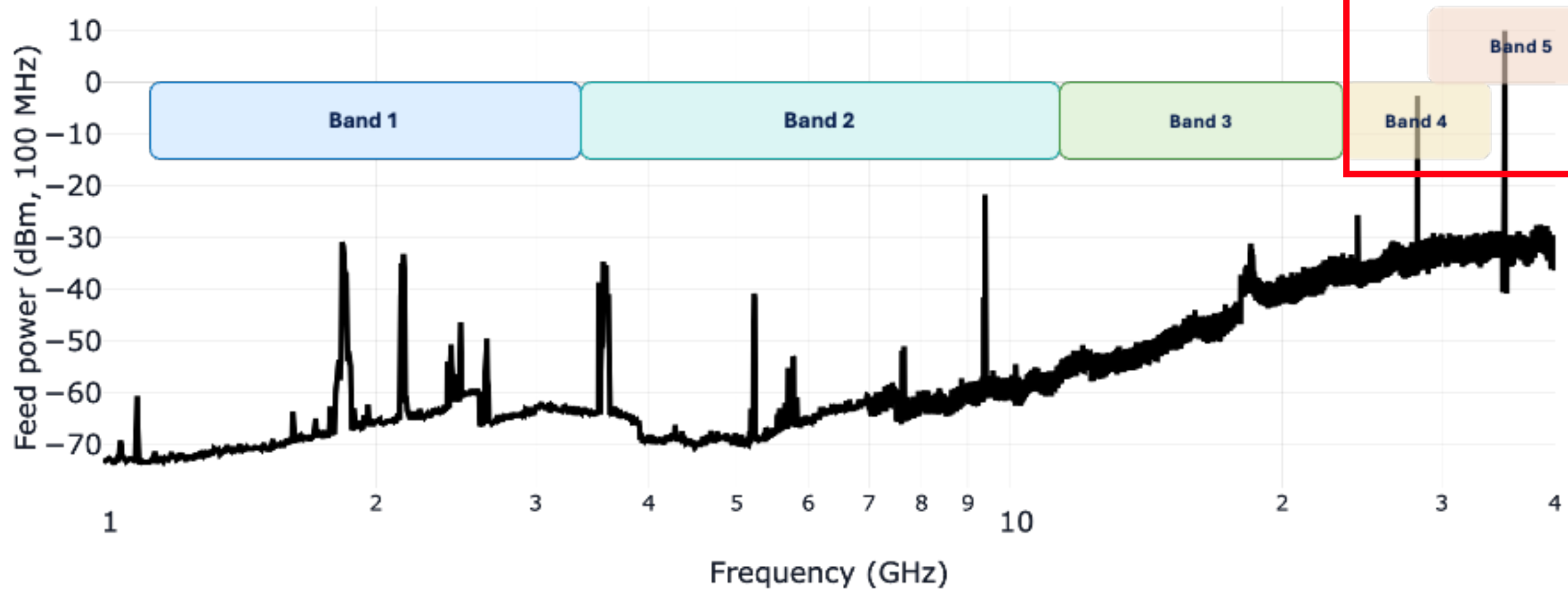
Turnhead Arm (Rechts)
Ca. 4500kg
3425 x 790 x 1965 [mm]

Zentralteil
Ca. 2000kg
2390 x 3050 x 1070 [mm]

Bodensegment
Ca. 3200kg
3970 x 3050 x 525 [mm]



RFI environment





Time plan

- Construction season on site is Apr-Oct
 - 1 season for foundation and preparations
 - 1 season for telescope construction
- Aiming for early science with first ngVLA telescopes and early SKA-VLBI





Time plan

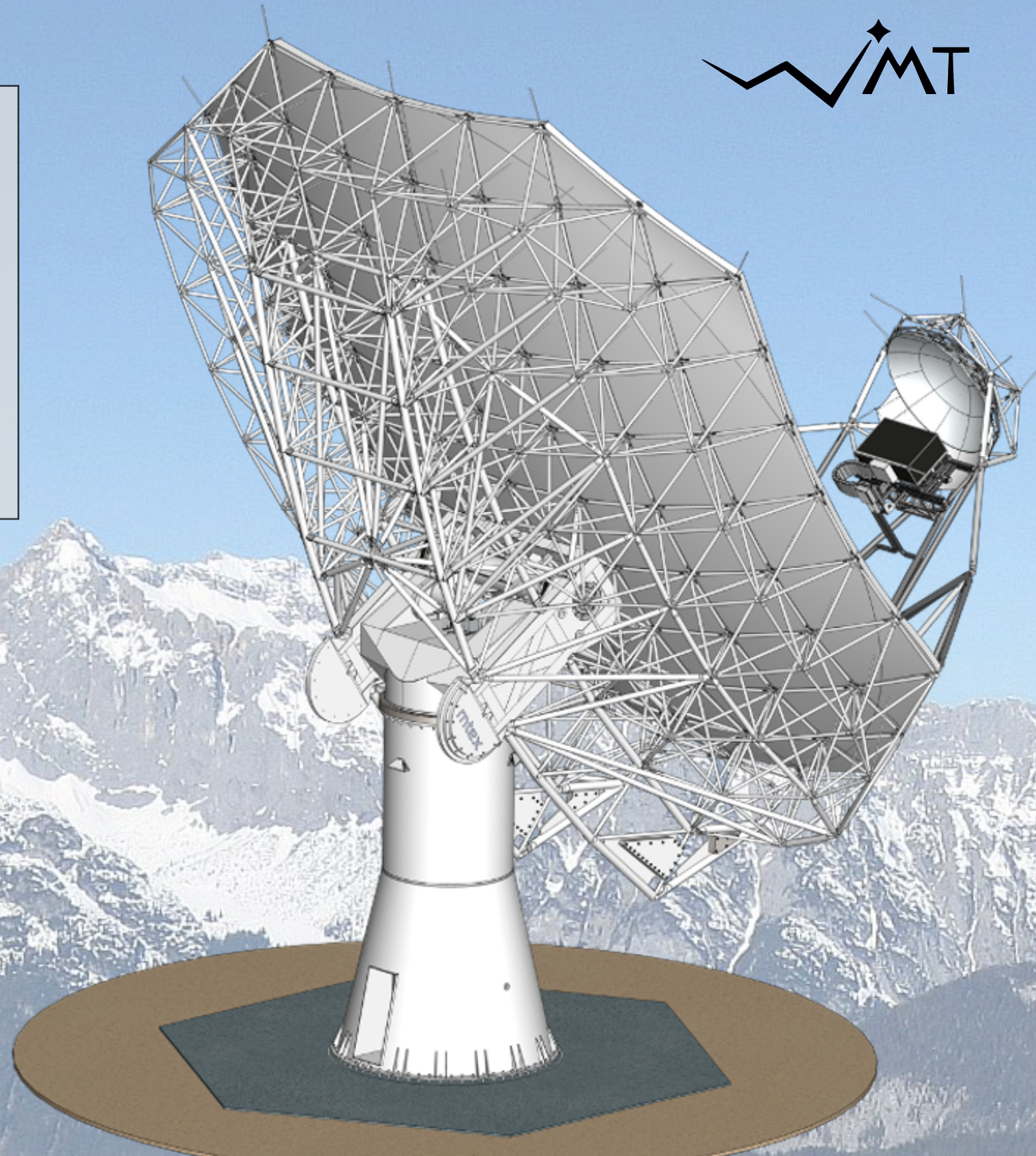
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Thanks for your attention!



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UFS Consortium Board Meeting, Nov 27, 2025

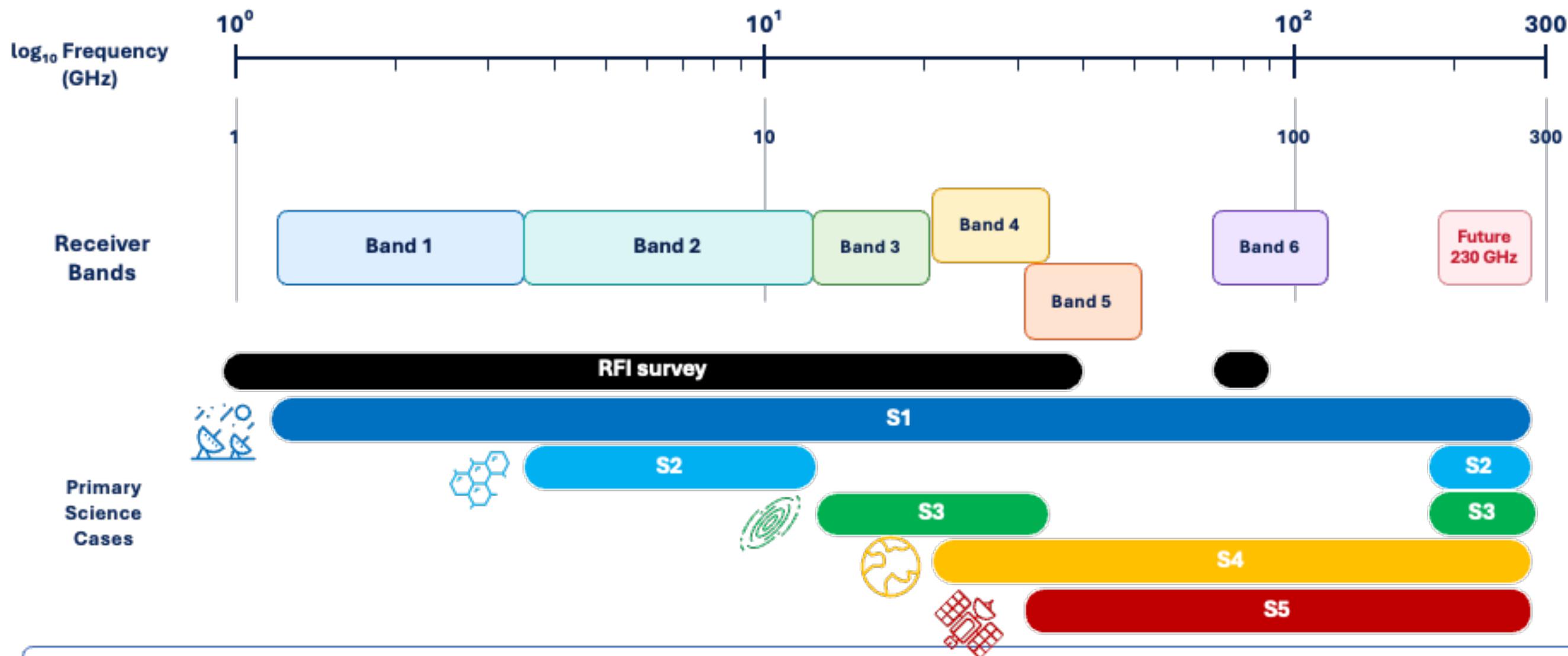


UFS Consortium Board Meeting, Nov 27, 2025



WMT Receiver Bands Overview

Frequency (GHz) – $\log_{10}$ scale, displayed from 1 to 300 GHz



Science Driver Cases

S1 High-resolution VLBI science S2 Star formation, ISM, astrochemistry S3 Galaxy evolution and surveys
S4 Atmospheres & planetary science S5 Space-domain awareness & radar