
ASTRON

General Big Science Industry afternoon

Wiebe van Breukelen

February 9th 2026, Eindhoven

ASTRON

Netherlands Institute for Radio Astronomy



Exploring the universe

- ASTRON is the Netherlands Institute for Radio Astronomy, and is part of NWO-I.
- *Our mission is to make discoveries in radio astronomy happen.*
- *We do this by developing new and innovative technologies, operating world-class radio astronomy facilities, and pursuing fundamental astronomical research.*

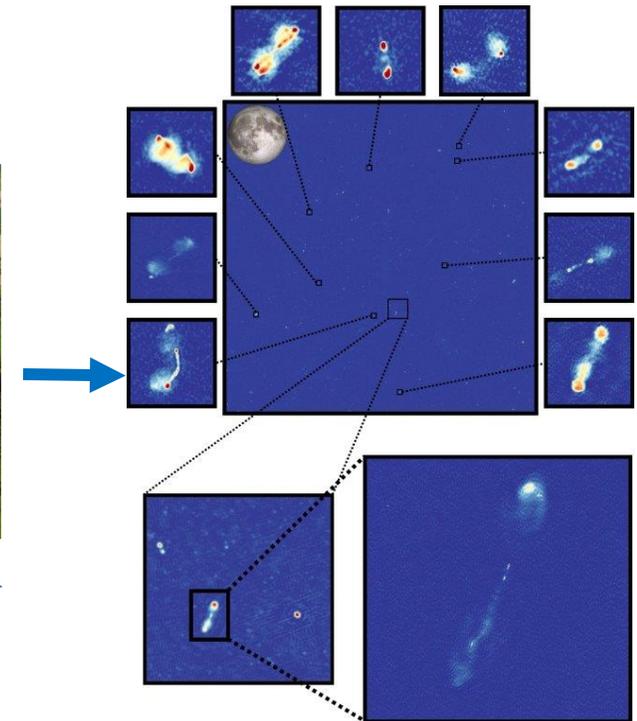
Timeline



1956: Dwingeloo Radio Telescope

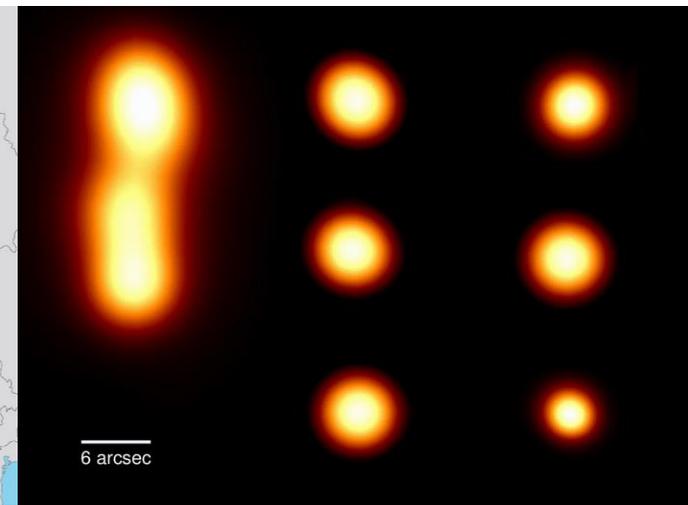
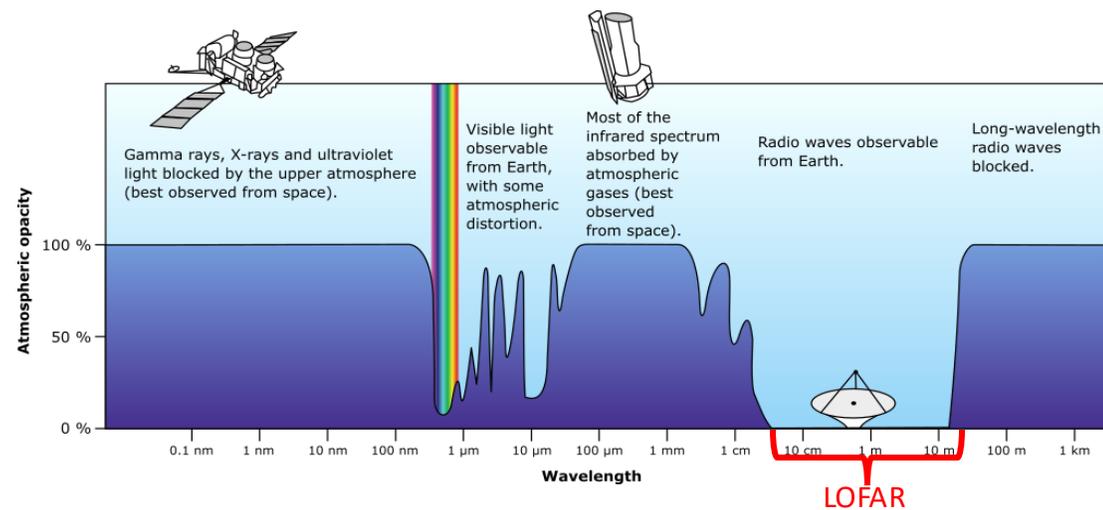
1970: Westerbork Synthese Radio Telescope

2012: LOFAR (*Low Frequency Array*)



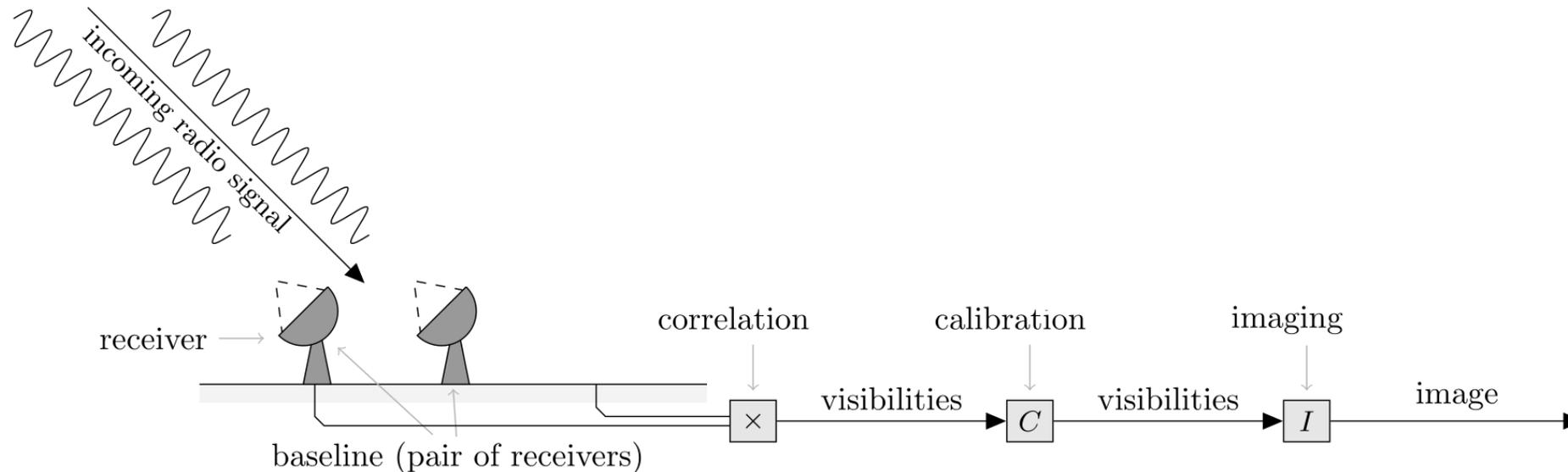
Our largest instrument: LOFAR

- **LOFAR:** *Low-Frequency Array*
- Observing between 10 MHz – 240 MHz
- Spread across all of Europe, together forming the largest radio telescope in the world



Telescopes as software-defined instruments

- Traditional telescopes: dish, receiver
- Now: **arrays of antennas**, digital backends, and software pipelines
- ASTRON focuses on both **instrumentation** and **data processing**
- Software is central to the telescope: from real-time systems to (offline) processing pipelines



Current: LOFAR2.0 Upgrade

- LOFAR 2.0, roll out in progress
 - **Major upgrade to improve sensitivity**
 - Increases data volume and processing demands
- Upgrades at station (hardware) and software level
 - ASTRON-built **Uniboard 2** processing board spread across 75 antenna fields, totaling over 1200 FPGAs
 - **GPU**-based correlator and processing pipelines (> 400 Gbit/s throughput)

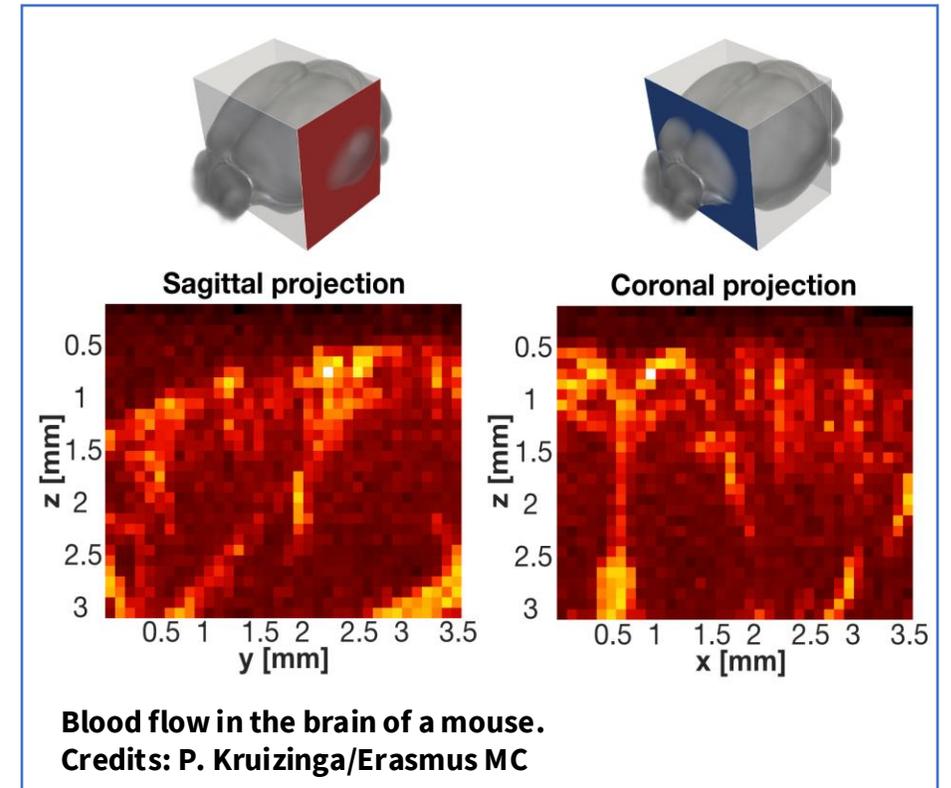
Lots of challenges across the analog and digital domain!



Collaboration with industry

Medical imaging

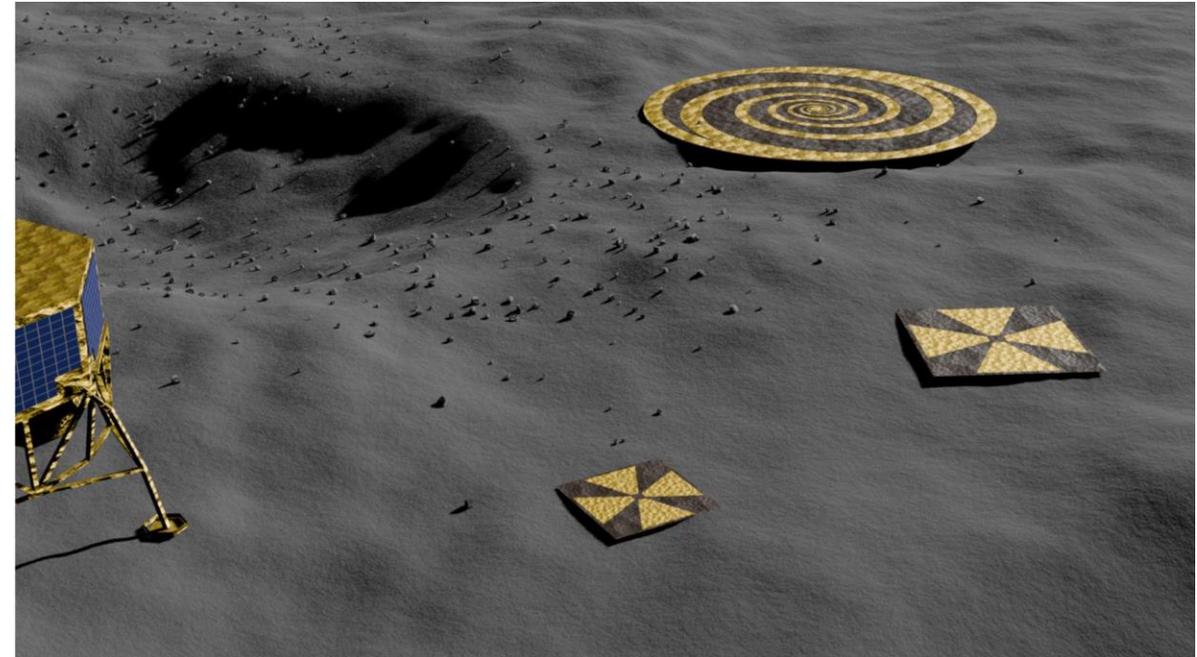
- Application of our technologies in other domains
- By leveraging GPU tensor cores, blood vessels can be mapped accurately and rapidly.



Collaboration with industry

Radio telescope on the Moon

- **Goal:** Observing hydrogen deep in the universe (Dark Ages / Cosmic Dawn)
- Earth has too much radio noise; the far side of the Moon may offer the right conditions
- Feasibility study in collaboration with ESA and various universities



Radboud Universiteit

TU/e

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Coming up: SPIE 2026 conference

- **SPIE Astronomical Telescopes & Instrumentation** conference, 5 – 10 July 2026
- Over 2000 attendees
- 54 m2 Dutch Pavilion with NWO-I research institutions and industry (for instance: Demcon Focal, cosine, DUI, JPE and VDL ETG)
- Still space for multiple companies to join the NL booth!
- More information:

SPIE. ASTRONOMICAL
TELESCOPES+
INSTRUMENTATION



Interested in collaborating? 🙌

If you are interested in collaborating or just want to explore ideas, please get in contact with me, Wiebe (breukelen@astron.nl) or Lukasz (nowak@astron.nl)

Thank you for your attention!