

LOFAR2.0: Building on the LOFAR Infrastructure to Create a Unique Low- Frequency Telescope for the Coming Decade

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What is LOFAR2.0

- An expansion of the technical and scientific capabilities of LOFAR.

Won't Discuss Improvements to...

- General system monitor and control.
- Long-term archive.
- Responsiveness.
- Calibration and algorithms
- etc.

...these can all be big science drivers, but won't sell
an NWO-G or other large investment grant on
their own.

The Options

- These aren't mutually exclusive.
- Could go for some combination of these.
- *But* NWO-G can't look like a "grab bag" of incremental improvements: there needs to be a central big idea (perhaps to carry the smaller improvements).

LOFAR2.0 Community Consultation

- **Mar 24th, 2015:** LOFAR2.0 Brainstorm at ASTRON.
- **June 1st, 2015:** presentation of the various options at LOFAR Users Meeting.
- **Nov 19th, 2015:** presentation of the various options at LOFAR PIs meeting.
- **April 4th, 2016:** update and consultation at LOFAR Users Meeting.

KNAW Grootchalig Infrastructuur

- Roadmap for major Dutch scientific infrastructure on the ~2025 timescale.
- Submitted on Jan 11th, 2016.
- LOFAR2.0 will appear in KNAW report and brochure this summer.
- May be useful for leveraging future funding for LOFAR2.0.

Selected!

LOFAR2.0 Boundary Conditions

- Leverage existing investment.
- Remain *unique* and scientifically *impactful*.
- Strong community support.
- Financially and technically feasible on a 3-10 year timescale.

LOFAR2.0 Hardware Upgrades

Stage I

Double or triple station electronics using e.g. Uniboard2

$40 \times 100\text{kEur} = 4\text{MEur}$

- Use all 96 LBAs.
- Simultaneous LBA+HBA for ionospheric calibration.
- Simultaneous LBA+HBA but on different fields.
- Correlator and data transport need to grow proportionately.

LOFAR2.0 Hardware Upgrades

Stage II

Replace LBA dipoles with new design

4000 x 500Eur = 2MEur

- Achieve much better response at 30-50MHz.
- Need to prove the potential in Stage I?

LOFAR2.0 Hardware Upgrades

Stage III

Build ~6 new stations

6 x 500KEur = 3MEur

- Strategically chosen to augment 10-100km baselines?
- Fill in Superterp too?

LOFAR2.0 Hardware Upgrades

Stage IV

Build ~6 new international stations

6 x 1000KEur = 6MEur

- Strategically chosen to augment 200-1000km baselines.

Your ideas and impressions

LOFAR2.0 Science Case

- Discovering the “Cosmic Dawn” and characterizing the “Epoch of Reionization”.
- Tracing galaxies through cosmic time.
- Cosmic magnetism in the nearby Universe.
- Transients and serendipity.