Welcome to

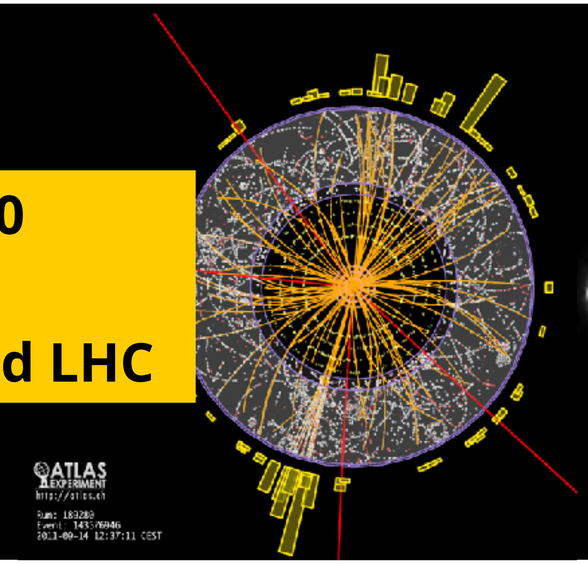
Nikhef

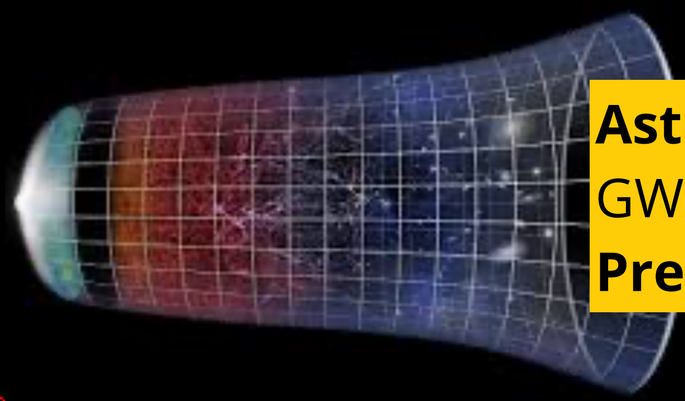
Andreas Freise, 18.03.2025

The mission of Nikhef

- Elementary constituents and forces of our Universe
  - Accelerator based Particle Physics - at CERN
  - Astroparticle physics - particles and radiation from the cosmos

LHC operation >2030
ATLAS, LHCb, ALICE
Preparations beyond LHC





Astroparticle physics
GW, DM, Neutrino, UHECR, *eEDM*
Preparations next generations

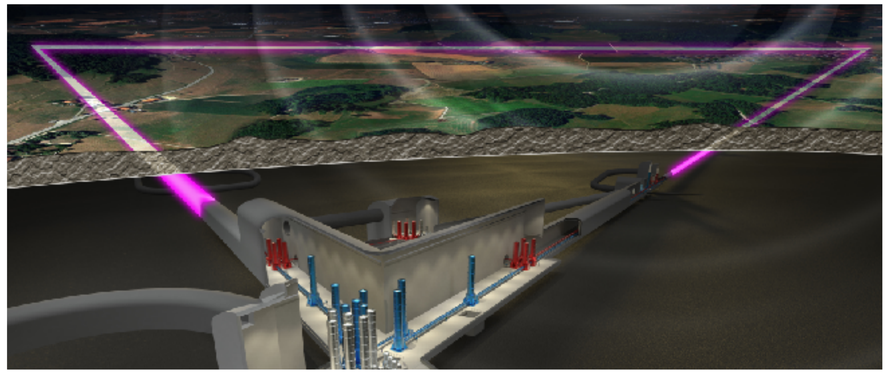
- Enabling programs
  - Detector R&D
  - Theory - phenomenology
  - Data Processing
- Technical teams/workshops
  - Mechanical
  - Electronics
  - Computing

Gravitational waves in the Netherlands

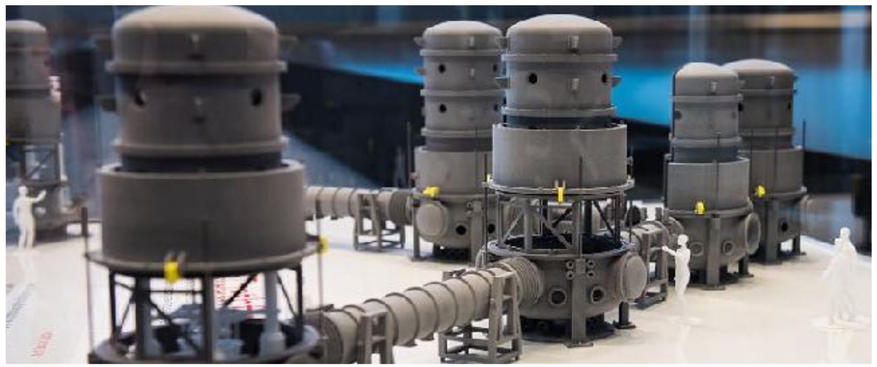
- **Nikhef**
- Maastricht University
- Radboud University Nijmegen
- University of Amsterdam
- Vrije Universiteit Amsterdam
- Utrecht University
- University of Groningen
- SRON
- Leiden University
- ASTRON
- TU Delft
- University of Twente
- KNMI
- TNO
- TU Eindhoven

Some key points from ground-based GW projects

Virgo: Nikhef provides several hardware systems to Virgo (e.g. filter cavity) and became a full EGO council member in 2021. We currently work through a grant of 2.7M€ for hardware for further upgrades.



Einstein Telescope: Nikhef co-leads the ET project, we originally received 42M€ for preparing a bid to host ET near Maastricht. Now building a large team of scientists but also engineers and managers.



ETpathfinder: 10m scale prototype interferometer, a testbed for future GW technologies, kick-started with 15M€ capital investment, currently under construction in Maastricht.

The ET team at Nikhef

Welcome to Amsterdam!

I hope it inspires you to continuing your great work!

ETO Design Task Force

Reported to the BGR, 17.03.2025

- In October 2024, INFN approached ETO with the request to urgently update the ET design. The previous design process had led to an increase in size and volume of the detector, leading to a infrastructure with a potential cost beyond the envisaged acceptable envelope.
- ETO agreed to set-up and run a task force, bringing the right people together (from ETO, the ET Collaboration, and the teams in EMR and Sardinia), **bypassing the existing, insufficient organisational structures**.
- **The mandate**: to adapt, in a short time, the detector layouts of ET with a smaller footprint, **towards a cost-effective civil infrastructure while maintaining ET's scientific performance**. In particular, it will:
  - review and update the detector layout for the triangle configuration
  - review and update the detector layout for the 2L configuration.
- The task force **started to work in January 2025, with the aim to deliver the new design in May 2025**. The task force is lead by Fiodor Sorrentino, Technical Coordinator in the ETO Project Office.
- ETO is preparing an external committee to review the designs produced by the task force.

ETO Design Task Force

Reported to the BGR, 17.03.2025

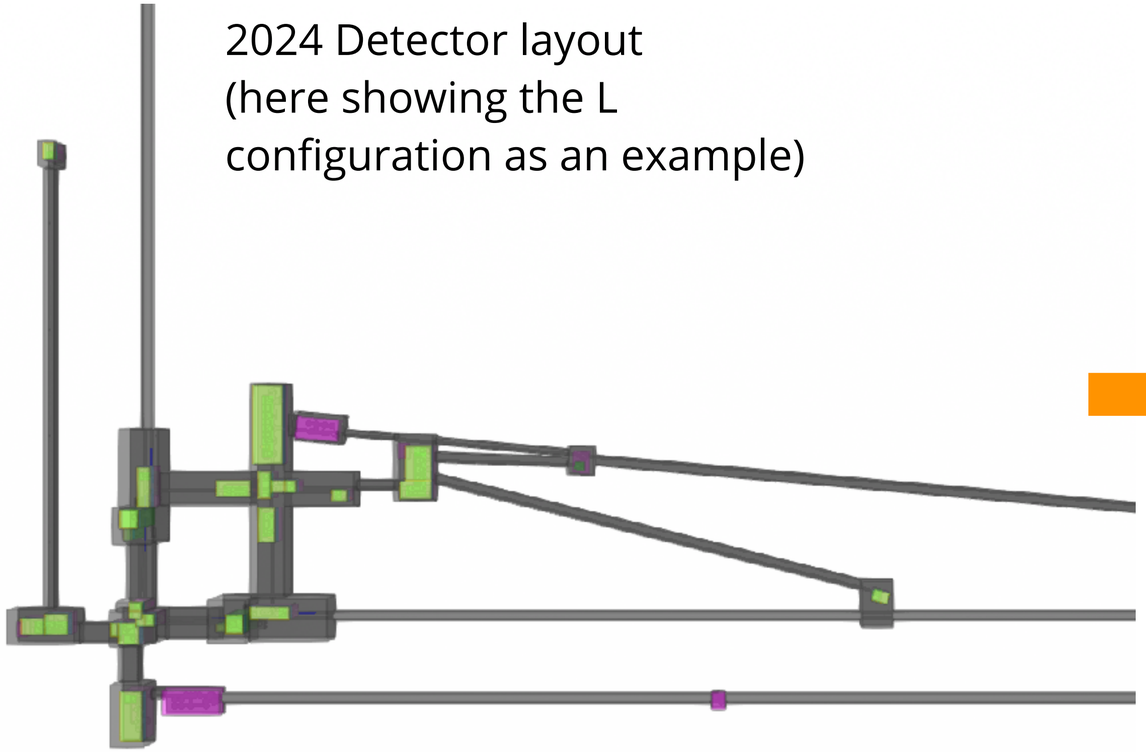
- The Task Force has weekly virtual meetings and continues to work in distributed groups at all times. A key element to the success are well-structured in-person meetings:
  - 1st workshop - methods consolidation & 2L layout update - Pisa, 18-20 February
  - 2nd workshop - 2L layout consolidation - Amsterdam, 18-20 March
  - 3rd workshop - triangle layout consolidation - TBD end of April / early May
- Members of the task force report a good working atmosphere, and that good progress is done by a smaller core group.

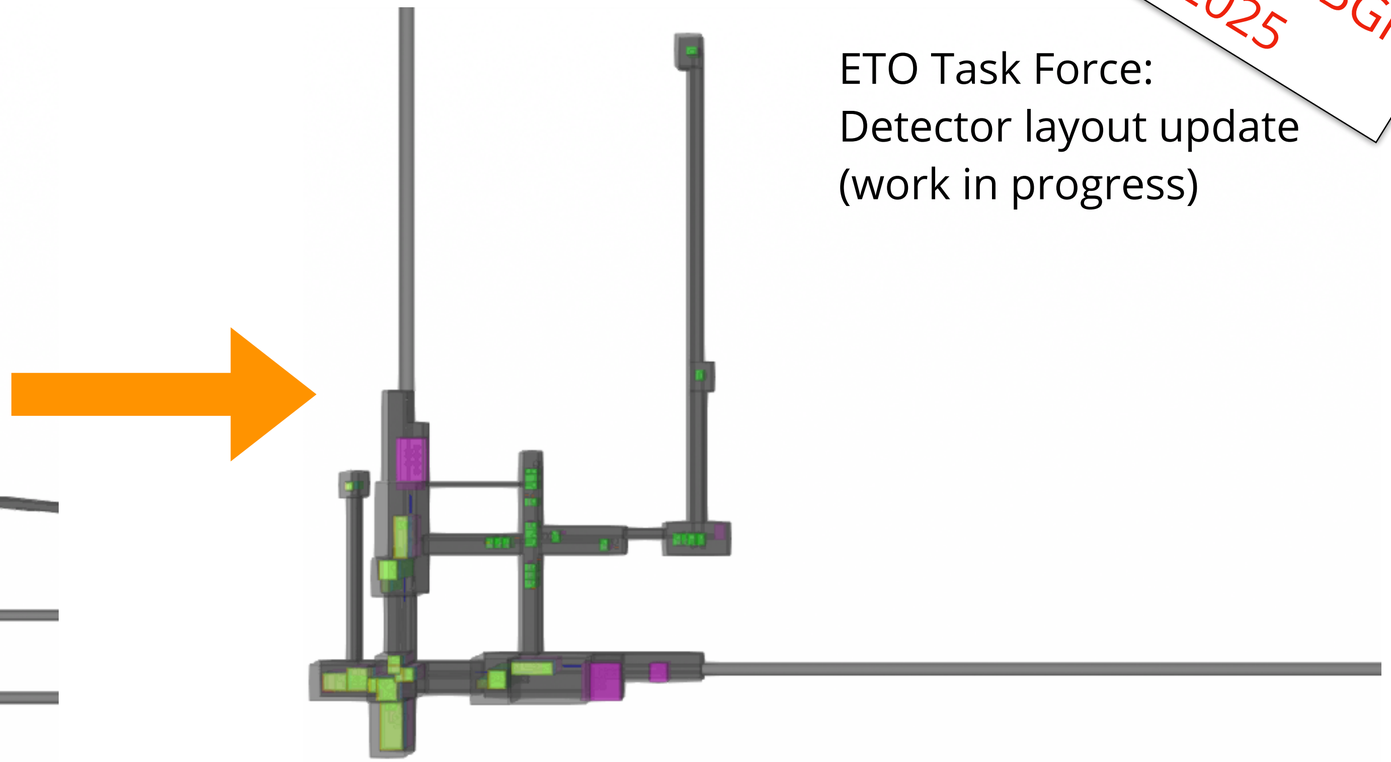
Task force in-person meeting in Pisa

ETO Design Task Force

Reported to the BGR, 17.03.2025

2024 Detector layout
(here showing the L configuration as an example)





ETO Task Force:
Detector layout update
(work in progress)

Rapid progress, immediately reducing the ‘volume’ and therefore the cost of the civil infrastructure.
This is not yet an optimal design, simply a better design from a well-integrated team.

ET Baseline Design, May 2025

Reported to the BGR, 17.03.2025

- The output of the task force will represent **the first baseline design for the Einstein Telescope detector**, for both geometries, the triangle and the 2L.

- **Delivered by ETO,** this peer-reviewed baseline design will be the central input for the preparation work of the local teams, allowing site proposals to propose their implementation of a research infrastructure that is based on **a common agreed detector design**.

Reflections and reminders

- I am looking forward to a second successful workshop of the design task force!
- From what I hear and see, the task force has made a great start!
- As you have seen, we reported the positive progress to the ET Coordinators and to the Board of Governmental Representatives.
- Thank you all (again) for volunteering for this special effort!

Reflections and reminders

- The time for the task force work is very short!
- We **must deliver one complete report** (i.e. one document) including the design for the triangle and one for the 2L in (early) May 2025.
- Above all, we must demonstrate focussed work, following the mandate. We must strictly limit the scope to an clearly achievable outcome and work professionally.
  Don’t behave like a scientists!
  Don’t make the Task Force a mini-ET project!

Reflections and reminders

- There must be **no evaluation of any downscoping**, i.e. we don't investigate scenarios which change the sensitivity of ET. (Therefore we remove the split HF/LF scenario from the agenda.)
- We should de-emphasis working on alternative designs, and focus on working out one design for each geometry. The 'options' from the mandate text should mostly be understood as integration options.
- Many other interesting topics and tasks should come up in your work and should be collected for later, but must not be part of the delivered document.

Enjoy Amsterdam

for example, by boat?

or…

more traditionally?