Einstein Telescope

Technical challenges of the Einstein Telescope

The European physics and astronomy community wants to build a next generation gravitational wave detector: the Einstein Telescope. This detector will enable scientists to study parts of the universe that have never been observed before. It also comes with unique technical challenges that push the current state-of the art. In the coming three years we will invest more than 20 M€ on industry orders in the research facilities ETpathfinder and E-TEST to develop and test necessary new techniques. We are looking for industry partners who would like to join us in this challenge. That's why we would like to invite you to two webinars and online discussions to explore the possibilities.

Introductory webinar: Wednesday 1 July 2020 15:00-17:00
Details & discussion: Wednesday 15 July 2020 9:00-17:00 (one hour per technological challenge, you can attend the ones that are of interest to you).
For whom: Industry
More info & registration: http://indico.nikhef.nl/e/ET-challenges-general

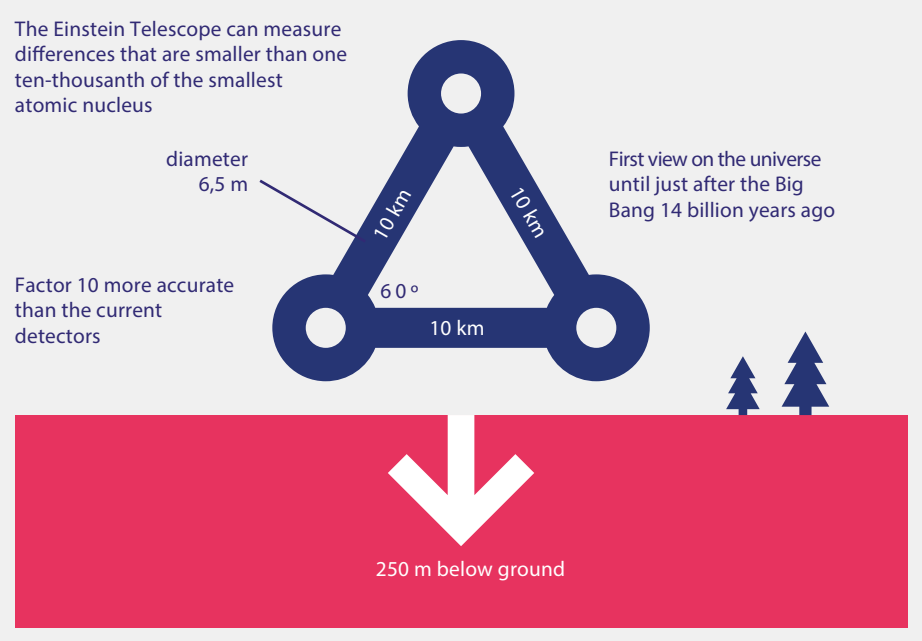
Outline of the programme

The first meeting will start with a general introduction on gravitational waves research. After that we will discuss the technological challenges in the domain of advanced instrumentation, and highlight several fields that require co-development. There is also time for questions. During the second meeting two weeks later, we will organize a full day of one hour webinars on each subject with more technical information and discussion.

The technological challenges include:

- Constructing a 30 km long laboratory deep underground in the border region Belgium – Germany – the Netherlands.
- Constructing a 30 km long ultra-high vacuum system in that laboratory housing a laser beam for interferometry.
- Improving and optimising the optical system for laser interferometry. This includes low-bandwidth, low-noise laser sources, mirrors, mirror materials, interferometry, optical modelling and design, photodiodes, squeezed light, optical coatings.
- Optimizing sensors to monitor the whole system, including inertial sensors for seismic vibration, displacement sensors. Also vacuum, temperature and other system sensors that are needed with low-noise electronics and in large quantities.
- Designing and optimizing the controls of the complete system, including real-time control hardware and software, accurate timing, digital demodulation, DAQ-system, Low-noise electronics.

- Vibration attenuation on the whole system.
- Cryogenic cooling with high vibration attenuation.
- Services optimised for the underground facility, such as vibration free ventilation (air conditioner) with low-noise electronics, water pumps, telecom, light, power.
- Special attention will be given to the challenging cryogenic mirror suspension systems.



About the Einstein Telescope and ETpathfinder

The Einstein Telescope is an advanced gravitational-wave observatory, currently in the planning stage. The border region between Belgium, Germany and the Netherlands, is being considered as a possible location. This is because of its tranquility, stable ground and strong ecosystem of scientific institutions and high-tech companies. Currently an R&D-lab is being built in Maastricht: ETpathfinder. This lab will play a crucial role in the development and testing of technologies for the Einstein Telescope.

Want to know more? Have a look at www.einsteintelescope.nl.

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