**Taskforce Weekly Plenary Meeting**
***Agenda, 27 January 2025***

**Meeting time:** 14:30 – 16:00 CET

**Zoom meeting room:**

<https://cern.zoom.us/j/64071474060?pwd=ZjZSaGJwVUZJSjU0b1p3WHllU3Nudz09>

Attendees: All task force members

Chair: Fiodor Sorentino

* **Science case, tools and criteria for performance risk evaluation**

***14:30-15:00 CET***

**Point presented by:** Francesco Iacovelli

**Point submitted for:** Information

Task force mandate will be to modify detector layout without substantially affecting the scientific outcome of ET. The ET astrophysical and cosmological reach is made of several different observables, which are affected by different frequency ranges in the sensitivity curve; we will recap the ET science case, the software tools for computing relevant figures of merit, and the possibility to establish a set of quick metrics to evaluate the impact of changes in the ET sensitivity curve on the scientific performance.

**Summary of discussion:**

Francesco provided a high-level overview of the science goals and capabilities of the Einstein Telescope (ET), highlighting its potential to significantly advance astrophysics, fundamental physics, and cosmology through improved sensitivity and detection capabilities compared to current gravitational wave detectors. Key science cases discussed include neutron star properties, primordial black holes, and stochastic gravitational wave backgrounds.

Plans were discussed to assess the impact of different ET design configurations on the science output, using a set of metrics including number of detections, parameter estimation accuracy, and sensitivity to stochastic backgrounds. This will involve using existing tools like GWFAST and GWFISH, as well as potentially developing new capabilities to handle continuous waves and core collapse supernovae. The goal is to provide a quantitative, comparative analysis of how design changes affect the science case.

**Actions:**

* Finalize science evaluation tools;
* Set up a GitLab with some easy-to-use code (for example to use in optical layout preliminary work).
* **Civil infrastructure, tools and criteria for cost breakdown**

***15:00-15:30 CET***

**Point presented by:** Jonathan Bratanata, Max Majoor and Wissam Wahbeh

**Point submitted for:** Information and discussion

Predicting the cost of an underground civil infrastructure requires a dedicated engineering study. For the sake of steering the instrument design work, a parametric modelling approach can be applied to coarsely estimate the relative impact of the various elements of the detector layout on the cost of the corresponding civil infrastructure. We will present such criteria and a proposed approach to establish a fast link between detector layout changes and civil infrastructure cost.

**Summary of discussion:**

Wissam presented the plan to leverage parametric modeling and generative design approaches to integrate civil infrastructure requirements and costs into the ET design process. The goal is to create flexible models that can quickly generate and evaluate different infrastructure layouts and provide cost estimates to inform the overall detector configuration. Key challenges include defining appropriate cost relationships and optimization criteria.

**Actions:**

Finalize the infrastructure cost tools.

* **Configuration brainstorming continued**

***15:30-15:45 CET***

**Point presented by:** Fiodor Sorrentino

**Point submitted for:** discussion

We will discuss current ideas on viable solutions to reduce detector layout volumes. We will start to combine available concepts into global configuration options to be analyzed in detail during the in-person meetings, with a schedule depending on their readiness.

**Summary of discussion:**

The task force members reviewed various ideas that have been proposed for modifying the ET detector configuration, such as reducing filter cavity lengths, simplifying cryogenics, and separating the high and low frequency detectors. The next step is to evaluate which of these options are viable while maintaining the overall science performance and identify configurations to analyze in depth at the upcoming in-person meetings.

**Actions:**

Continue contributing ideas and feedback on the GitLab repository and finalise those discussions towards the first in-person meeting in Pisa.

* **Schedule of the first in-person meeting (Pisa)**

***15:45-15:55 CET***

**Point presented by:** Fiodor Sorrentino

**Point submitted for:** discussion

We will discuss a draft agenda for the 3-days meeting in Pisa on February 18÷20, as well as the necessary actions to prepare background information and tools in due time.

**Summary of discussion:**

The task force members discussed plans for the upcoming in-person meetings in Pisa and Amsterdam, where they will dive deeper into the analysis of potential ET configurations. Additional parallel meetings are also planned to discuss risk analysis and prepare for the Pisa meeting. Participants were encouraged to continue contributing ideas and feedback on the GitLab repository.

**Actions:**

* Prepare and finalise the background information and tools before the in-person meeting in Pisa.
* Provide feedback on the schedule of the first in-person meeting and register presence in the [indico page](https://agenda.infn.it/event/44990/).
* **A.O.B**

***15:55-16:00 CET***