# ETO Task force for ET detector layout - 18th weekly meeting

F. Sorrentino

- Chapter 1, page 2, The\_ET\_Baseline\_Detector\_Layout.pdf
  - What is the definition of "acceptable costing"?
    - @Fiodor: our reference is the preliminary costing for the ESFRI proposal, but we cannot estimate the absolute cost at this stage. We look for a layout for which:
      - minor cost reduction can be only achieved by substantial increase in technical risk
      - Major cost reduction can be only achieved by descoping the scientific performance



- Chapter 2.2, page 6, The\_ET\_Baseline\_Detector\_Layout.pdf
  - The system decomposition in four branches and the nodes described in this chapter should be present in the TAB.1/TAB.7. With the given material, it has been impossible to understand the completeness of the model and its coherence and consistency. A simplified diagram of the Level 3 would help
    - @Romano



- Chapter 2.4, page 8, The\_ET\_Baseline\_Detector\_Layout.pdf
  - In the System decomposition (figure 4), it seems to be missing the infrastructure layout
    - @Romano



- Chapter 3, 1, page 11, The\_ET\_Baseline\_Detector\_Layout.pdf
  - Many terms are here qualitatively defined ... are they quantitatively defined elsewhere?
    @Anna/Antonio

The overall optical layout is developed by adhering to a set of optical constraints aimed at maximizing detector performance in terms of sensitivity and controllability. For ET-LF, we prioritize minimizing the number of optics, in order to minimize the number of suspensions and reduce suspension and related control noises. For ET-HF, the circulating power in the interferometer is high and the optics are subject to thermal deformation. Key among these constraints is maintaining a not too small beam size on optical surfaces to mitigate thermal noise contributions. Additionally, an appropriate accumulation of the Gouy phase is required to ensure the stability of all optical cavities. Minimization of optical losses, essential for preserving the sensitivity curve, has also guided the layout. To this end, the angles of incidence have been optimized, and a collimated beam has been implemented at the beam splitter for the ET-HF detectors in both 2L and triangular configurations. This requirement has been relaxed for ET-LF, where the lower circulating power allows for a non-collimated beam without significantly compromising performance.



- Chapter 3.6.1, The\_ET\_Baseline\_Detector\_Layout.pdf
  - Not clear what the TAB.3/9A is.
    - @Anna/Antonio



- Chapter 4.2.2, page 25, The\_ET\_Baseline\_Detector\_Layout.pdf
  - It would be useful to have an idea of the weight (%) of the large impact vs the small/medium impact
    - @Romano



- Chapter 4.3, page 26, The\_ET\_Baseline\_Detector\_Layout.pdf
  - Not clear what is the outcome...and what is the difference/improvements has been achieved wrt 2024 baseline
    - @Romano



- Chapter 5.1.4, page 30, The\_ET\_Baseline\_Detector\_Layout.pdf
  - The new layout reduces/optimises the number of towers and interconnecting vacuum pipes (and I guess, vacuum systems needed to reach and maintain vacuum)...why this is not considered in the analysis as a cost reduction?
    - @Max cost analysis was limited to infrastructure across this study



- Chapter 5.2.1, page 33, The\_ET\_Baseline\_Detector\_Layout.pdf
  - Comparison with 2024 reference quantify the "smaller".
    - @Max



- Chapter 6.1.3, page 43, The\_ET\_Baseline\_Detector\_Layout.pdf
  - Volumetric Breakdown of the Layout(s) the statement that "it is nearly the triple" is not correct as you would have to multiply the L for 2.
    - @Jonathan



- Chapter 6.1.3, page 43, The\_ET\_Baseline\_Detector\_Layout.pdf
  - The sentence "(not accounting for the access "is incomplete/truncated.....
    - @Jonathan



- Chapter 7.2.2, page 52, The\_ET\_Baseline\_Detector\_Layout.pdf
  - Design Structure Matrix (DSM) Interdependency Study what is the result?
    - @Ghada



- Chapter 8.1, page 59, The\_ET\_Baseline\_Detector\_Layout.pdf
  - Noise budget for baseline configuration, comparison with 2024 reference DEFINE MINOR and why you did not go in a further optimisation.
    - @Mikhail/Valeria



- Chapter 1, page 2, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - The study logic makes reference to a reference infrastructure layout. Which one?
    - @Fiodor to rephrase: basic infrastructure is defined throughout the study



- Chapter 1, page 3, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - After the sentence, "This allowed to identify the main cost drivers and the most critical parameters for civil infrastructure costing....." A table should be provided to list which one they are
    - @Fiodor: link to section 7



- Chapter 1, page 3, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - There is a mention to a "simplified risk analysis" but there is no reference to it. Do we need to consider it referencing to the "Full Risk Study.xlsx"?
    - @Fiodor: clarify that this is actually the case



- Chapter 3.3.5, page 38, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - There are risks identified that are not listed in the "Full Risk Study.xlsx".
    - @Marco/Giacomo/Ghada



- Chapter 4.4, page 78, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - It would be useful understand the net contributions (thermal noise limitations vs noise generated by the cryosystems) of each feature of the cryosystems (i.e (1) payload cooling, cryopumps limitation of the payload heat load, to the each There are risks identified that are not listed in the "Full Risk Study.xlsx".
    - @Steffen/Fulvio/Ettore



- Chapter 4.4.7 and 4.4.8, page 87,
  Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - Missing text
    - @Henk Jan delete two subsections



- Chapter 5.2, page 94, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - The strategy for the vacuum system for the pipes interconnecting the towers still lacks of details and might have an impact on the space required if the cryogenic solution is retained
    - @Patrick/Julien/Antonio P.



- Chapter 6.1.2, page 99, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - The noise impact of the operation in rest mode for clean room is not described. This could be a limiting factor in the cleanroom strategy and the surface/volume requirements for the infrastructure layout
    - @Max



- Chapter 6.1.4, page 106, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - The requirements for the HVAC system are not defined hence we consider that you have taken sufficient margins to consider the volume occupied by the ventilation system.
     Please confirm what are these margins. In addition, the requirements on the HVAC also largely depends on site conditions (air quality, humidity of the under ground, etc.). Have you taken these variables into consideration?
    - @Max/Patrick



- Chapter 6.1.2, page 99, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - Is the requirement for ISO9 applicable minimum requirement for the all underground?
    - @Max/Patrick



- Chapter 6.2, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - Confusing unstructured analysis. An introduction to the objectives and a summary table of the options analysed with the corresponding solutions/conclusions would help. In addition, there is no link with the final baseline presented in the Figure 58
    - @Max



- Chapter 7.3, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - It is understood that the estimation has been "based solely on estimated minimal excavated volumes". This implies that the estimated cost d not take into consideration the ground conditions of the two/three proposed sites (which could have been communicated by the local sites). Does this mean that you have taken the upper conservative bound in the estimations (I.e. the worst case)?
    - @Jonathan/Maria



- Chapter 7.5, page 135, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - A good number of technical requirements have been presented in the previous chapters but not contextualised here. For example, the ISO9 requirements, the Noise room space, etc.
    - @Jonathan



- Chapter 7.5, page 137, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - The whole observation of the drainage pipes and their implications for the civil engineering layout are not well described and it would help a drawing to understand what the actual proposed design is. The consideration on water flow and minimum distance of 100m from the arm pipe and the 20m/s speed seems wrong. Can you please check.
    - @Fiodor cross check with J. Harms



- Chapter 7.5, page 137, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - Considering the requirements of ISO9, a good part of the Lining and finishing requirements can be derived
    - @Jonathan



- Chapter 9.3, page 160, Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf
  - There is an extensive presentation of the derivation of the scientific requirements on the main design parameters. However, it would be useful having a table summarizing which one they are and, more importantly, what are the conclusions of the TF on this analysis



• TAB.4, there are no tolerances defined like for the other requirements



• In general, the documents still contain some typos and missing references ( for example, page 85 Supporting\_Document\_for\_The\_ET\_Baseline\_Detector\_Layout.pdf)

Figure ?? shows some startpoints of tracks from the surfaces outside the liquid-nitrogen (LN2) cooled shield (the warm environment), inside the inner part of the LN2 shield, inside the neon-cooled shield (35K), inside the hydrogen-cooled shield (15K). The payload (mirror, marionette, cold filter, reaction mass) is cooled to 8K, as is the coldest cryotrap.



# Feedback by ETC on Gitlab

• In the text in Section 8.1, references to Figs. 19 and 20 seem to be swapped



# Consistency checks & missing information

- All sections
  - please check broken references
  - fix text highlighted in red
  - adjust language for text imported from other documents (e.g. "we believe", "we expect", ...)
  - fix missing text



# Author list and external contributors

ISB

VAC&CRYO

division

- We will include some names outside of the task force team as "external contributors" in the author's list
- Example: OSD people in charge of running the science case computation
- Please let me know who provided you with active support in the development of the work presented in task force output documents
- We will collect proposals until Friday 20/6

EINSTEIN

FI ESCOPE



# Timeline

- apply changes to documents within Friday 20/6
  - prepare answers to reviewer's comments by the same date
- last weekly meeting on Monday 23/6
- send answer to review committee by end of Monday 23/6
- final adjustments to documents and delivery on Friday 27/6
  - together with release of review committee's report

