Vacuum Technology

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Einstein Telescope

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ET Beampipe Vacuum system

Beam pipe vacuum system is the biggest Einstein Telescope sub-system

after the underground excavation (preliminary estimated cost ~ 560 Meuro)

120 Km 1m diameter UHV tubes

Preliminary vacuum requirements:

H_2 10^{-10} mbar, H_2O $5x10^{-11}$ mbar, N_2 10^{-11} mbar, Hydrocarbon < 10^{-14} mbar

(> factor 5 more stringent than Virgo)

Exploit 2G detectors experience and push forward the UHV performance

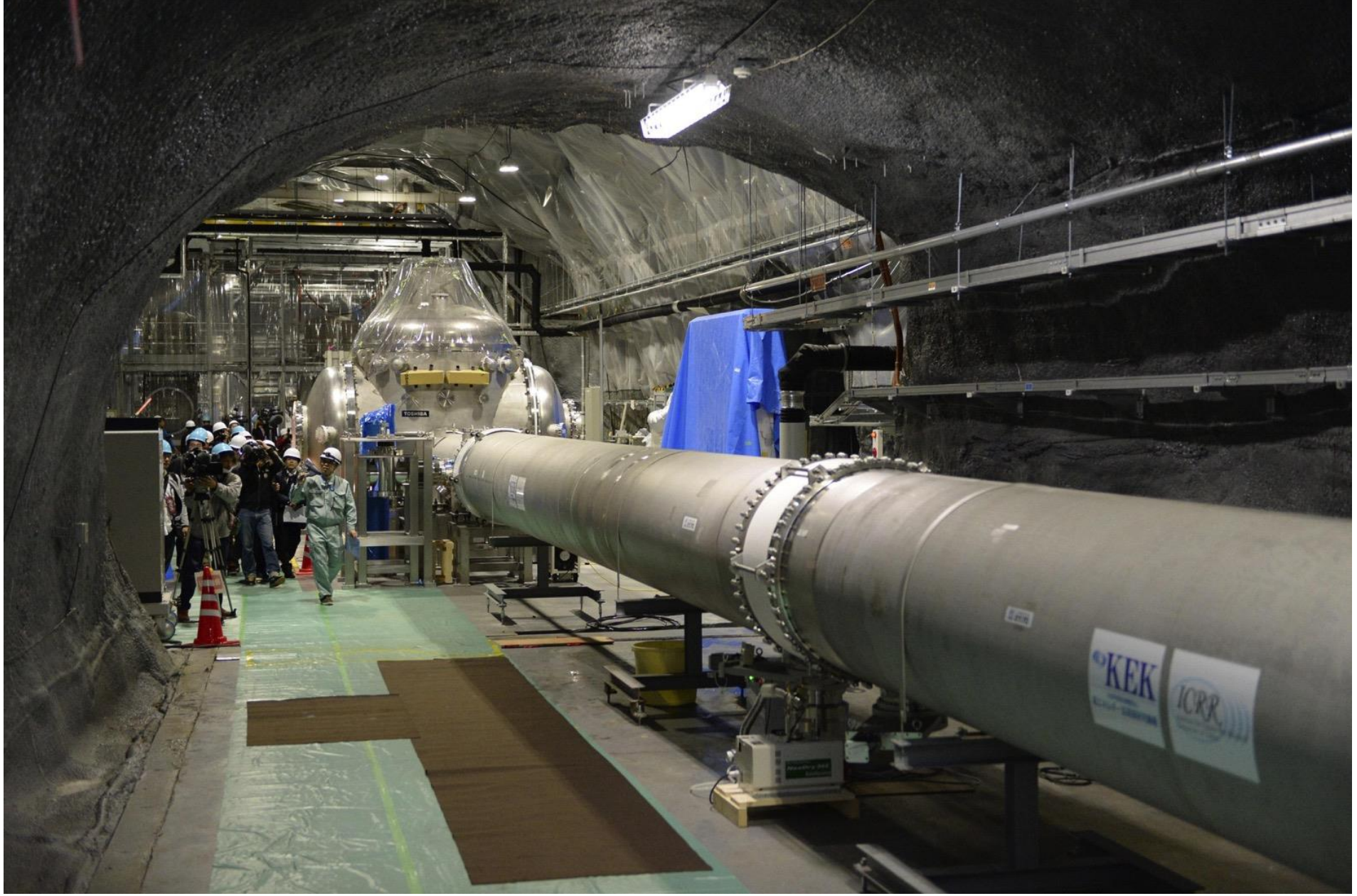
R&D on:

- Cost effective solution for
  - pipe material (austenitic, duplex, low carbon, aluminium)
  - production processing choice (Ruhrstahl-Hausen vacuum process during steel refining, ……)
- Surface treatment to reduce outgassing
  - problem of underground bakeout costs and thermal management (with a 150 °C 10 days bakeout and thermal insulation, estimated tunnels temperature rise of 15-20 °C)
- Corrosion tests -> ET lifetime 50 years

fwo VLAIO

Virgo vacuum system

KAGRA, Japan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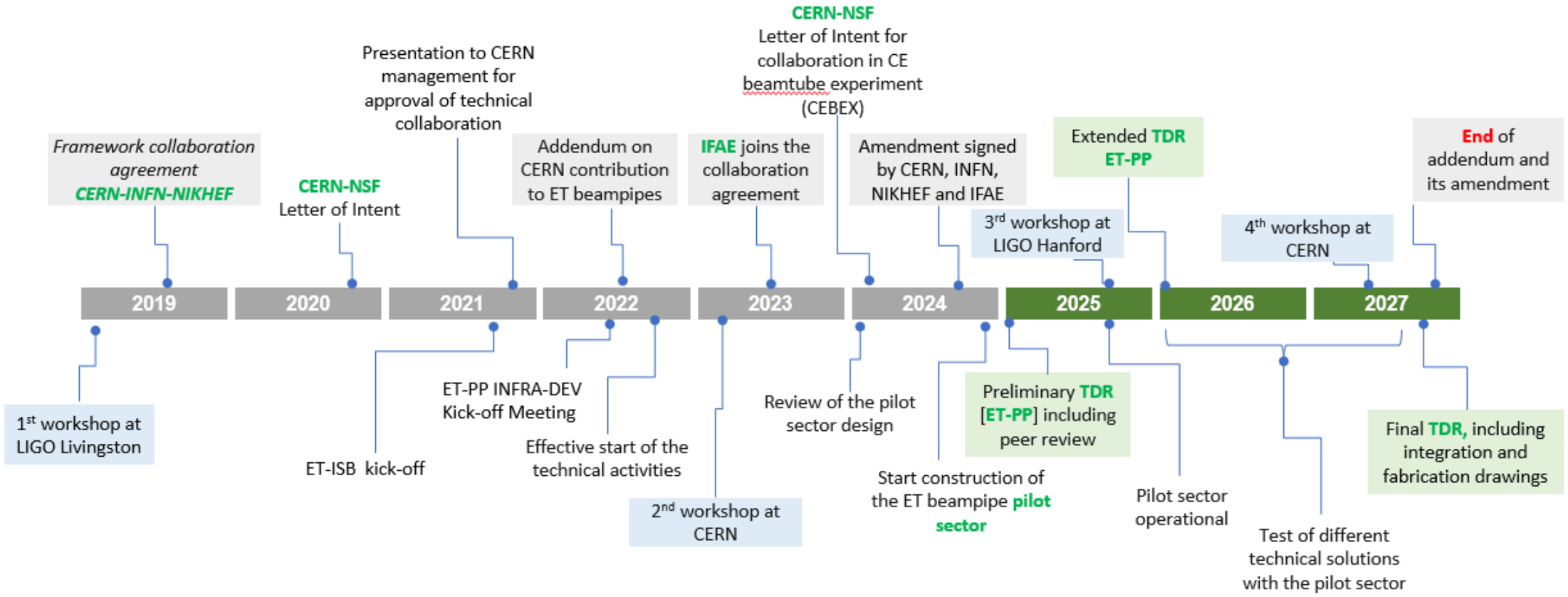
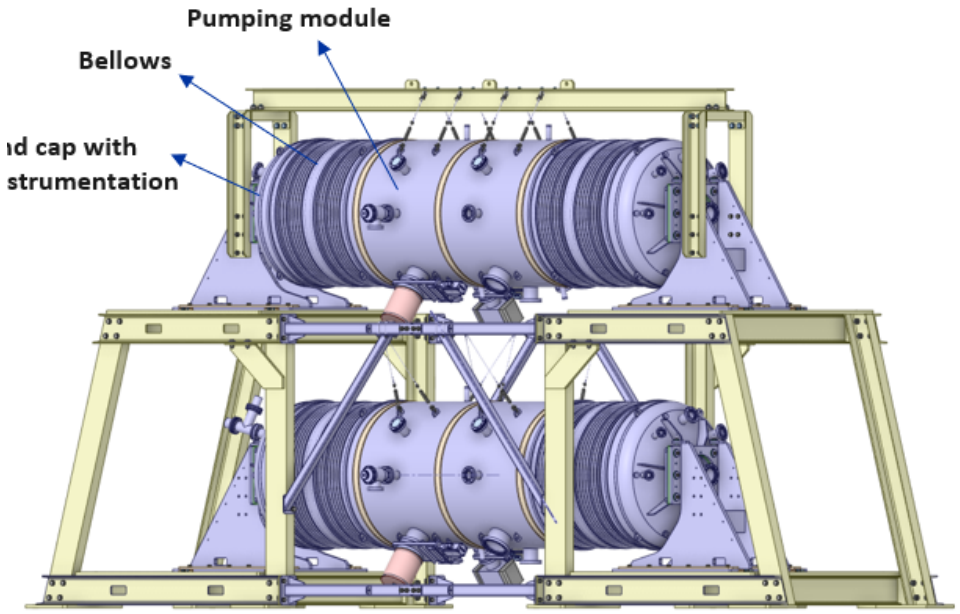
WP 6.2: Introduction and objectives (2)

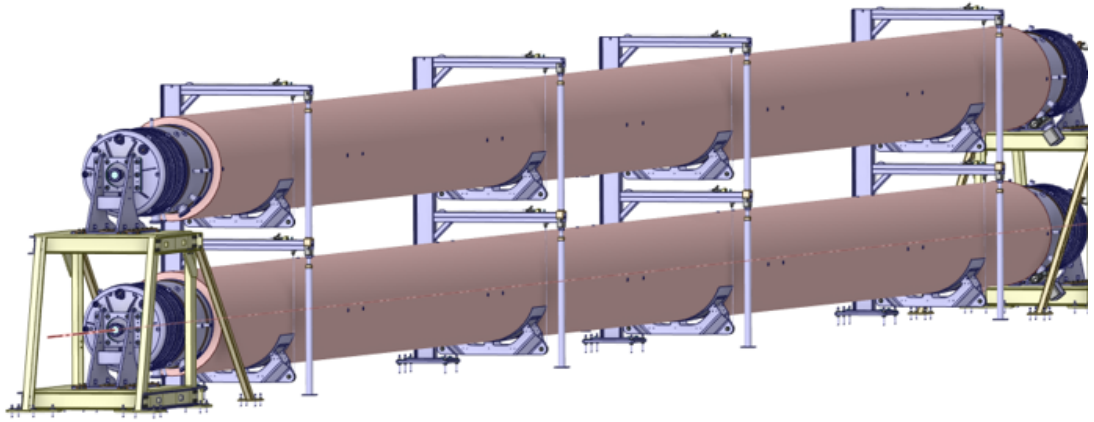


Introduction: ET pilot sector components

The ET pilot sector will be assembled and tested in two phases.



Phase 1 / Background



Phase 2 / ET Pilot Sector

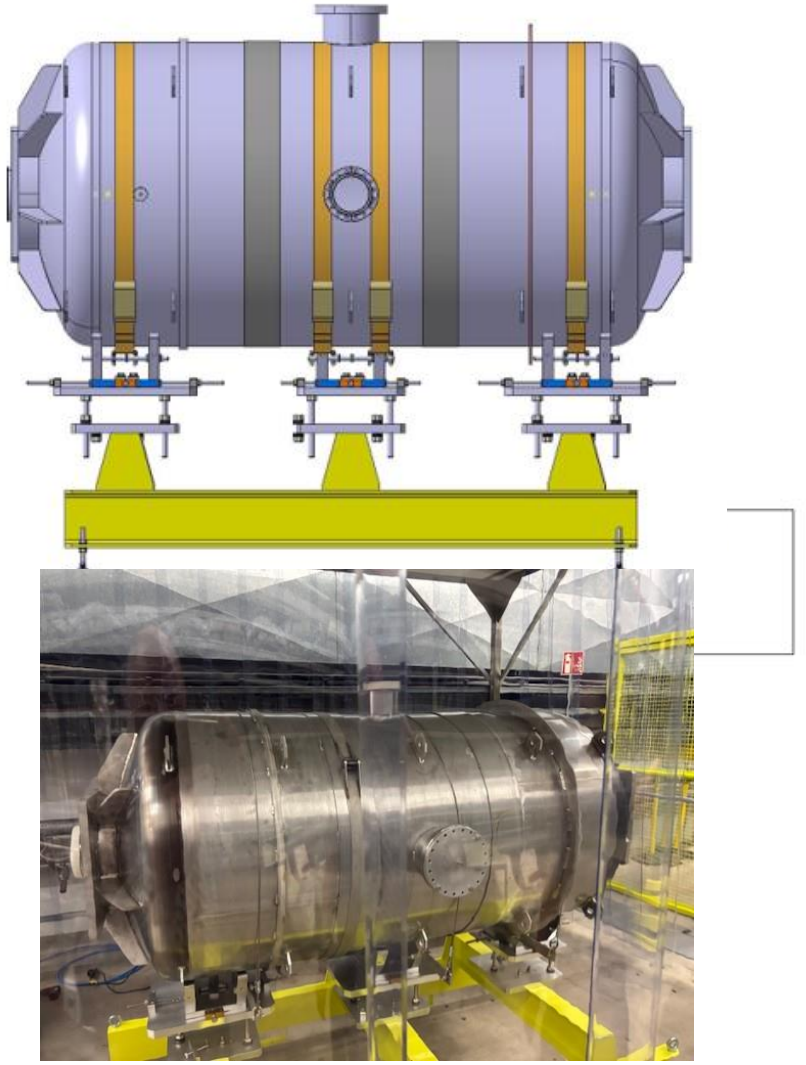
Leak detection tooling test

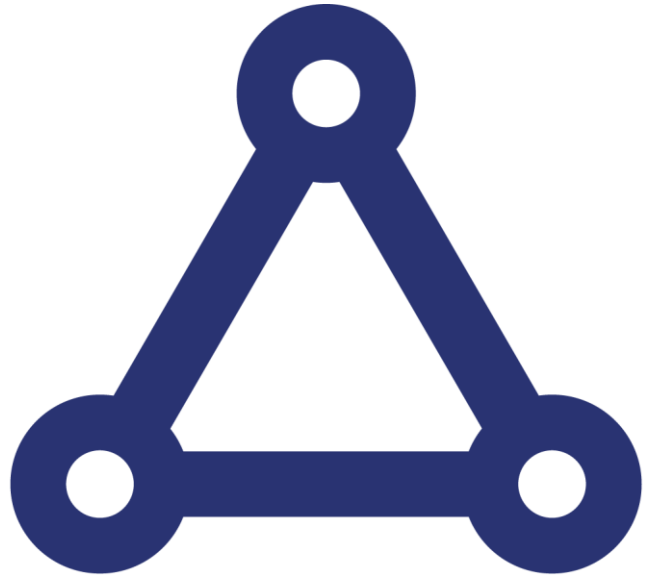
The tooling can be used for leak detection of 1E-10 mbar l s^{-1} for the components of the pilot sector.

Performed with Jan Hansen, Carlo Scarcia

Pump down and leak detection

Figure 1: Mock-up assembly





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