

11-14 November 2025
Opatija, Croatia



Contribution ID: 48

Type: **talk**

Vacuum chambers, Outgassing, and Cryogenic Pumping in the Vacuum System of ET

The Einstein Telescope (ET) will be the first third-generation gravitational wave observatory, requiring an underground vacuum system of unprecedented scale. The system will comprise more than 60 large unbaked chambers (“towers”), spanning $\sim 10^5 \text{ m}^2$ of surface area and a volume of $\sim 10^4 \text{ m}^3$. Achieving and maintaining the required vacuum levels presents a unique challenge: ET must reach pressures in the low 10^{-9} mbar range in many room temperature towers while accommodating large gas loads, extensive use of high-outgassing materials and not degrade the long arms’ vacuum (low 10^{-10} mbar range).

This contribution presents ongoing work on the design of several types of tower chambers and integrated vacuum system, addressing outgassing issues, materials selection and characterization, and the use of cryogenic pumping as both a necessity for cooled optics, but also for an effective vacuum solution.

The scale and complexity of the project necessitate a departure from traditional laboratory approaches, requiring an industrial-level strategy to ensure both technical feasibility and cost effectiveness.

Authors: GARGIULO, Julien; PASQUALETTI, Antonio

Presenter: GARGIULO, Julien

Session Classification: Instrument Science (ISB)

Track Classification: ISB: Vacuum and Cryogenics