Contribution ID: **6** Type: **Oral**

Cryocooler Development for the Einstein Telescope Pathfinder

Thursday 30 October 2025 11:00 (20 minutes)

The Einstein Telescope (ET), the next-generation underground gravitational wave observatory, demands unprecedented sensitivity to detect spacetime distortions. A critical component in achieving this sensitivity is the cryogenic cooling of its mirror systems to temperatures near 10 K. However, conventional cooling methods introduce mechanical vibrations that can compromise the interferometric measurements. To address this, a consortium comprising the University of Twente, Demcon kryoz, and Cooll has developed a zero-vibration cooling system tailored for the ET. This system leverages sorption-based cryocooling technology, originally developed for space applications, which operates without moving parts and thus eliminates vibration sources. The cooling process is achieved through thermally-driven adsorption-desorption cycles, enabling continuous operation at cryogenic temperatures without mechanical disturbance. The mirrors are cooled via thin suspension wires, ensuring thermal conduction while maintaining mechanical isolation. The innovation not only meets the stringent thermal and mechanical requirements of the ET but also sets a new benchmark for vibration-free cryogenic systems in precision instrumentation. This development is currently being validated at the ETpathfinder facility, a prototype setup designed to test key technologies for the Einstein Telescope.

Submitters Country

The Netherlands

Are you a student?

No

Author Affiliations & Email Addresses

I confirm that valid email addresses and affiliations have been added for all co-authors.

Co-Author Affirmation

By clicking here, I, the submitting author, affirm that all co-authors know of and concur with the submission of this abstract.

Author: KUNST, Romaine (Demcon)

Presenter: KUNST, Romaine (Demcon)

Track Classification: Cryogenics in Big Science