Contribution ID: **114** Type: **Contributed Oral**

C3Or3D-03: Conceptual cryostat design for cryogenic payload suspension studies for the Einstein Telescope

Wednesday 12 July 2023 14:30 (15 minutes)

The Einstein Telescope (ET) is a third generation gravitational wave detector,combining a low-frequency (LF) and a high-frequency (HF) laser interferometer. Cryogenic operation of ET-LF in the temperature range of 10 K to 20 K is essential to suppress the suspension thermal noise, which dominates the detection sensitivity at frequencies below 10 Hz. This requires suspension materials with high thermal conductivity and low mechanical dissipation at cryogenic temperatures. Two possible suspension concepts are currently considered, using either monocrystalline suspension fibers made of silicon or sapphire, or titanium suspension tubes filled with static He-II. The dissipative behavior of these suspensions is characterized by the mechanical Q-factor. It can be measured by the ring-down method, exciting the suspensions to resonance vibrations on the nanometer scale and analyzing the decay time. For this purpose, a new cryogenic test facility is being planned, allowing the investigation of cryogenic payload suspensions for third-generation gravitational wave detectors. The test cryostat is equipped with a cryocooler and enables real-size studies with various suspension materials and geometries. The future integration of He-II is foreseen to enable He-II filled suspension studies. We describe the scope of experiments and the conceptual design of the test cryostat.

Author: Mrs KOROVESHI, Xhesika (Karlsruhe Institute of Technology (KIT))

Co-authors: Mr RAPAGNANI, Piero (Universita degli studi di Roma "La Sapienza"); Mrs MANGANO, Valentina (Universita degli studi di Roma "La Sapienza"); STAMM, Michael (Karlsruhe Institute of Technology (KIT)); Mr GROHMANN, Steffen (Karlsruhe Institute of Technology (KIT))

Presenter: Mrs KOROVESHI, Xhesika (Karlsruhe Institute of Technology (KIT))

Session Classification: C3Or3D: Aerospace Applications IV: Space