

New Generation Superattenuators for Einstein Telescope

Tuesday, 24 May 2022 23:15 (20 minutes)

Seismic noise and local disturbances are dominant noise below 10 Hz (0.1-10 Hz). With the introduction of high performance seismic isolation systems based on mechanical pendula, the 2nd generation GW antennas have reached the scientific goal of the direct observation of GW signals thanks to the extension of the frequency band down to 10 Hz. Now, the 3rd generation instrument era is approaching and the Einstein Telescope giant interferometer is becoming a reality with the possibility to install the detector in an underground site where seismic noise is 100 times smaller than on surface. Moreover, new available technologies and the experience acquired in operating advanced detectors are key points to further extend the detection bandwidth down to 2-3 Hz with the possibility to suspend cryogenic payload and then mitigating Thermal Noise too. In this talk, we present the preliminary studies devoted to improve seismic attenuation performance of the Advanced VIRGO Superattenuator in the low frequency region. Following the experimental lines, we analyze the possibility to improve the vertical attenuation performance with a multistage pendulum chain equipped with magnetic anti-springs that is hung to a double Inverted Pendulum in nested configuration. The feedback control requirements and the possible strategies to be adopted for this last element, will be presented.

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Session Classification: Suspensions for LF

Track Classification: Suspensions for low frequencies