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New Generation Superattenuators (NGSA) for Einstein Telescope: status of the project

The era of third-generation gravitational wave detectors is approaching, and the Einstein Telescope (ET) a large size interferometer, is becoming a concrete reality. The underground installation of the instrument offers significant advantages from seismic and local disturbances point of views: seismic noise level, indeed, is reduced by a factor of 100 compared to surface locations. In addition, recent technological advancements and the experience gained in operating advanced detectors, are keys point to conceive a detector extending its bandwidth down to 2–3 Hz and allowing for the use of cryogenic payloads. The NGSA is a R&D project involving the ET research groups in Naples, Pisa, and Sassari. The project is focused on enhancing vibration isolation performance for the Einstein Telescope. Starting from the mechanical suspension system used in the Advanced Virgo interferometer, already considered compliant with third-generation requirements, we are proposing performance improvements redesigning a multistage pendulum system. This novel structure makes use of magnetic anti-spring mechanical filters and is suspended from a double inverted pendulum in nested configuration (Nested Inverted Pendulum - NIP). A key passage of the project is the construction of NIP prototype in reduced scale, together with its experimental validation at the PLANET laboratory in Naples. In this presentation, we report on the status of the NGSA project, with a particular emphasis on the pre-commissioning phase and test program of the NIP prototype.

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