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Improving Low-Frequency sensitivity of gravitational wave detectors. A new compact, seismic attenuation system for the Einstein Telescope

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Third generation ground-based gravitational wave detectors will broaden our view of the Universe. In the meantime, upgrade programs as Virgo_nEXT are planned to boost the sensitivity of existing detectors such as Advanced Virgo in the post-O5 time frame. In particular, improving the sensitivity at low frequencies will enable the detection of coalescences of higher mass black holes and allow more precise early warning for binary neutron star mergers, increasing the number of expected multimessenger observations. In this scenario, designing a new generation seismic attenuation system is crucial to achieve higher sensitivity at low frequencies with respect to current interferometers. We present a new concept for a compact seismic attenuation mechanical filter that has the potential to reduce the size of current super attenuator systems, a result that could bring a leap in the sensitivity at low frequencies of gravitational-wave detectors and significant reduction in the underground civil work for the future Einstein Telescope.

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