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On the origin of the LIGO ”mystery” noise and the high energy particle physics desert

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One of the most ubiquitous features of quantum theories is the existence of zero-point fluctuations in their ground states. For massive quantum fields, these fluctuations decouple from infrared observables in ordinary field theories. However, there is no “decoupling theorem” in Quantum Gravity, and we recently showed that the vacuum stress fluctuations of massive quantum fields source a red spectrum of metric fluctuations given by ~ mass5/frequency in Planck units. I show that this signal is consistent with the reported unattributed persistent noise, or “mystery” noise, in the Laser Interferometer Gravitational-Wave Observatory (LIGO), for the Standard Model of Particle Physics. If this interpretation is correct, then it implies that: 1) This will be a fundamental irreducible noise for all gravitational wave interferometers, and 2) There is no fundamental weakly-coupled massive particle heavier than those in the Standard Model.

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