

Einstein Telescope and Newtonian Noise

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www1.physik.uni-hamburg.de/forschung/institute/ilp/forschung/schnabel.html

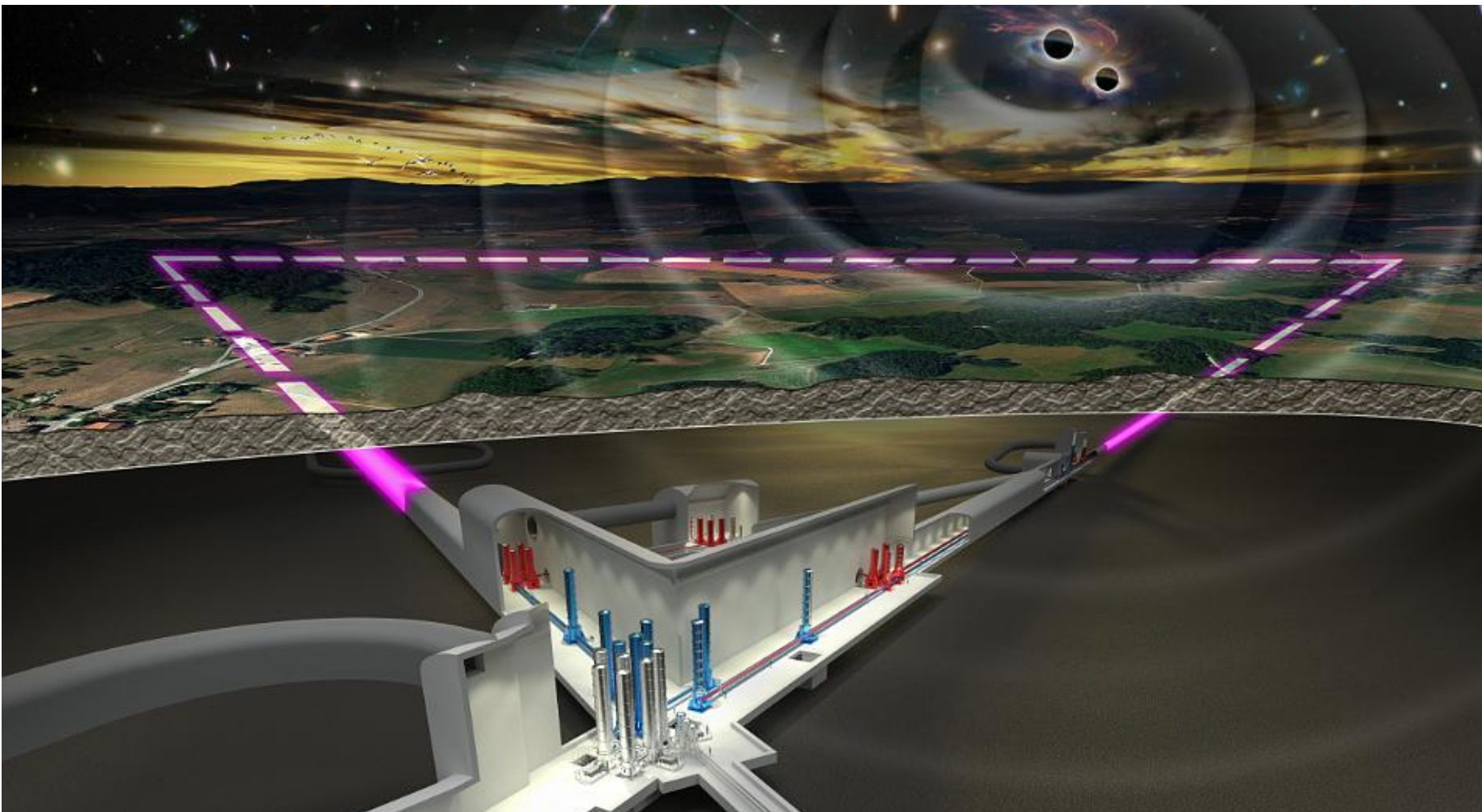


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Einstein Telescope – underground 3G Observatory

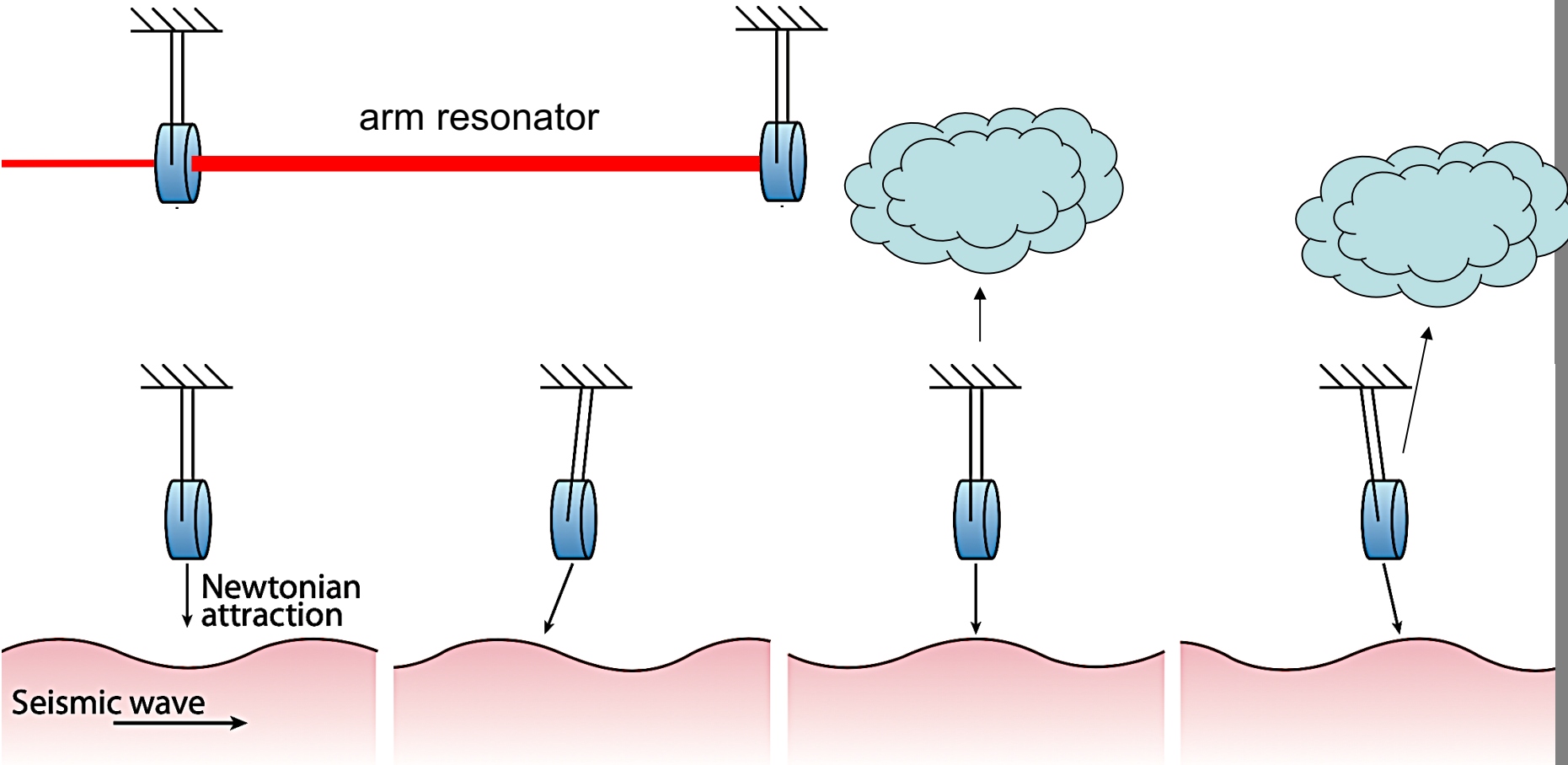
10km triangle, >100m under surface, either in Sardinia or at B-D-NL-boarder



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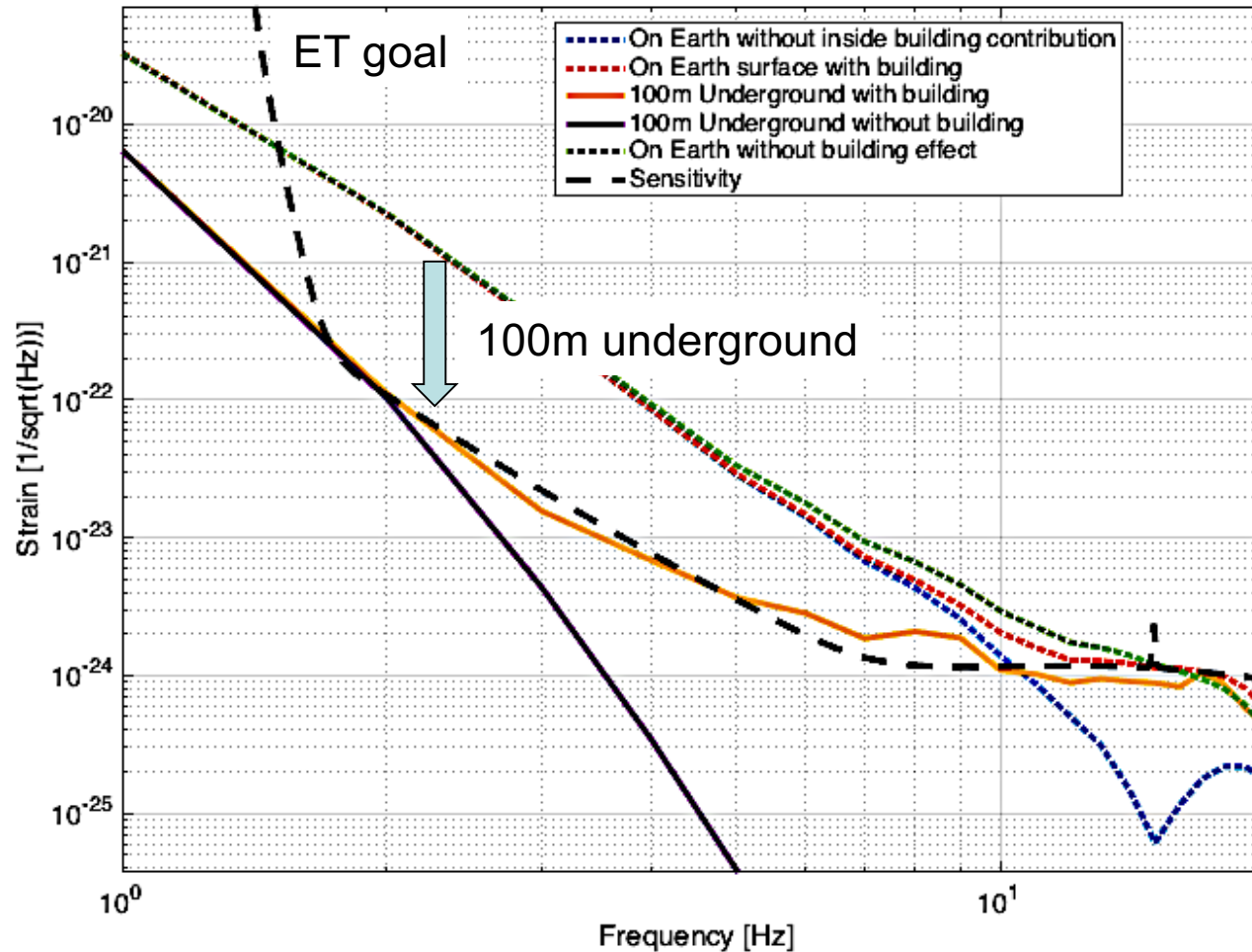


Seismic and atmospheric Newtonian Noise



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Atmospheric Newtonian Noise reduction

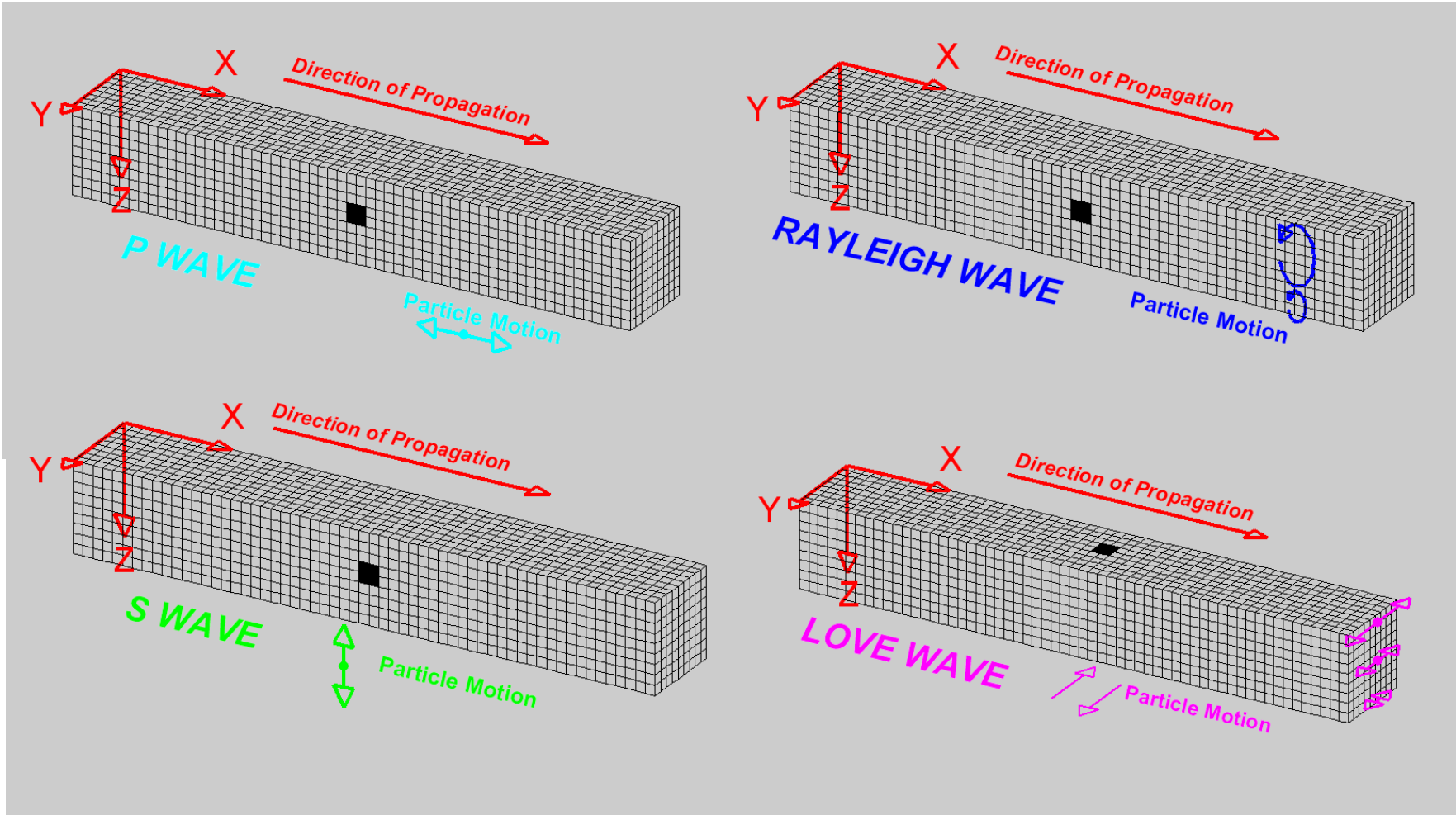


[D. Fiorucci, J. Harms, M. Barsuglia, talk@ GWADW (2017)]

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Body waves

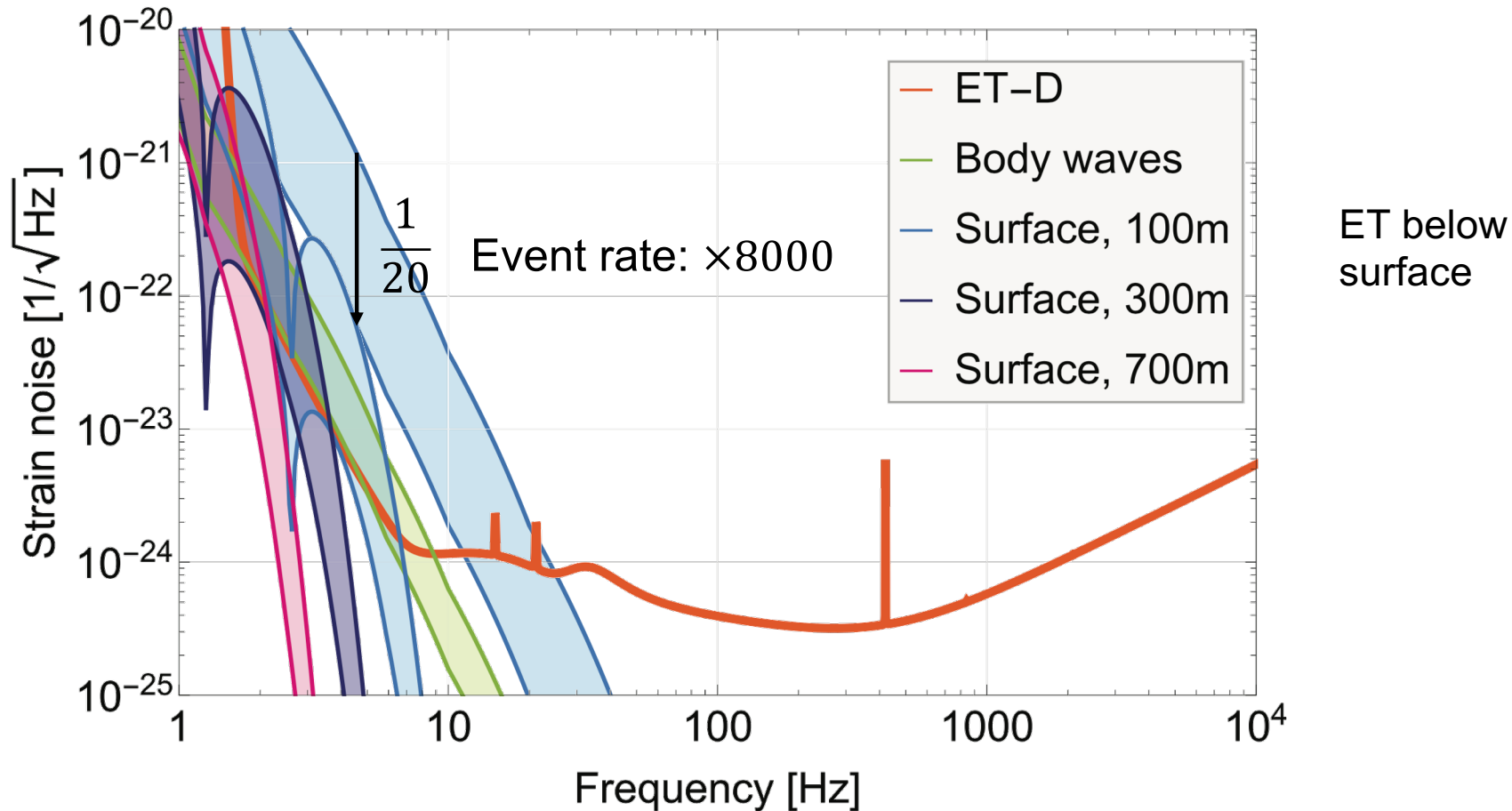
Surface waves



[<http://www.geo.mtu.edu/UPSeis/waves.html>]

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Seismic NN predictions for the Einstein Telescope

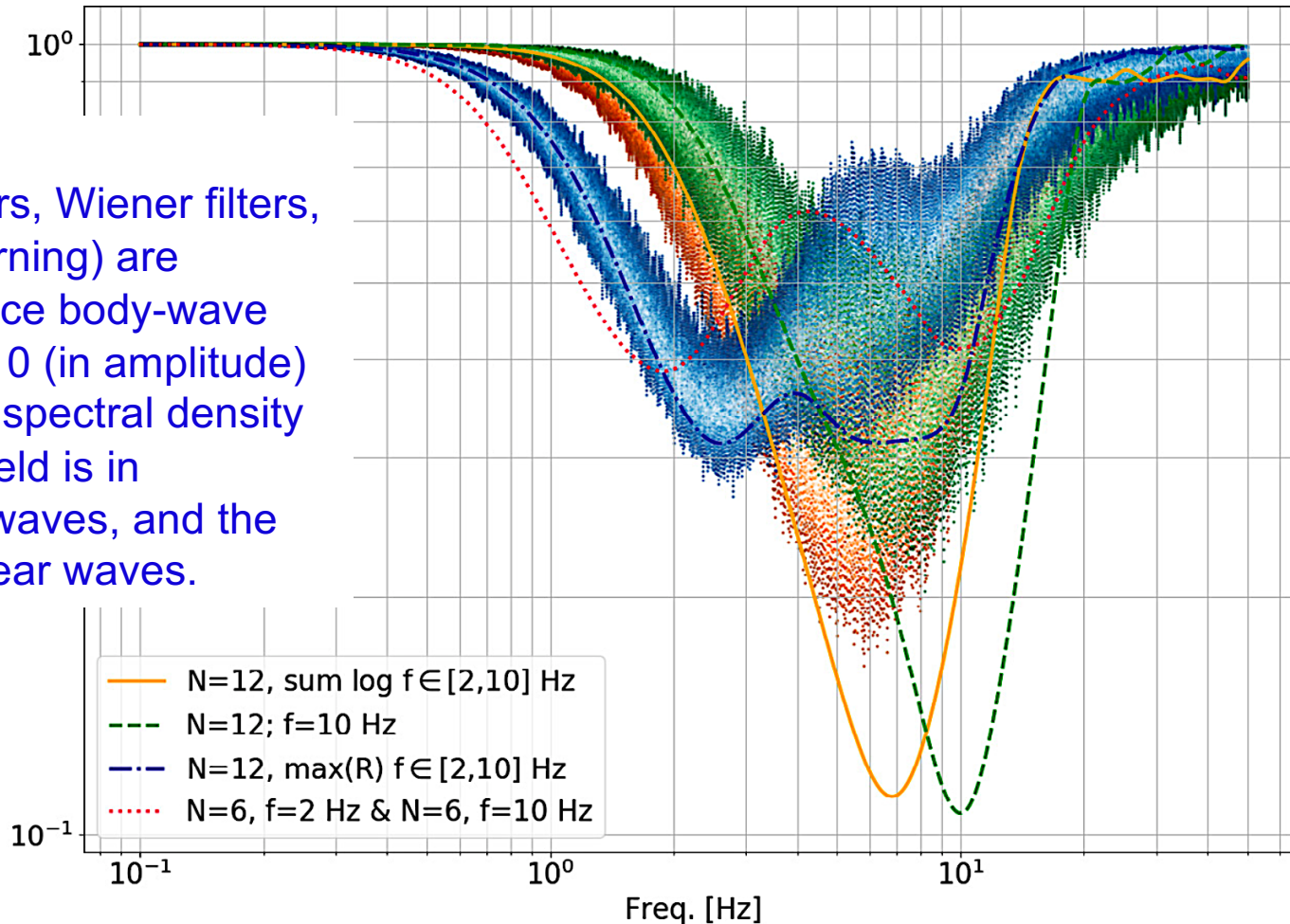


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[F Badaracco and J Harms, Class. Quantum Grav. **36** 145006 (2019)]

Additional seismic NN cancellation is required

Result of [1]:
About 15 sensors, Wiener filters,
(or machine learning) are
required to reduce body-wave
NN by a factor 10 (in amplitude)
when 1/3 of the spectral density
of the seismic field is in
compressional waves, and the
rest being in shear waves.



[1] F Badaracco and J Harms, *Class. Quantum Grav.* **36** 145006 (2019)]

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Summary

- The ET aims for enlarging its reach in distance by up to three orders of magnitude at frequencies from 2Hz to 30Hz.
- About two orders of magnitude will be realized by going underground.
- Another order of magnitude will be realized by noise cancellation on the basis of an array of measurement devices and machine learning.
- The application for the ESFRI road map was submitted recently.

LANDTAG NORDRHEIN-WESTFALEN
17. Wahlperiode

Drucksache **17/11657**

II. Beschlussfassung

03.11.2020

Der Landtag beauftragt die Landesregierung,

- sich gegenüber dem Bundesministerium für Bildung und Forschung dafür einzusetzen, den geplanten Bau des Einstein-Teleskops unter eventueller Beteiligung des Landes NRW finanziell zu unterstützen.

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