

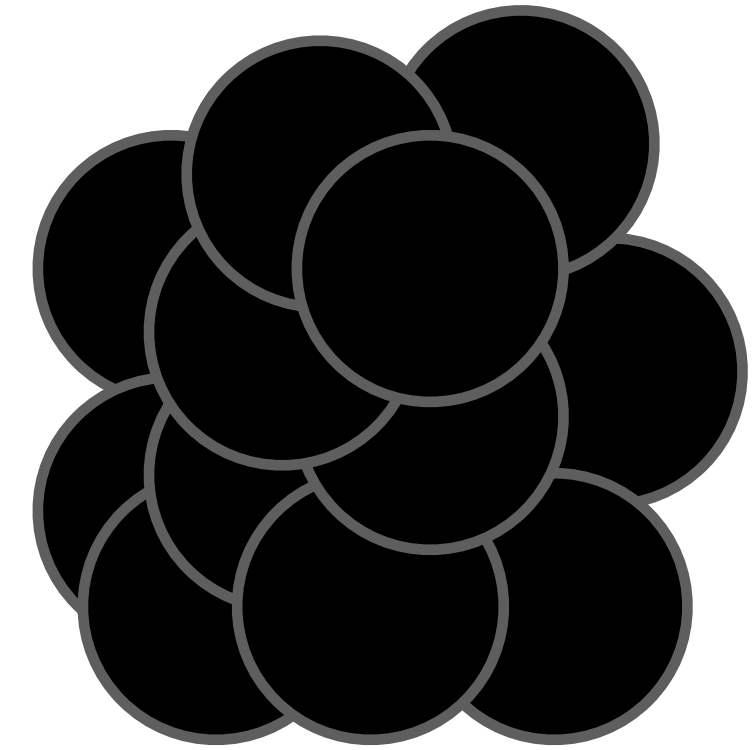
Listening for ultra-heavy dark matter with underwater acoustic detectors

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Based on arXiv:2502.17593

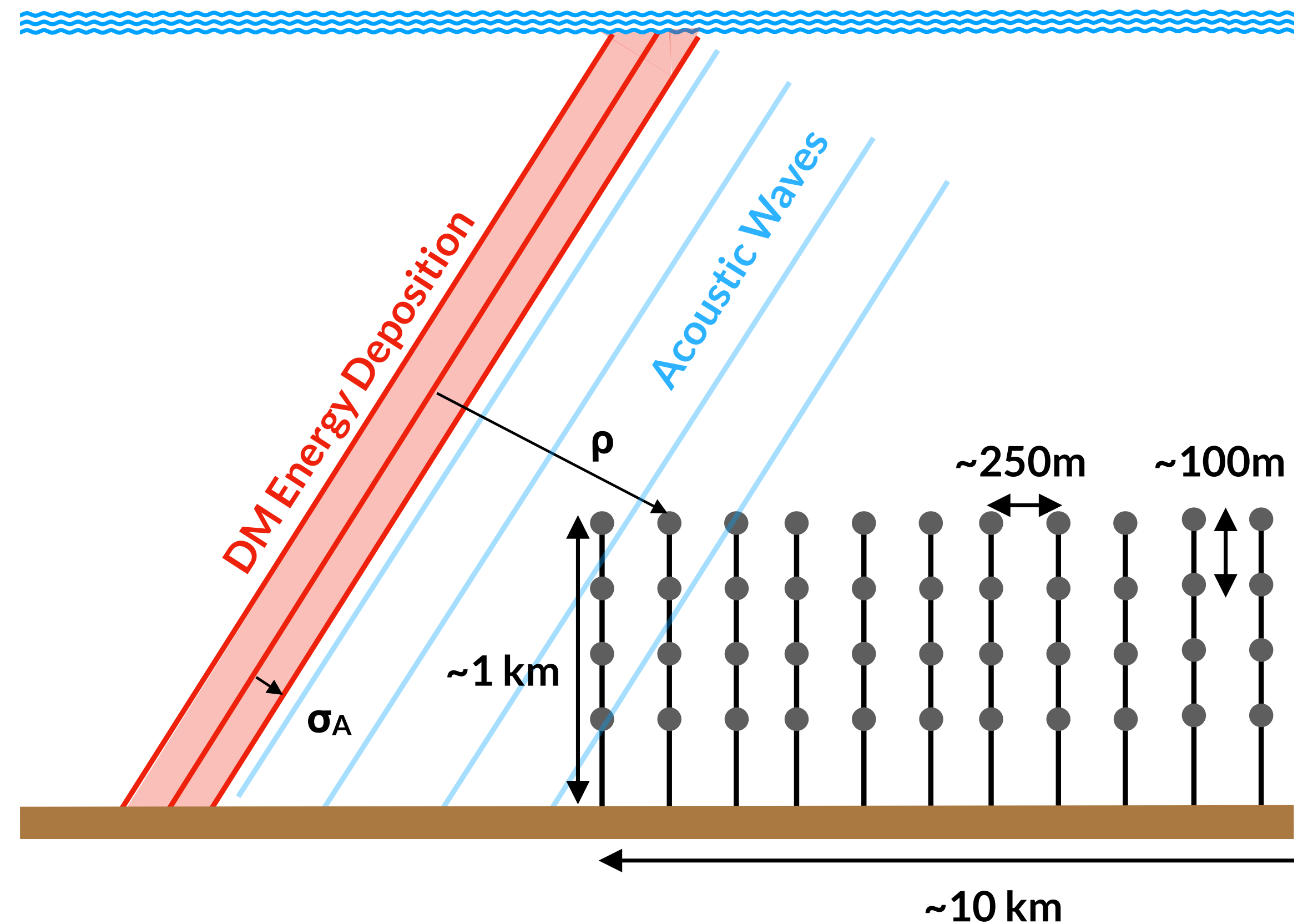
Ultra-heavy Dark Matter

- Low flux due to high mass \rightarrow evade conventional direct detection even with strong interactions
- Necessarily composite (unitarity)
- Large amounts of parameter space still available

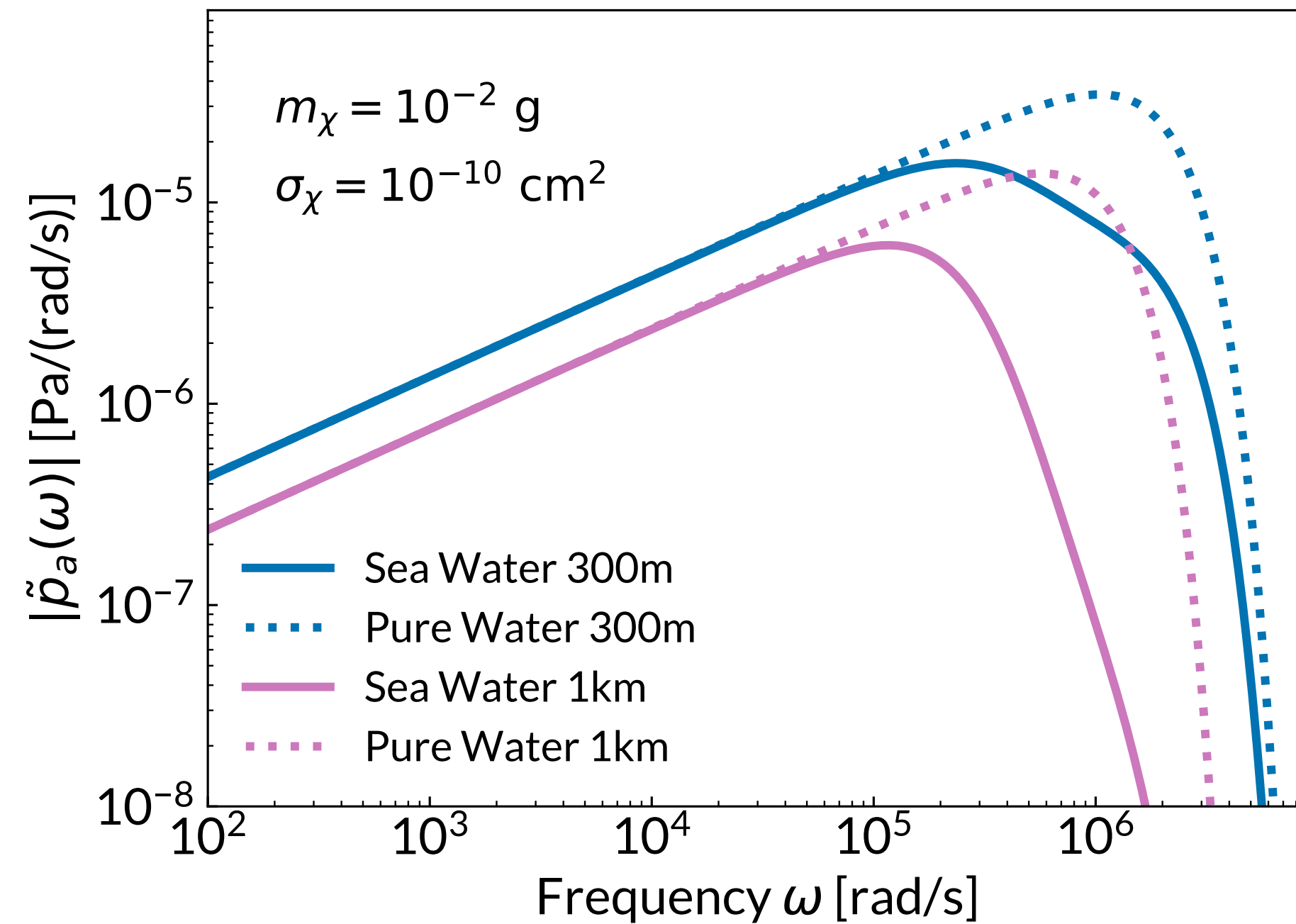
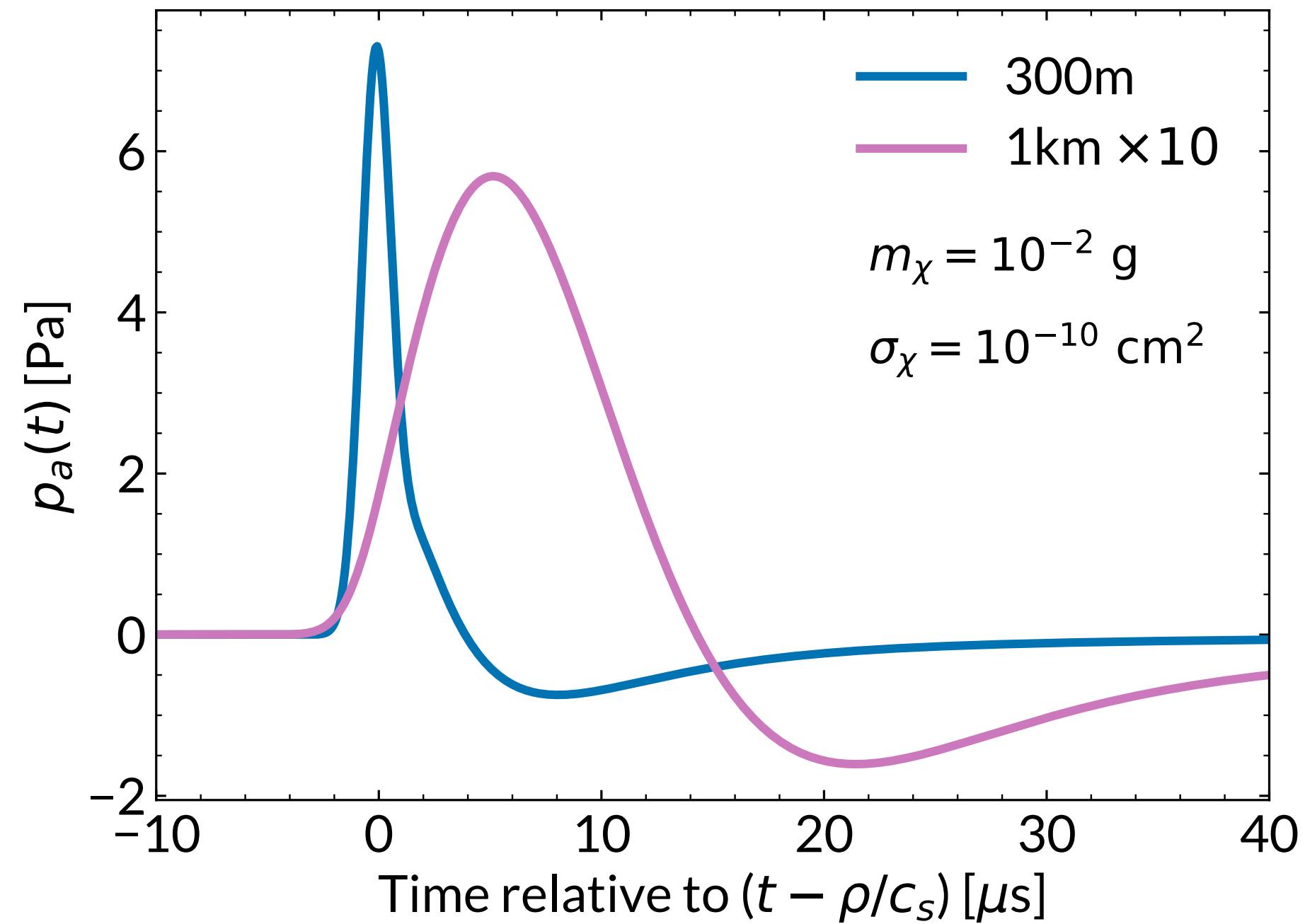


Acoustic Detection

- Idea: DM is weakly interacting enough to make it through the atmosphere
- DM deposits energy into the ocean creating pressure waves
- Detect pressure waves using a large hydrophone array
- Already proposed as a UHE neutrino experiment!



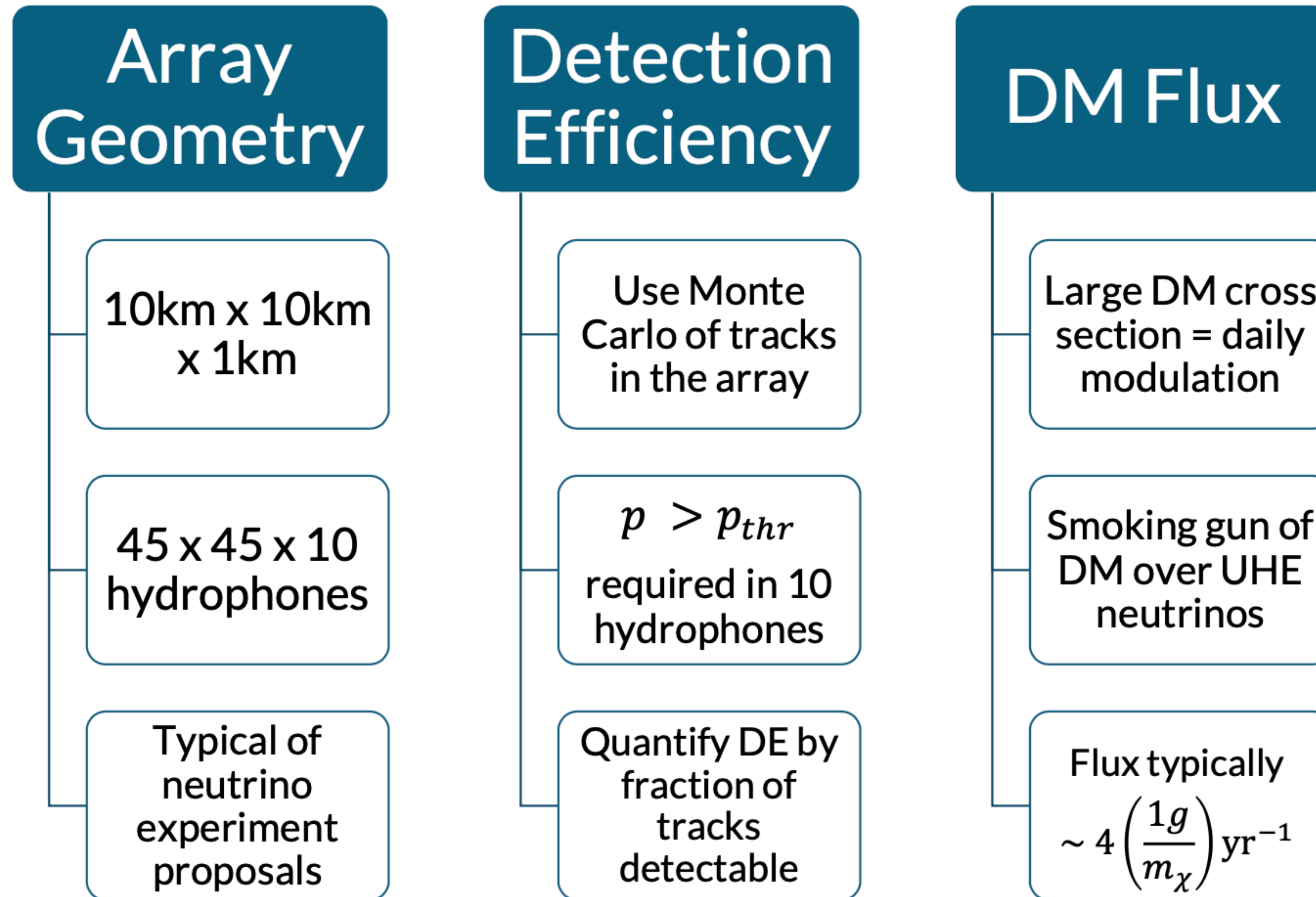
What is the signal?



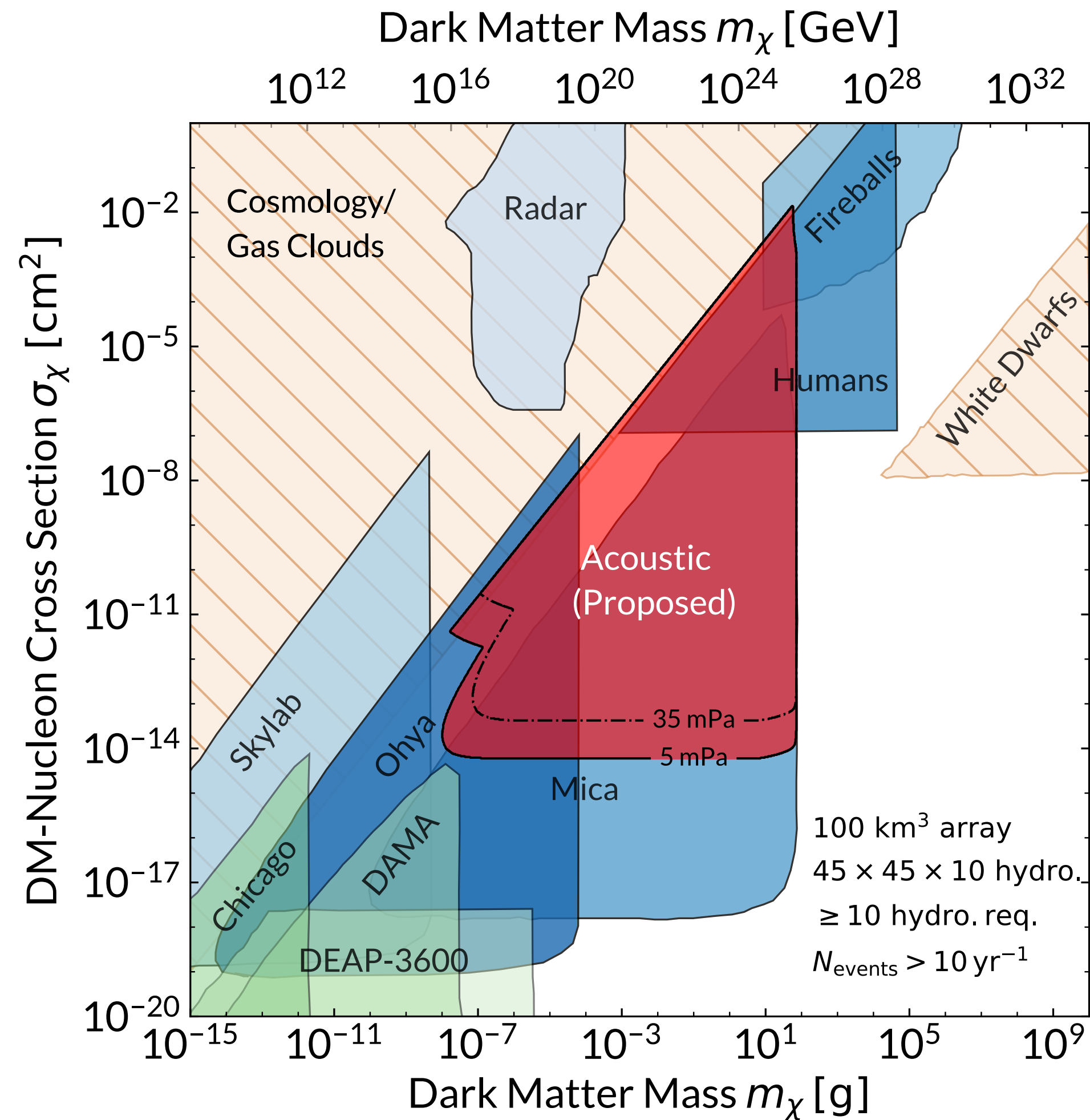
- Signal **bi-polar** in shape with $\mathcal{O}(10 \mu\text{s})$ duration
- Asymmetry depends on distance signal propagates

- Frequency cut-off arises from attenuation in sea water
- “Bumps” in cut-off = greater asymmetry

Calculating Sensitivities



Sensitivities



- Assuming proposed acoustic neutrino experiment parameters, **could constrain the gap!**
- Complementary to Humans, Mica, Ohya and Cosmological Bounds
- Also sensitive to spin dependent cross section through hydrogen, Ohya is not!

Thank you for listening!



arXiv:2502.17593