

LISA Noise Curves - Consider Cornish and Robson arXiv 1803.01944v1 and Maggiore Chapter7

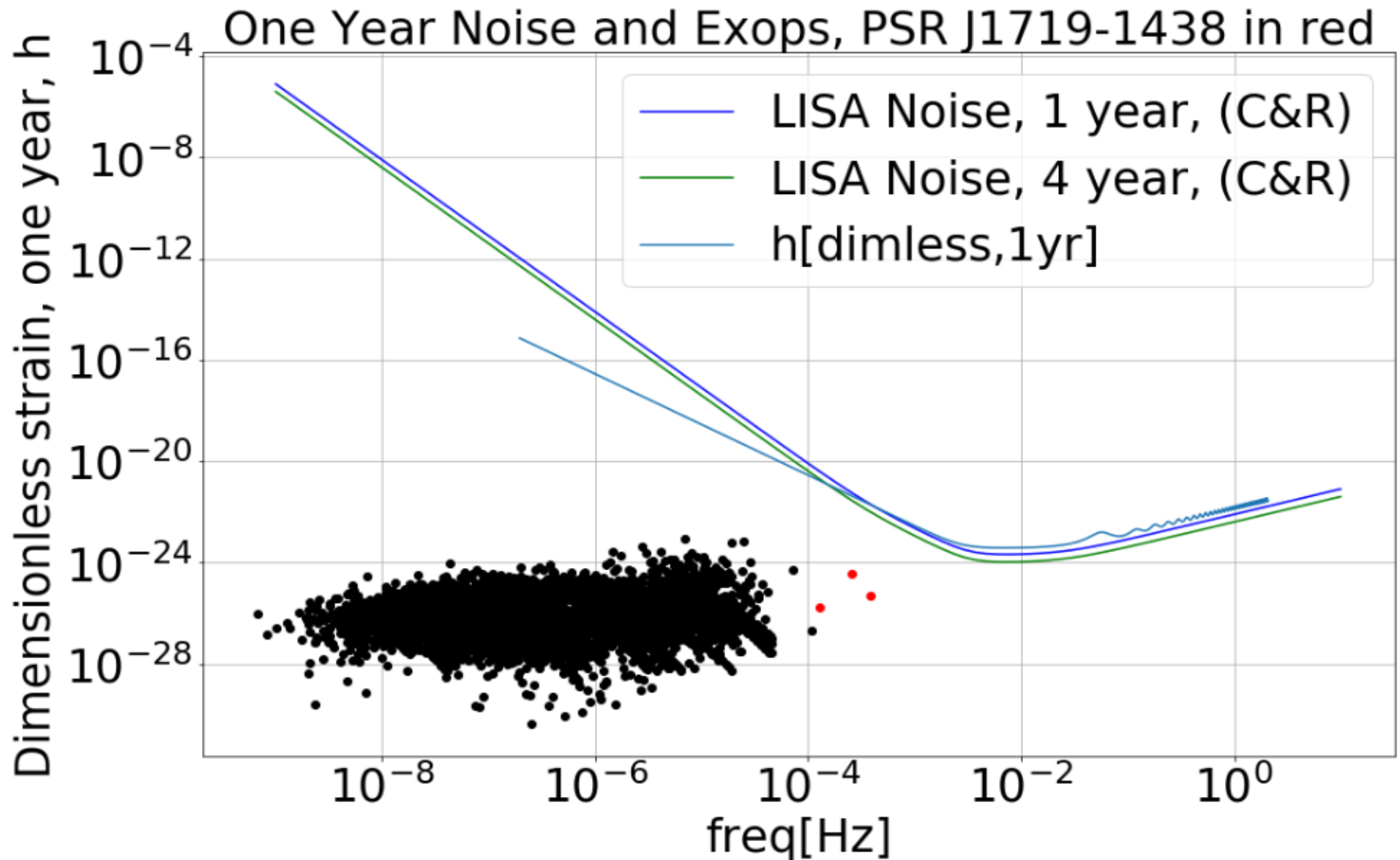
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20180410

Refs:
Maggiore, *Gravitational Waves*, Chapter 7
Cornish and Robson, *The construction and use of LISA sensitivity curves*,
arXiv 1803.01944v1

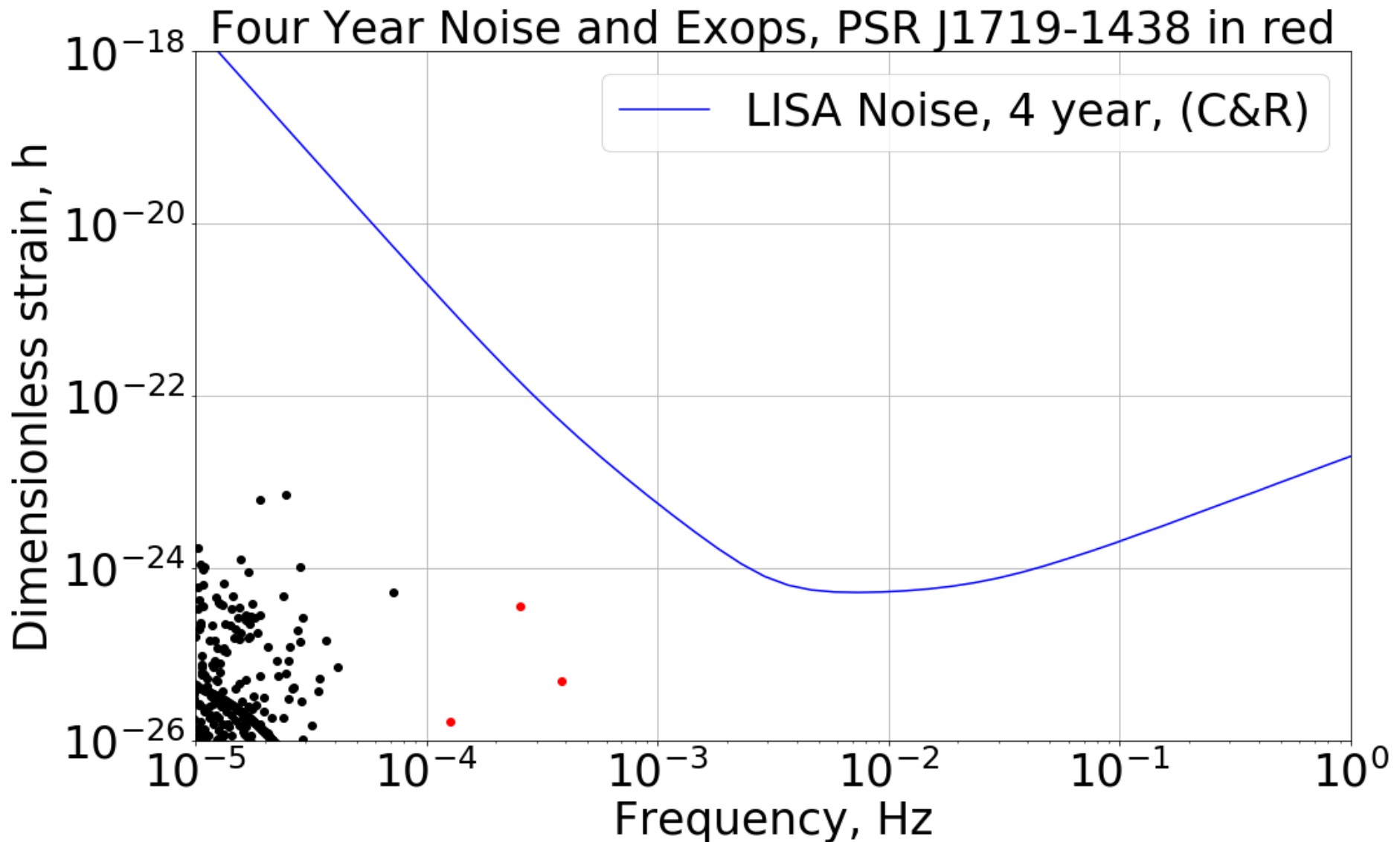
Some Points about our Exops

- Exop GW frequencies are low compared to either the round-trip time in a LISA arm (16.7 s) as a frequency, 60 mHz, or compared to $f_{\text{star}} = c/(2\pi L)$ which is 19.1 mHz.
 - Highest Exop GW frequency, see histogram in PrettyPlotsGWStrainEtc notebook, is XXXX
 - This puts us in the “LIGO Limit” where the LISA “signal response function of the instrument” (sky and polarization averaged) is the same at LIGO, $\text{cal R} = 1/5$ per channel.
- Oh yeah, C&R say that there are two independent Michelson interferometer channels below f_{star} and three above f_{star} .
 - So you can multiply signal, usual cal R , by 2 or 3.
 - That is Sky and Polarization averaged.
- Plot on following from GWStrainPlotsSNR notebook, currently last cell.

All Exop Modes and Cornish-Robson and Larson noise curves, 1 year and 4 year



All Exop Modes and Cornish-Robson 4 years



Questions

- Data presentation of histograms with a logarithmic x-scale...
 - is it cheating to make the histo evenly spaced in the log-x space?
- Following Maggiore, I find 2 T in the SNR below. Number of channels for C&R?
- Cornish and Robson are very careful to re-write

$$\rho^2 = 4 \int \frac{|\tilde{h}(f)|^2}{P_n(f)} df$$
$$\rho^2 = 4 \int \frac{|\tilde{h}(f)|^2}{P_n(f)} df = 4 \int_{f=0}^{\infty} \frac{f |\tilde{h}(f)|^2}{P_n(f)} d(\ln f) . \quad (17)$$

coherently extract the signal. Rather than plotting the signal power directly (which often lies below the sensitivity curve), the convention is to plot $h_{\text{eff}}^2 = 16(2fT)S_h(f)/5$, to account for the boost we get from the coherent signal extraction.

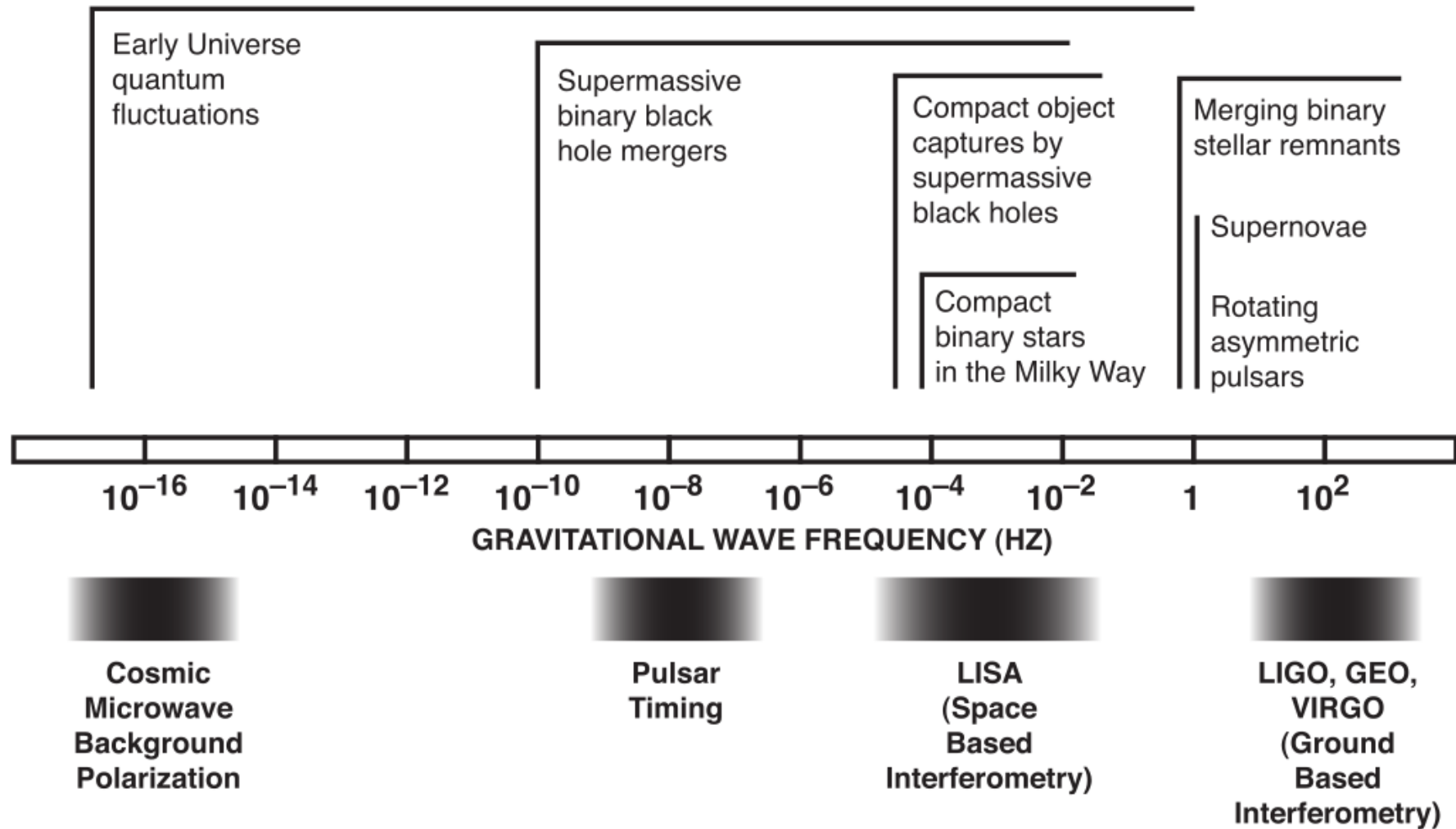
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Links

- Cornish and Robson, <https://arxiv.org/abs/1803.01944>
- aa

Backup

Gravitational Wave Spectrum



Strain from Exoplanets

Exoplanets RMS summed and LISA/eLISA Strain, 10 years strain

