

Do pulsar timing arrays observe a dark sector phase transition?



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Fitting NANOGrav with a phase transition

Multiple pulsar timing arrays recently found a stochastic gravitational wave background, whose dominant source is believed to be myriad inspiraling supermassive black holes. The underlying astrophysics is uncertain and does not match the data very well: The observed GW signal is one to two orders of magnitude too high.

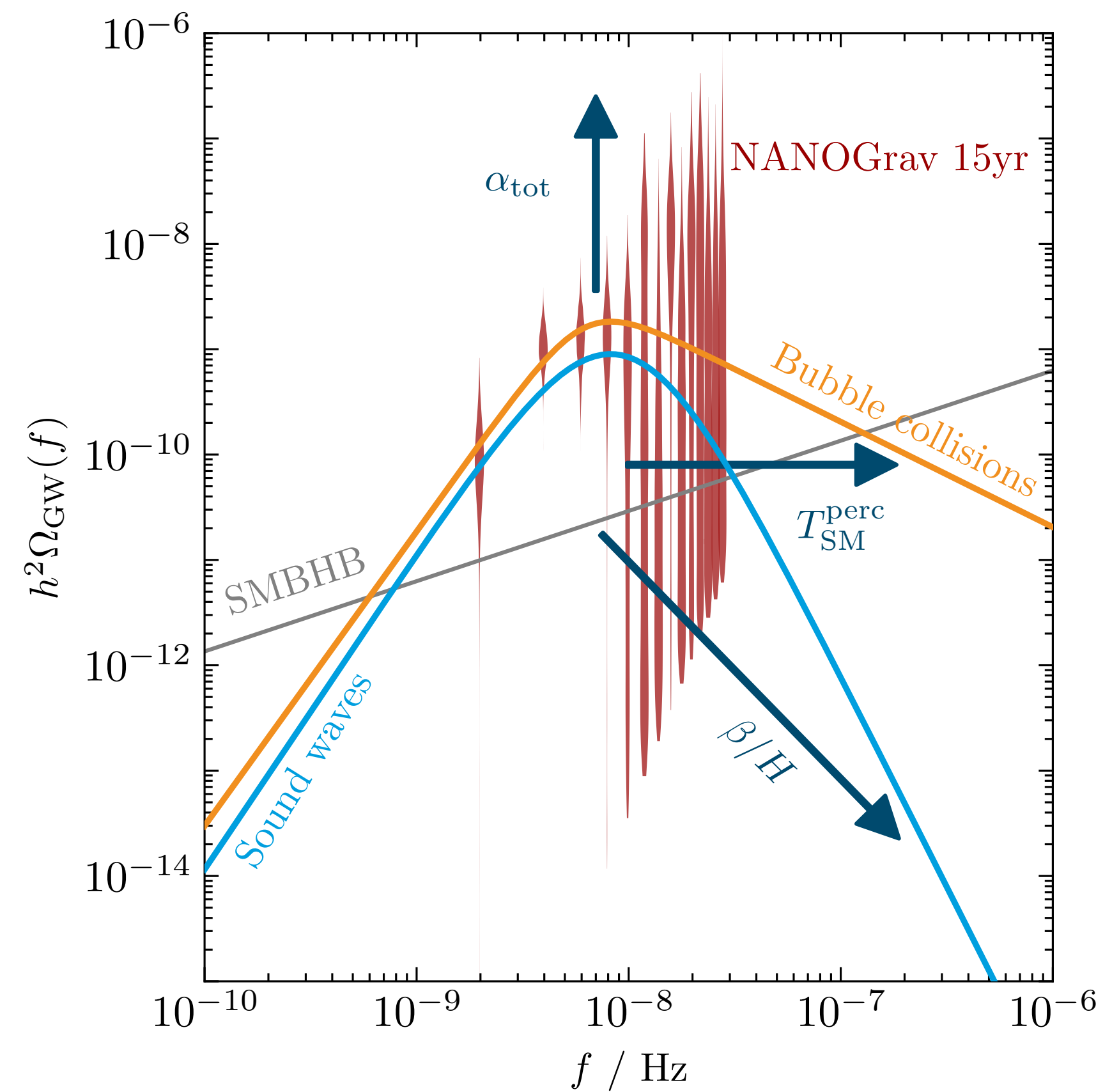
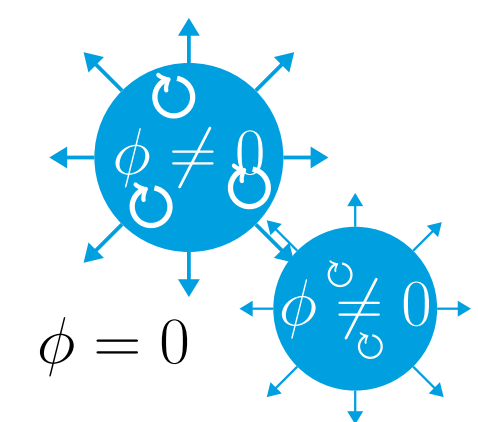


Figure 1. Two example spectra for fitting the NANOGrav 15 yr data together with arrows indicating how an increased phase transition strength α , speed β/H and percolation temperature T_{perc} affect the signal prediction.



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Constraints

This block catches your eye, so **important stuff** should probably go here.

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- **In euismod erat metus** non ex. Vestibulum luctus augue in mi condimentum, at sollicitudin lorem viverra.
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Performing a global fit

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$$\mathcal{L}_{\text{glob}}(\vec{\theta}_{\text{PSR}}, \vec{\theta}_{\text{PT}}) = \mathcal{L}_{\text{PTA}}(\vec{\theta}_{\text{PSR}}, \vec{\theta}_{\text{PT}}) \times \mathcal{L}_{\text{cosmo}}(\Delta N_{\text{eff}}(\vec{\theta}_{\text{PT}}))$$

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A heading inside a block

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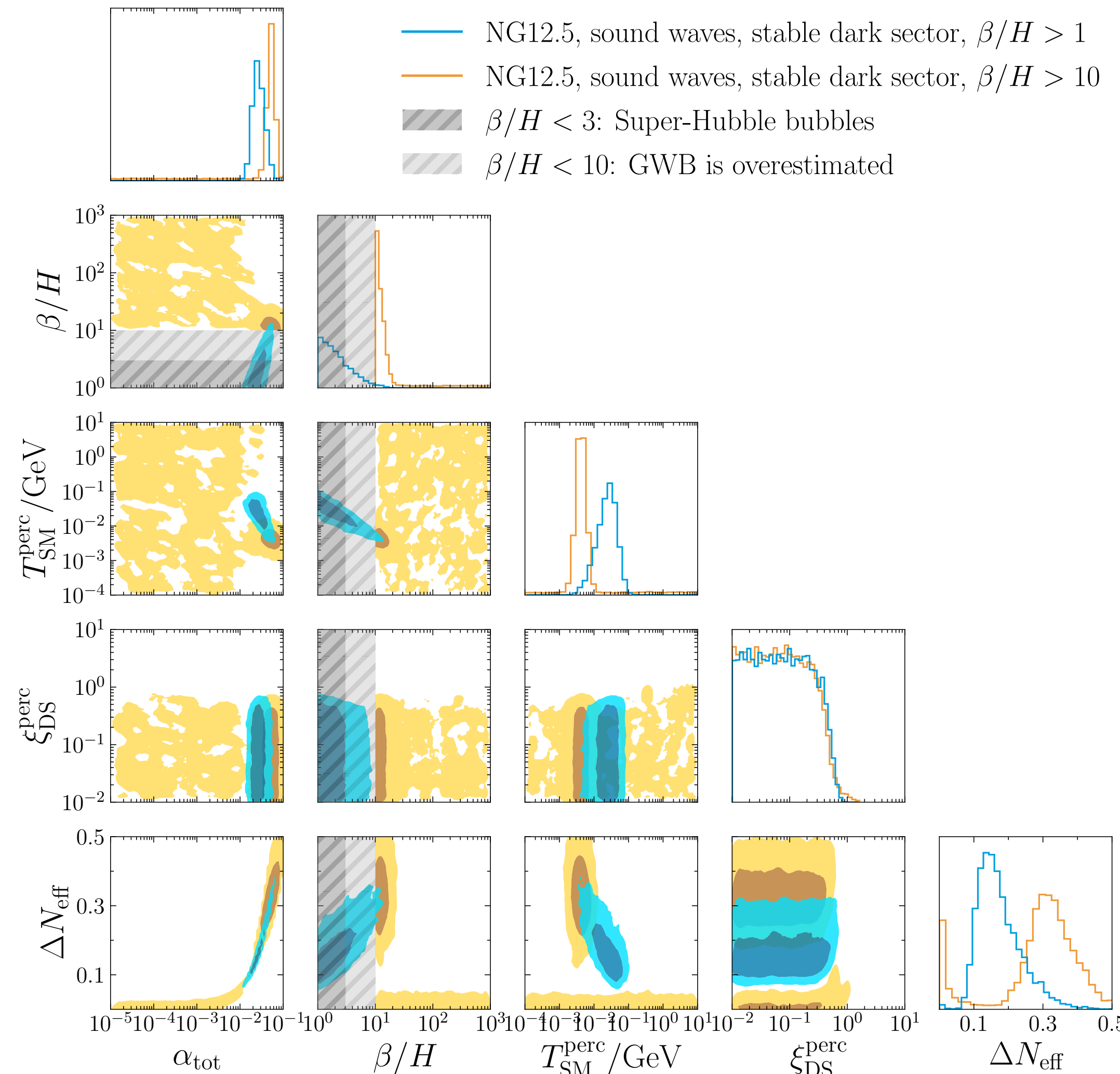


Figure 2. Caption

A block containing an enumerated list

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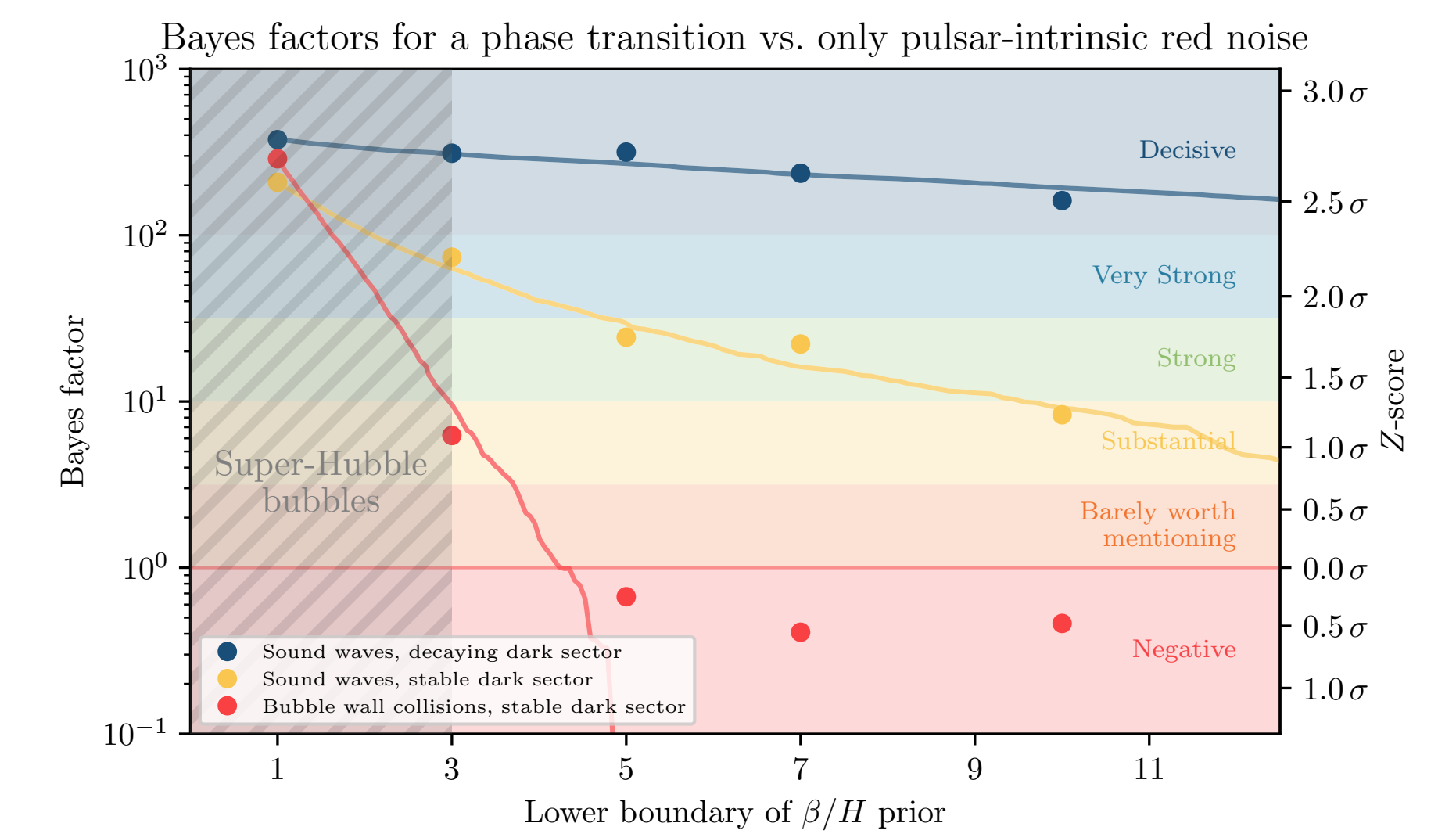


Figure 3. Caption

Donec quis posuere ligula. Nunc feugiat elit a mi malesuada consequat. Sed imperdiet augue ac nibh aliquet tristique.

References

- [1] P. F. Depta, K. Schmidt-Hoberg, P. Schwaller, and C. Tasillo, "Do pulsar timing arrays observe merging primordial black holes?," 6 2023.
- [2] T. Bringmann, P. F. Depta, T. Konstandin, K. Schmidt-Hoberg, and C. Tasillo, "Does NANOGrav observe a dark sector phase transition?," 6 2023.