

# Limits on the Number of Spacetime Dimensions From GWTC-2 Observations

KRIS PARDO<sup>1</sup> AND WILL M. FARR<sup>2,3</sup>

<sup>1</sup>*Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91101, USA*

<sup>2</sup>*Center for Computational Astrophysics, Flatiron Institute, New York NY 10010, USA*

<sup>3</sup>*Department of Physics and Astronomy, Stony Brook University, Stony Brook NY 11794, USA*

## ABSTRACT

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.



## 1. INTRODUCTION

Gravitational waves provide us with important tests of general relativity and cosmology. LIGO etc.

GW170817 limits and tests of extra dims and gravity leakage. (Pardo et al. 2018) (Pardo 2018, Lagos 2019, LIGO paper, Linder papers).

Although there have not yet been more GW events observed electromagnetically, the observed BBH event distribution can be used to place interesting cosmological bounds. Cite some other examples.

In particular, the mass function can be used to infer the redshifts of sources. Cite Farr et al 2019.

[kpardo@caltech.edu](mailto:kpardo@caltech.edu)

[wfarr@flatironinstitute.org](mailto:wfarr@flatironinstitute.org)

[will.farr@stonybrook.edu](mailto:will.farr@stonybrook.edu)

In this paper, we show how to use the PISN feature in the mass function to constrain gravitational leakage.

## 2. THEORETICAL FRAMEWORK

Gravitational leakage basics (EM distance vs GW distance)

Discuss the different models: graviton decay, extra dims (with screening), and Horndeski  $\alpha_M$ .

Overview of PISN theory?

### 2.1. *Statistical Formalism*

## 3. DATA ANALYSIS

## 4. RESULTS & DISCUSSION

## REFERENCES

Pardo, K., Fishbach, M., Holz, D. E., &  
Spergel, D. N. 2018, JCAP, 2018, 048,  
doi: [10.1088/1475-7516/2018/07/048](https://doi.org/10.1088/1475-7516/2018/07/048)