

# Explainable Deep-learning: Monte Carlo methods for Gravitational-Wave Inference

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My 250 word abstract goes here...

## I. INTRODUCTION

**Figs: LIGO Cumulative events**

**Figs: Hunter's Vit Schematic**

Remember to signpost rest of paper at end of this section!

### A. VITAMIN: User-Friendly Inference

## II. THEORETICAL FRAMEWORK

Don't apply it to our situation at this stage, just straight theory and equations (Section III deals with taking these eqns and applying them to our situation)

### A. Monte Carlo Framework

### B. SIR Framework

Do theory on normal IS and then say that SIR is an monte carlo approach/approx to normal IS then give equations for bot (talk about the NEW IMPROVED SIR method (link to Section V))

## III. METHODOLOGY

### A. Model Training

**Figs: loss plot, training hypers in table**

**Figs: initial corner plot? (to talk about params and how posteriors aren't perfect)**

### B. Likelihood Estimates

**Figs: Monte flowchart**

### C. Importance Resampling

## IV. RESULTS

### A. Self-consistency

### B. Reproducibility

### C. Importance Resampling

**Figs: Final corner plot (big)**

## V. FUTURE WORK

As we find ourself in a proof-of-concept mode, there is justification of a section dedicated to the next steps leading towards production of this code.

## VI. CONCLUSIONS

This is section has to encapsulate everything we did so that after the abstract a reader can go here and see if they want to buy the paper or not!

## VII. ACKNOWLEDGEMENTS

Thanks to Chris and Hunter and Michael and Daniel. Paragraph on the software used BILBY [1]

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- [1] G. Ashton, M. Huebner, P. D. Lasky, Colm Talbot, K. Ackley, Sylvia Biscoveanu, Q. Chu, A. Divarkala, P. J. Easter, Boris Goncharov, et al., *Astrophys. J. Supp.* **241**, 27 (2019).