

NOFA

UNLV



MUSES MEETING 2023 - CARL HASTER

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LIGO + MUSES

**WHAT SHOULD WE EXPECT FROM LIGO  
AND HOW CAN MUSES BE USEFUL?**

# STATUS UPDATE + WISHLIST

WHAT SHOULD WE EXPECT FROM LIGO  
AND HOW CAN MUSCLE BE USEFUL?

## BNS RANGE

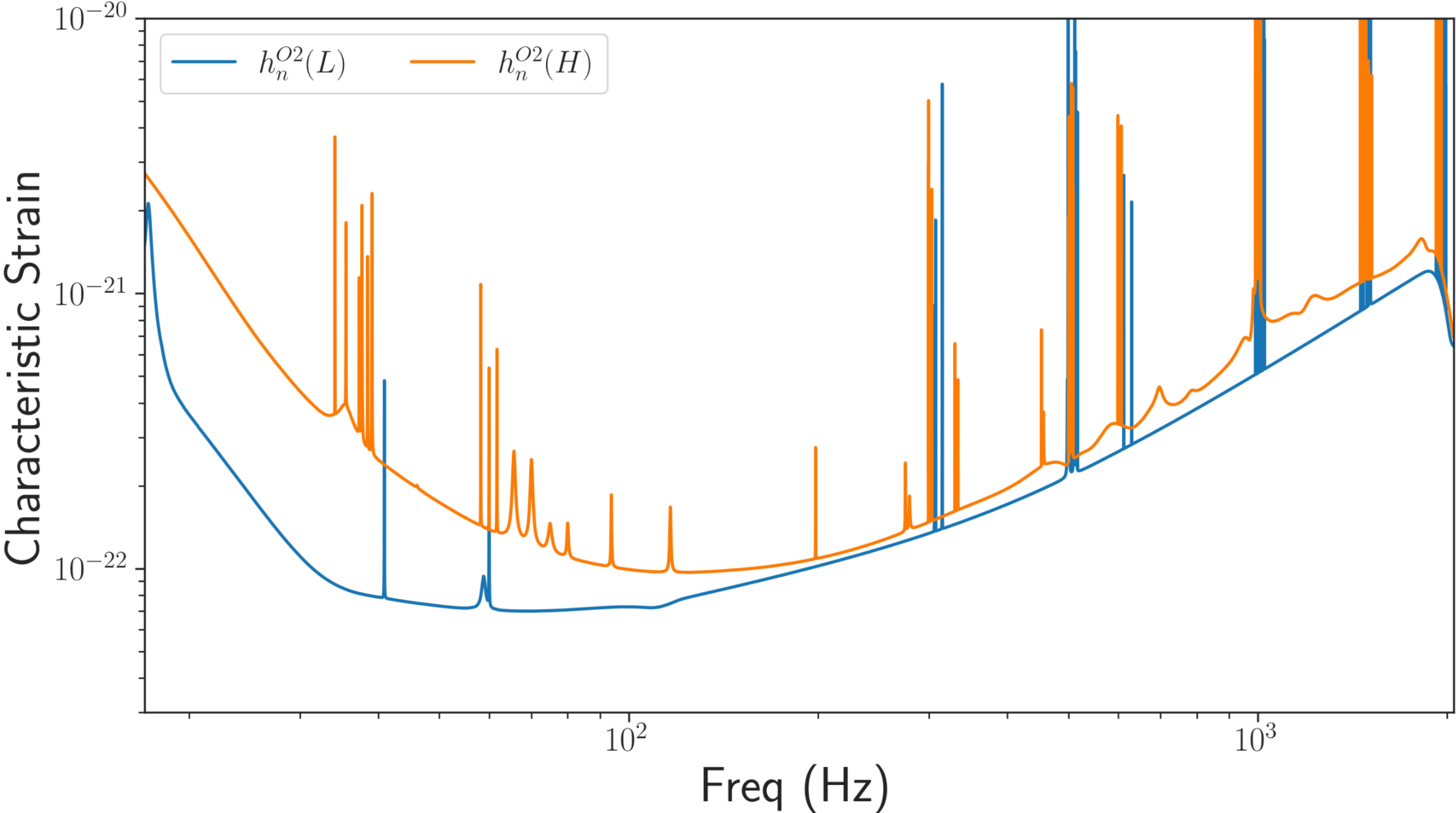
- ▶ O2
  - ▶ 70-110 Mpc
- ▶ O3
  - ▶ 110-140 Mpc
  - ▶ 2-4 increase in volume wrt O2
- ▶ O4
  - ▶ ~160Mpc
  - ▶ 1.5-3 increase in volume wrt O3



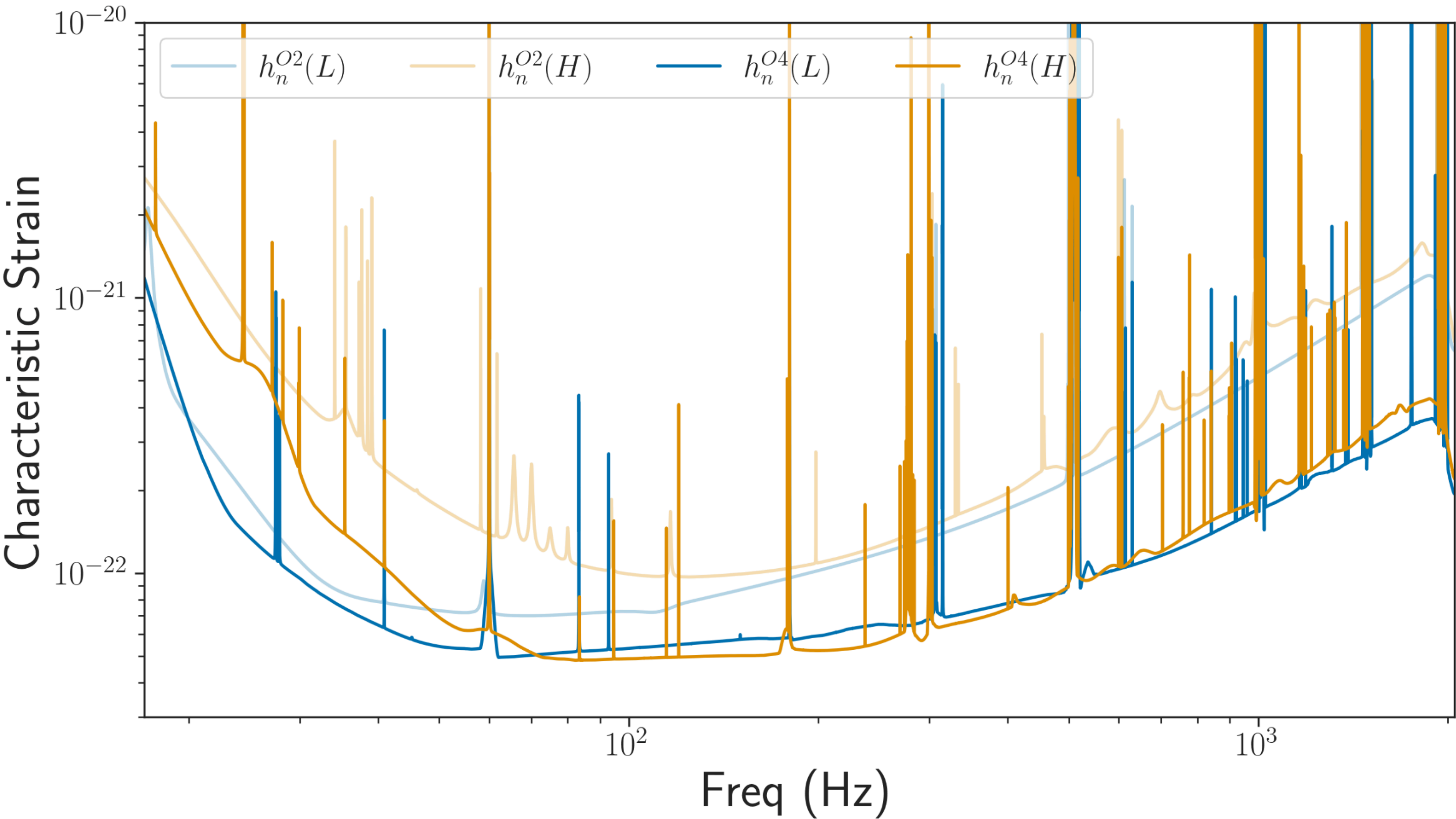
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- ▶ 1 thing with NSs
- ▶ 3-4 things with NSs
- ▶  $O(10)$  things with NSs

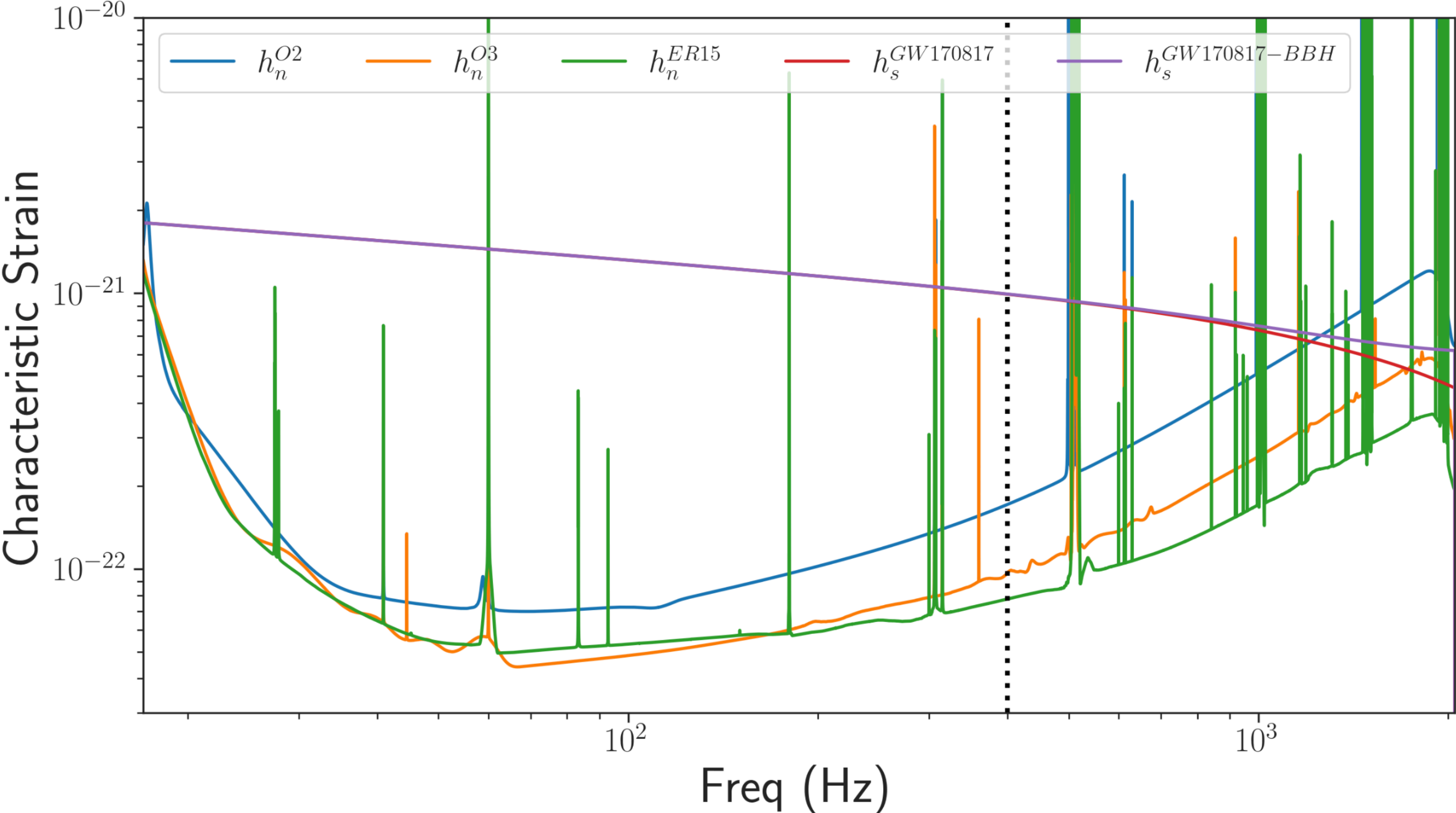
# LIGO SENSITIVITY



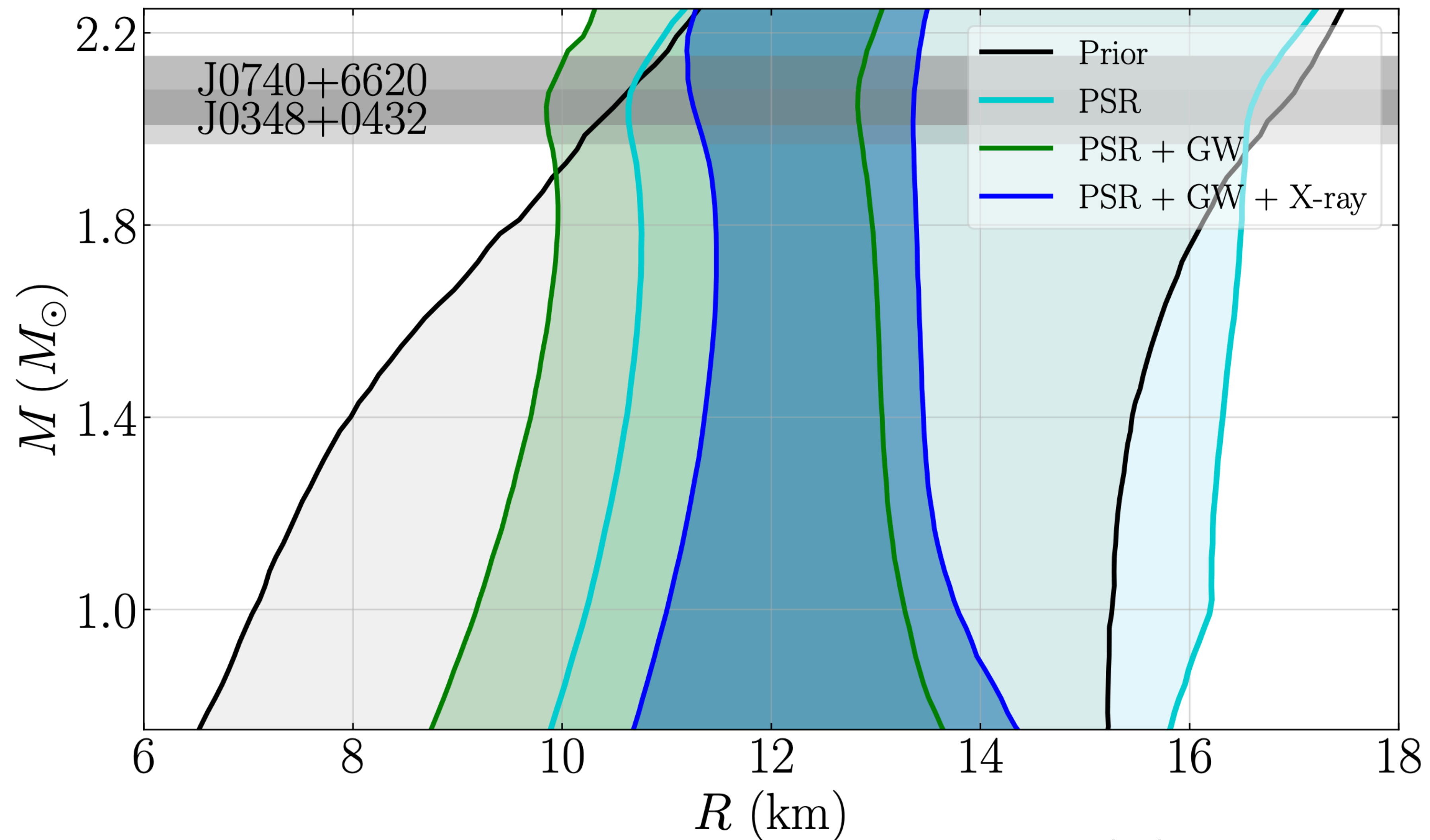
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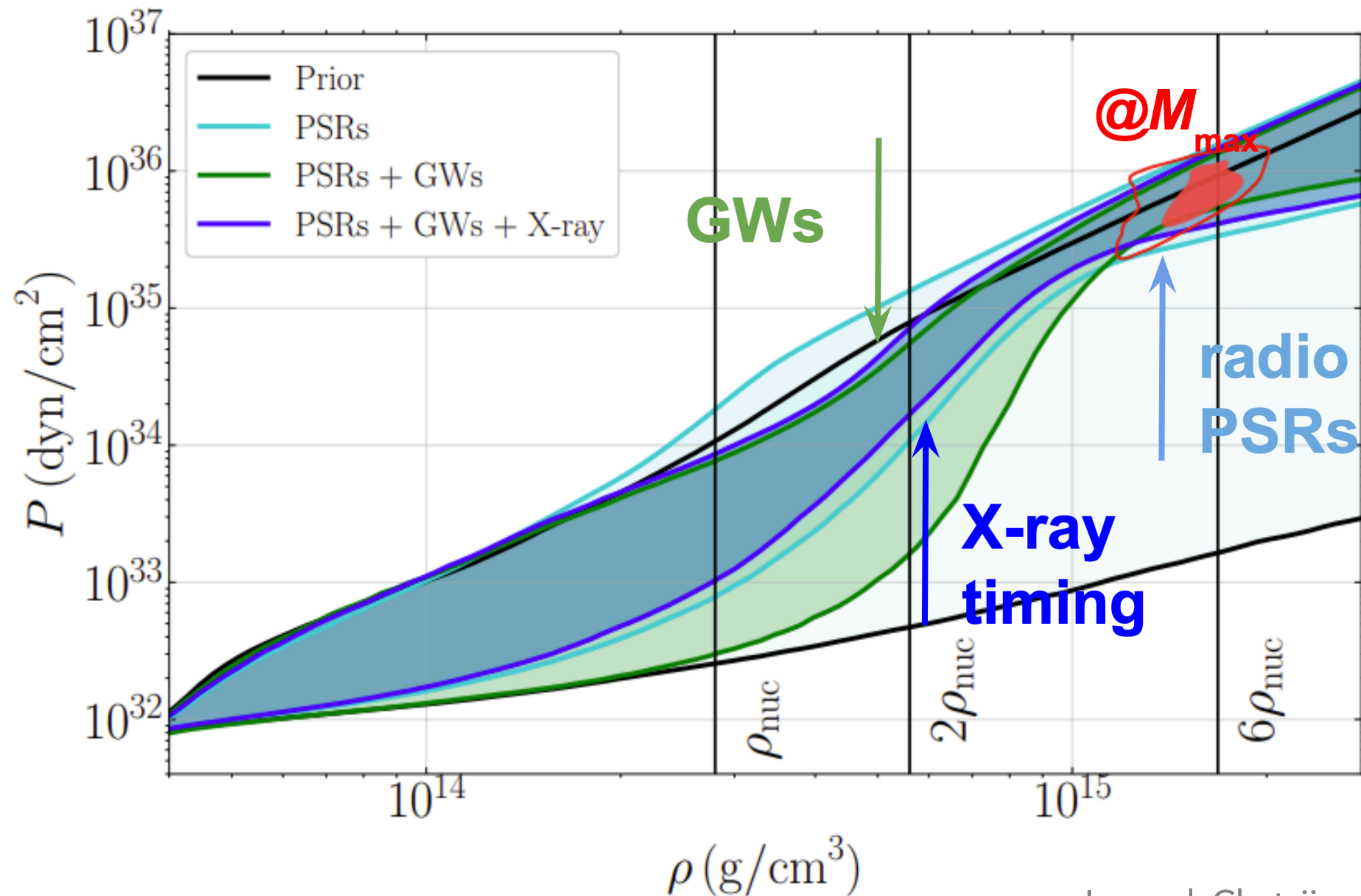


# CURRENT ASTRO CONSTRAINTS ON HIGH-DENSITY, COLD EOS

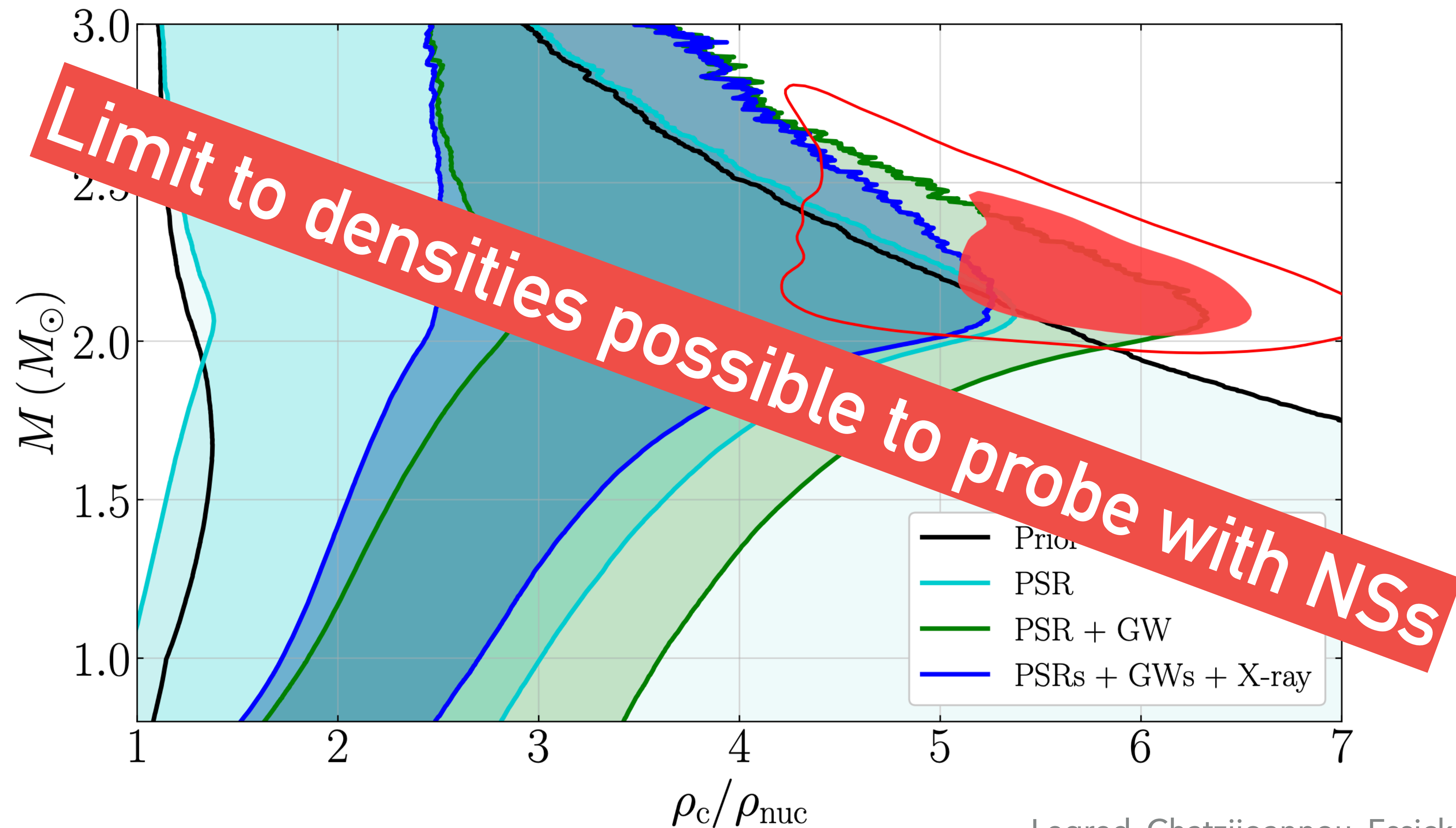




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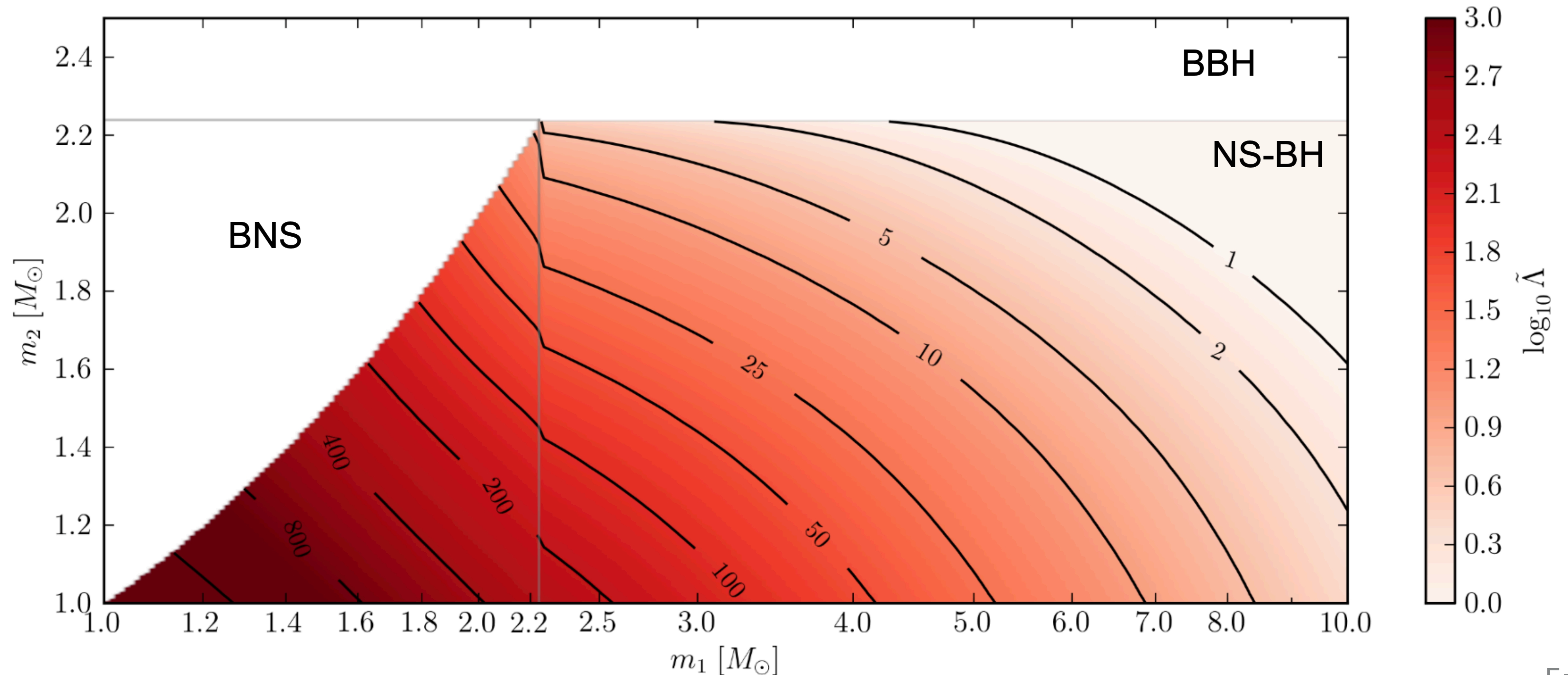


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# MEASURING $\Lambda$ (MASS)

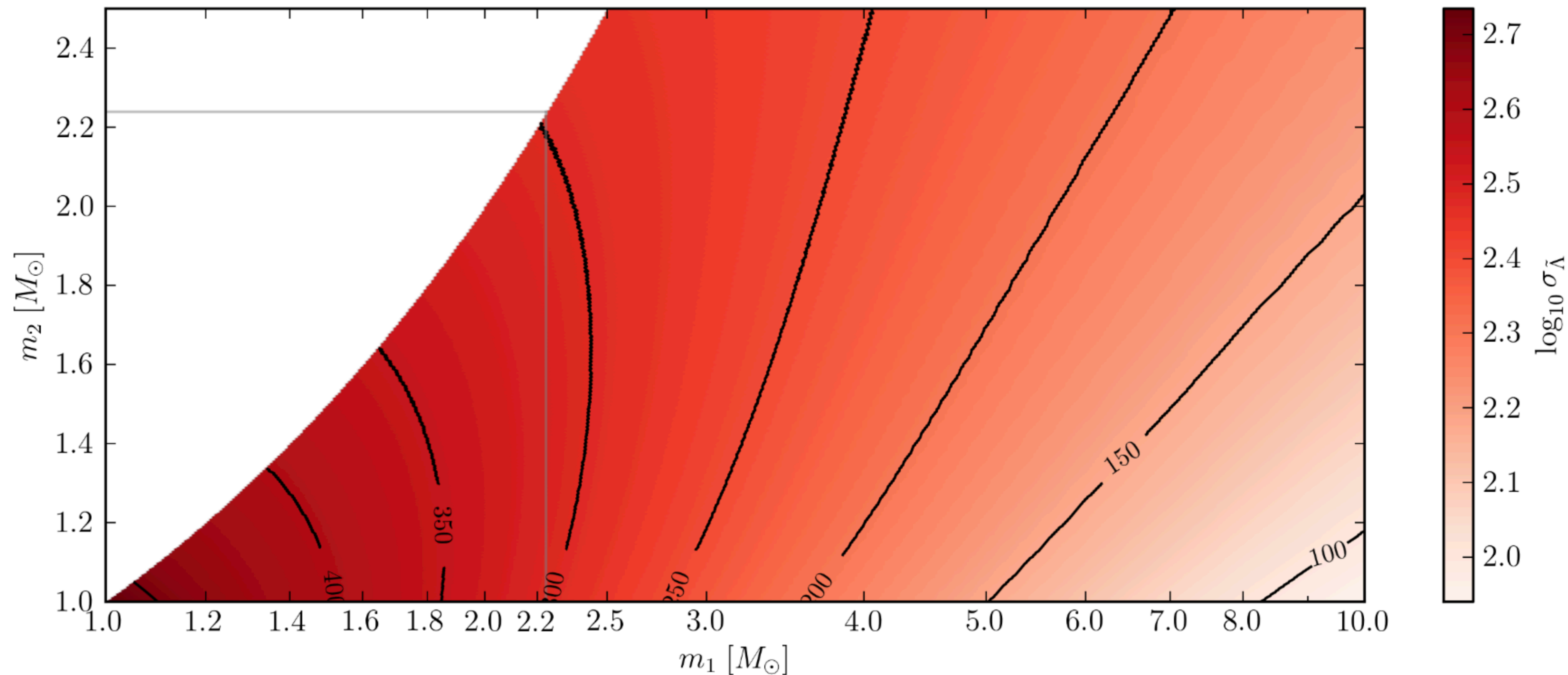
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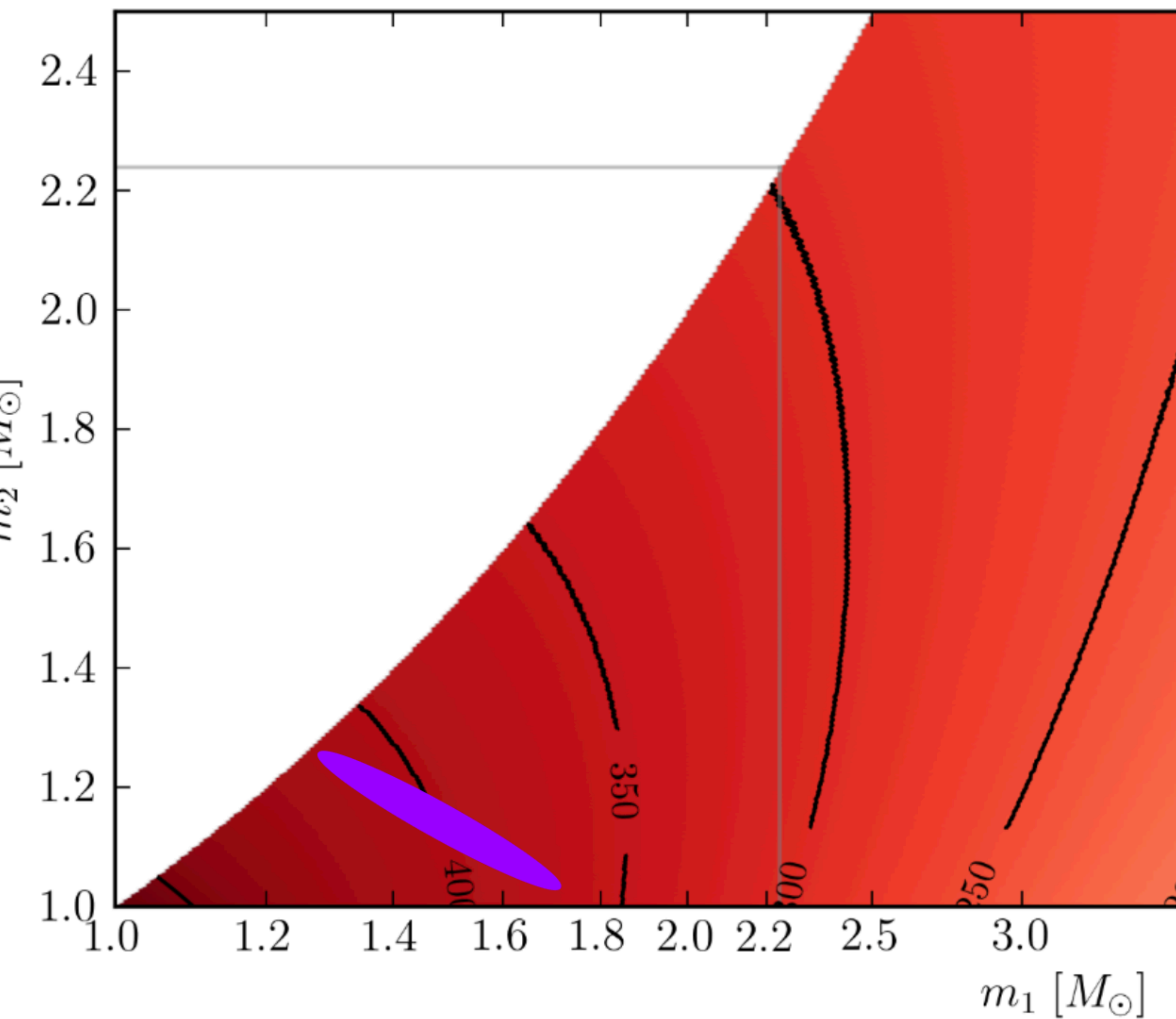


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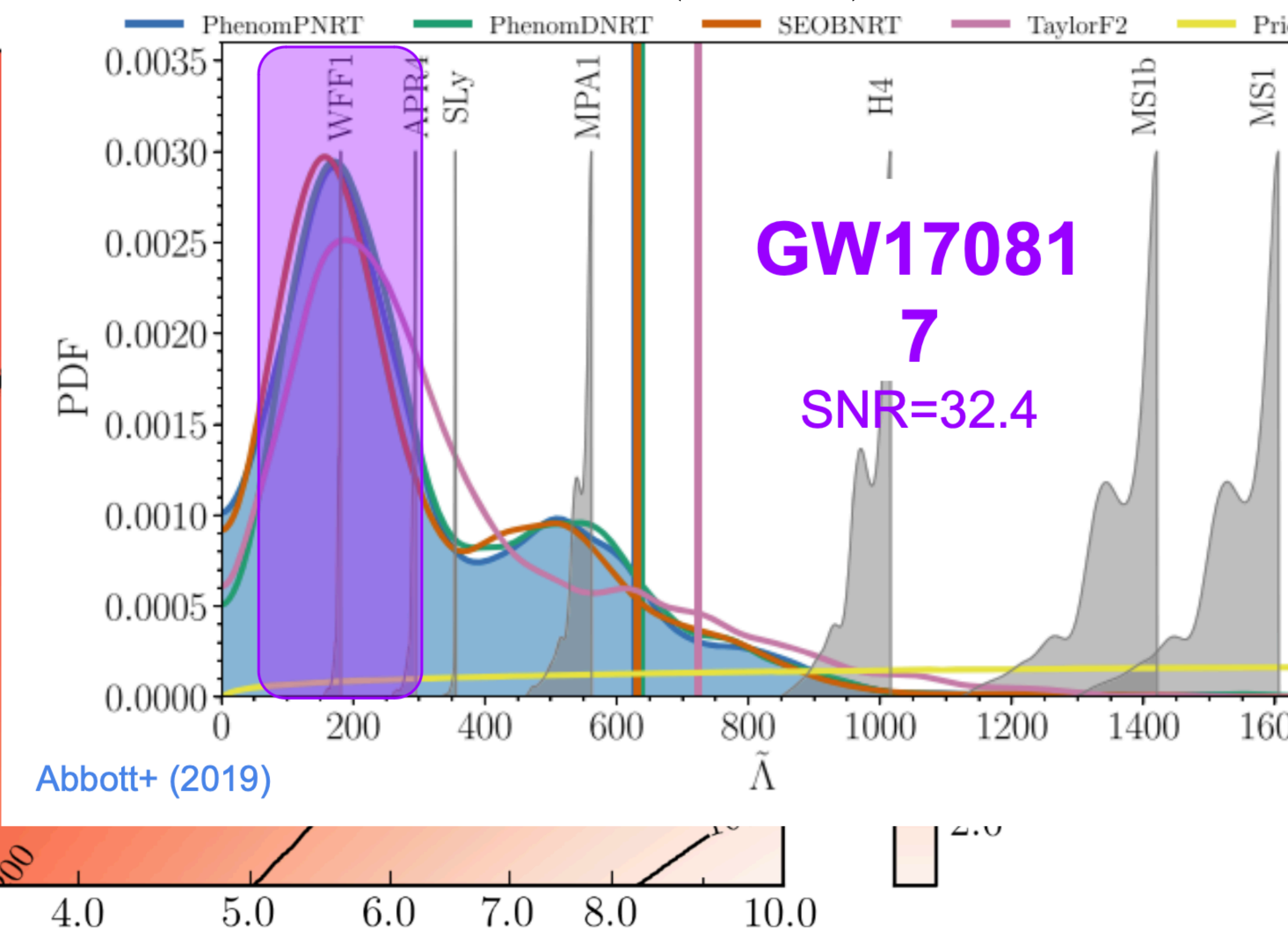
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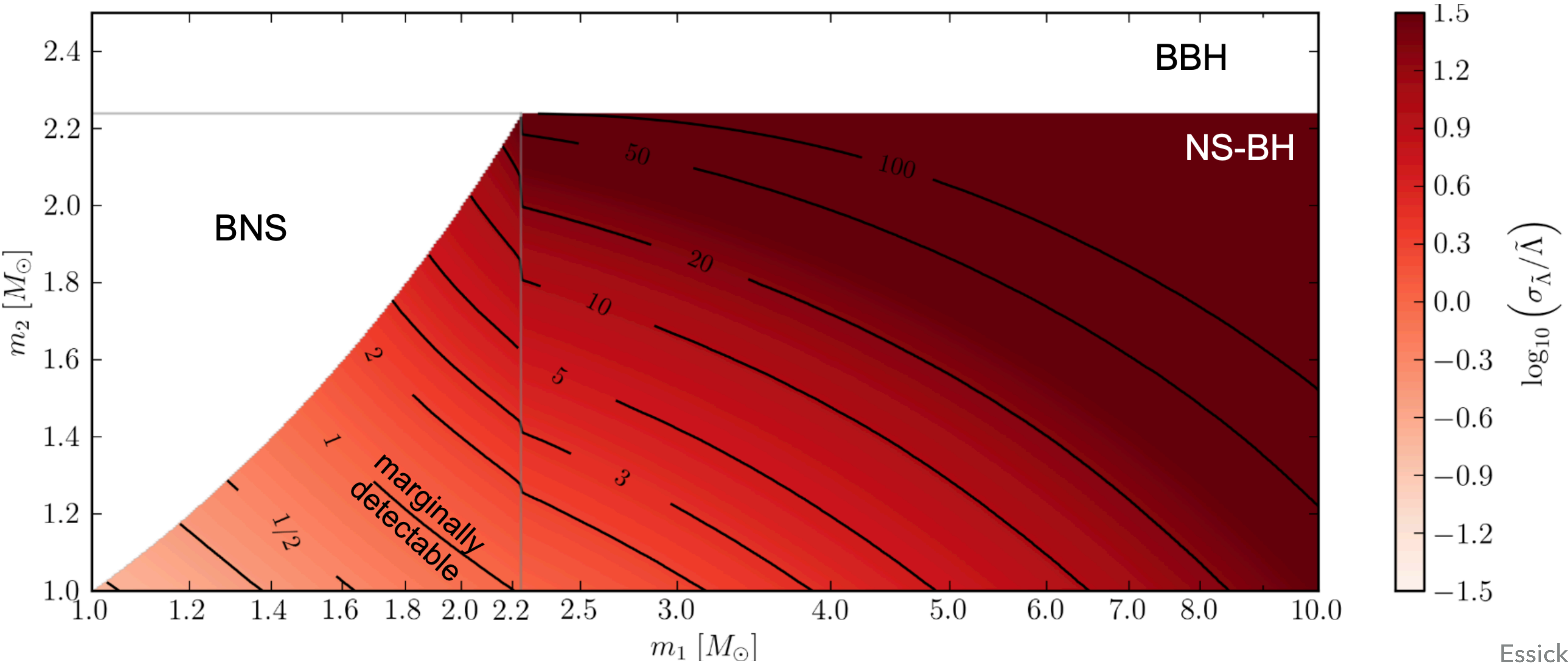
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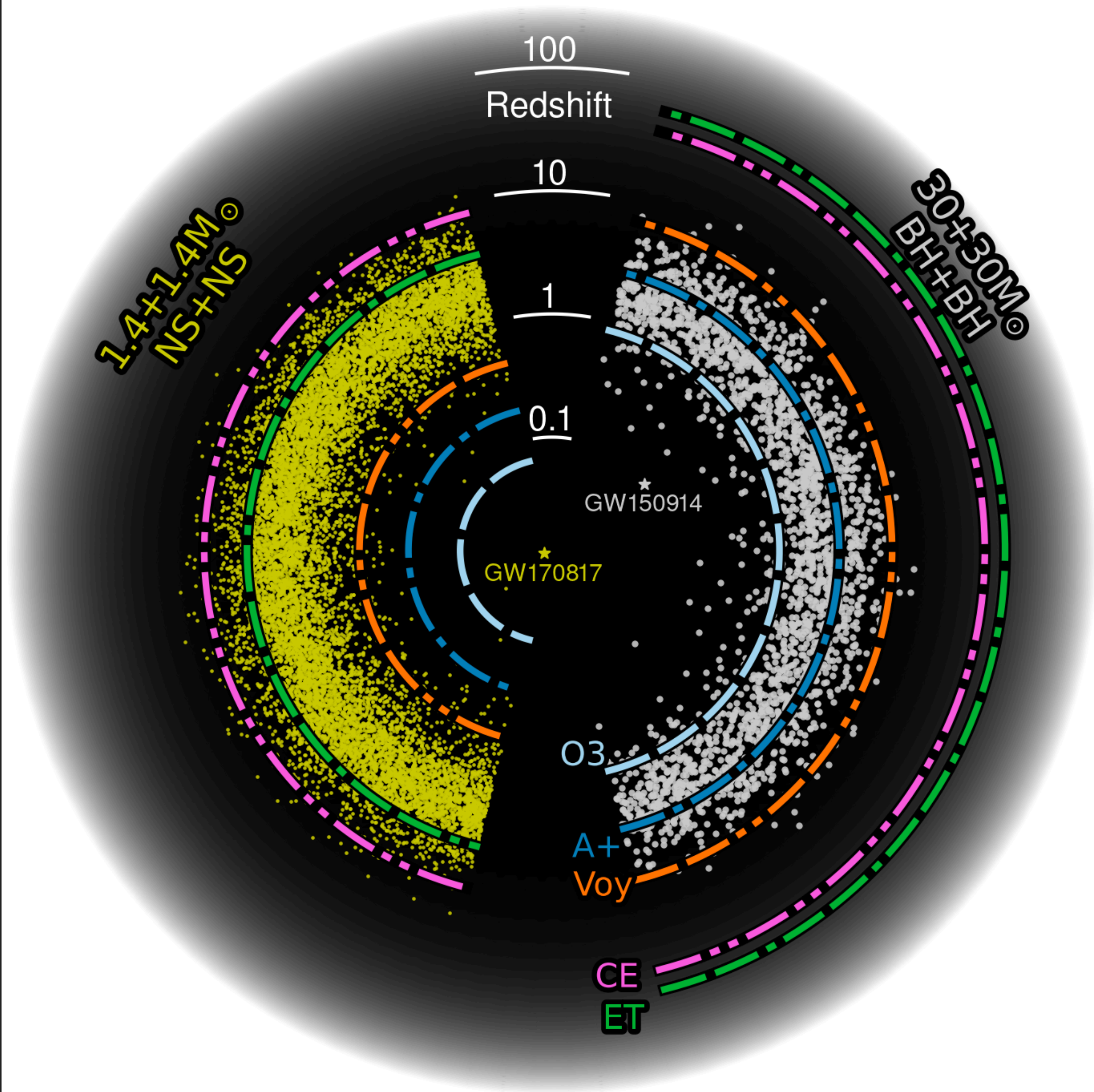


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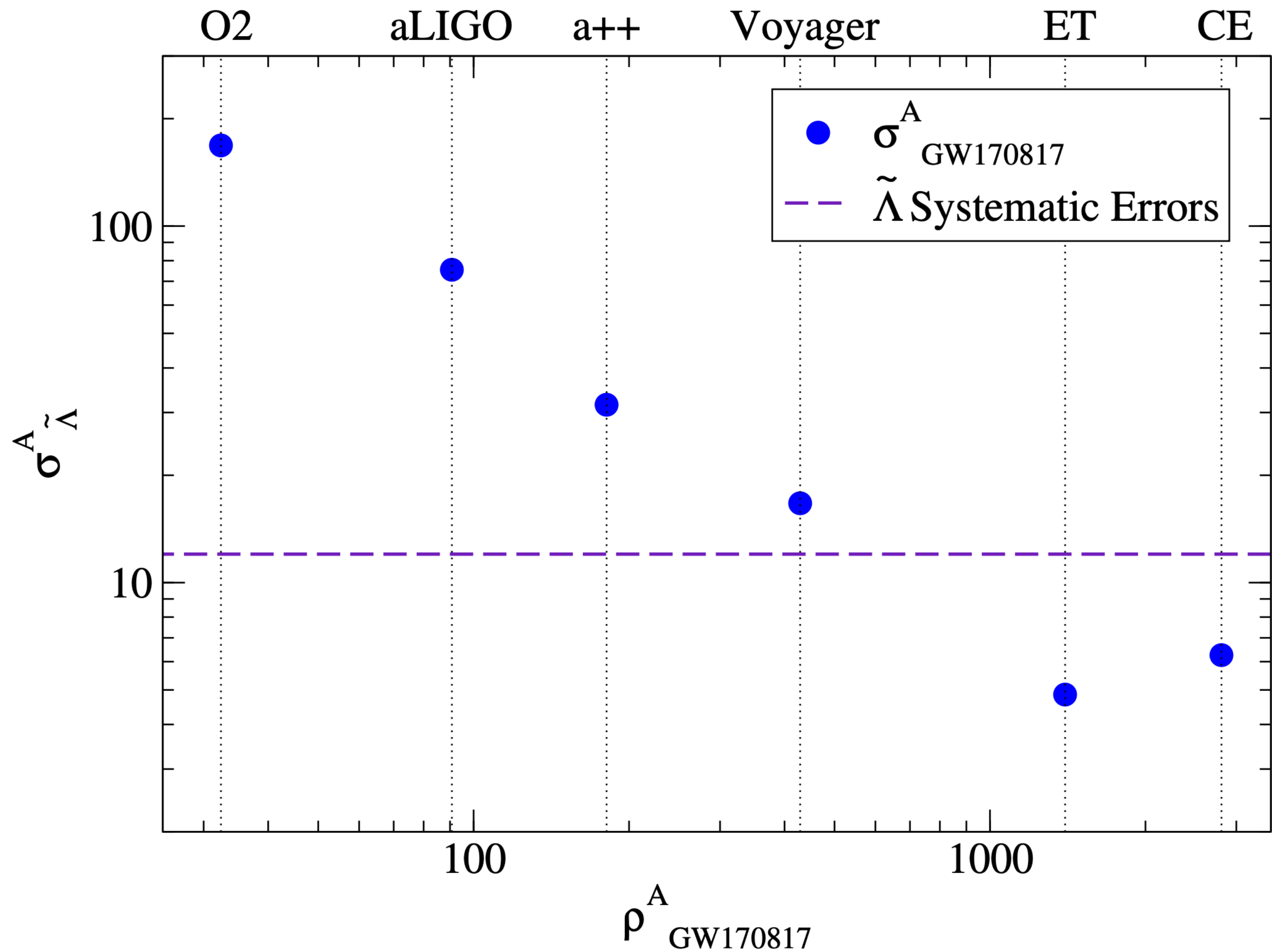




THE FUTURE

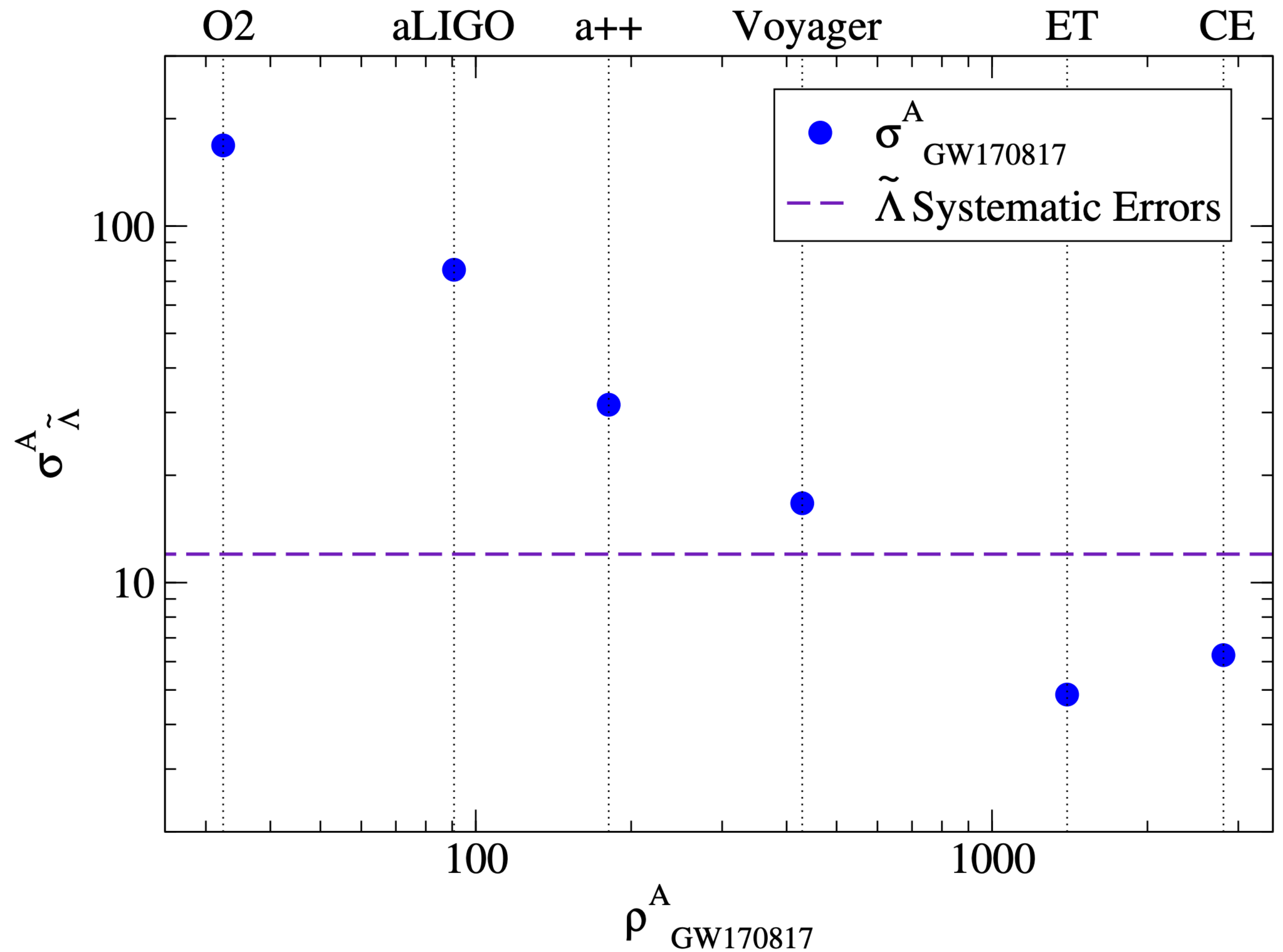
ALL THE  
NEUTRON STARS

WORRY ABOUT SYSTEMATICS



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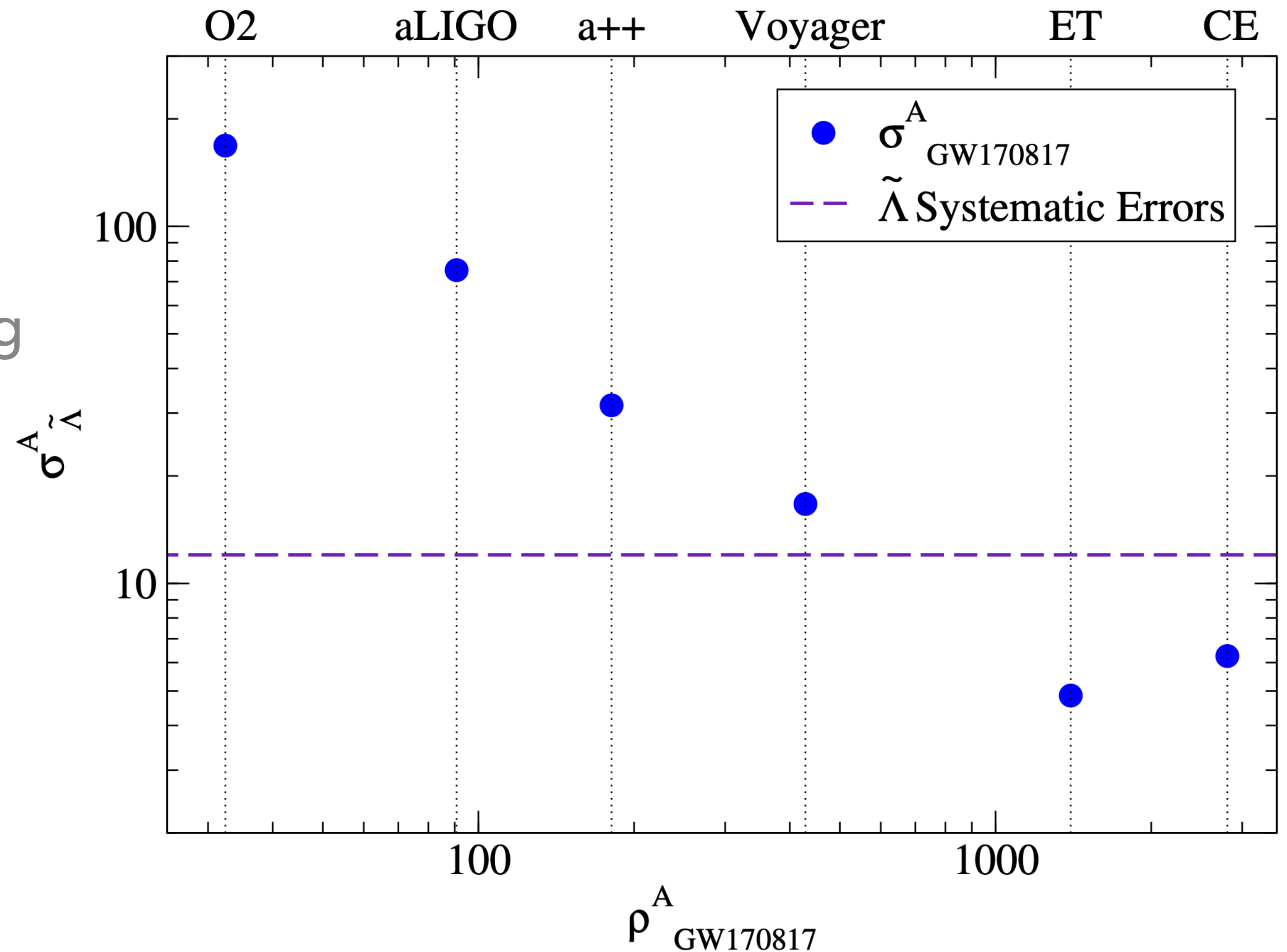
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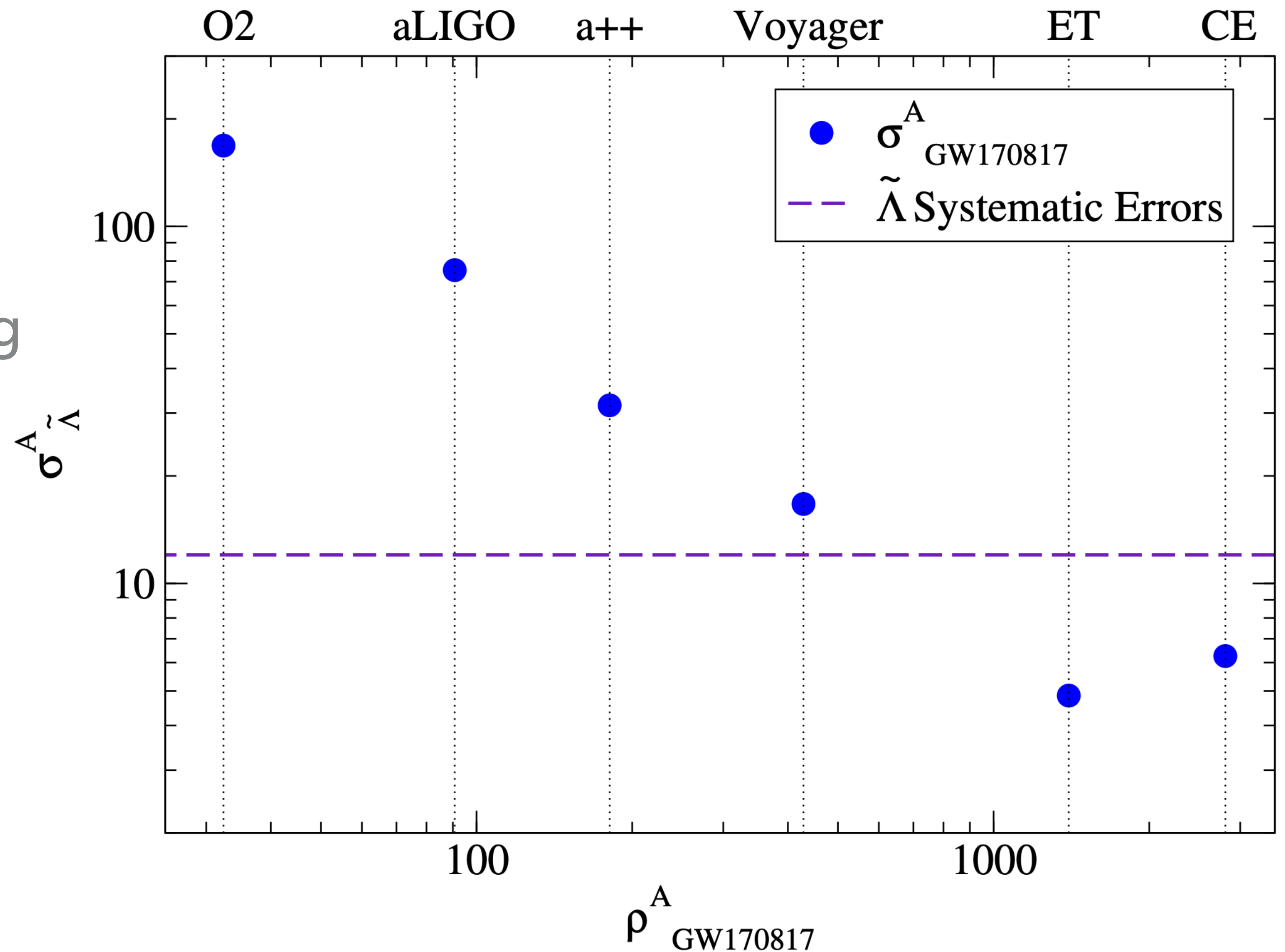
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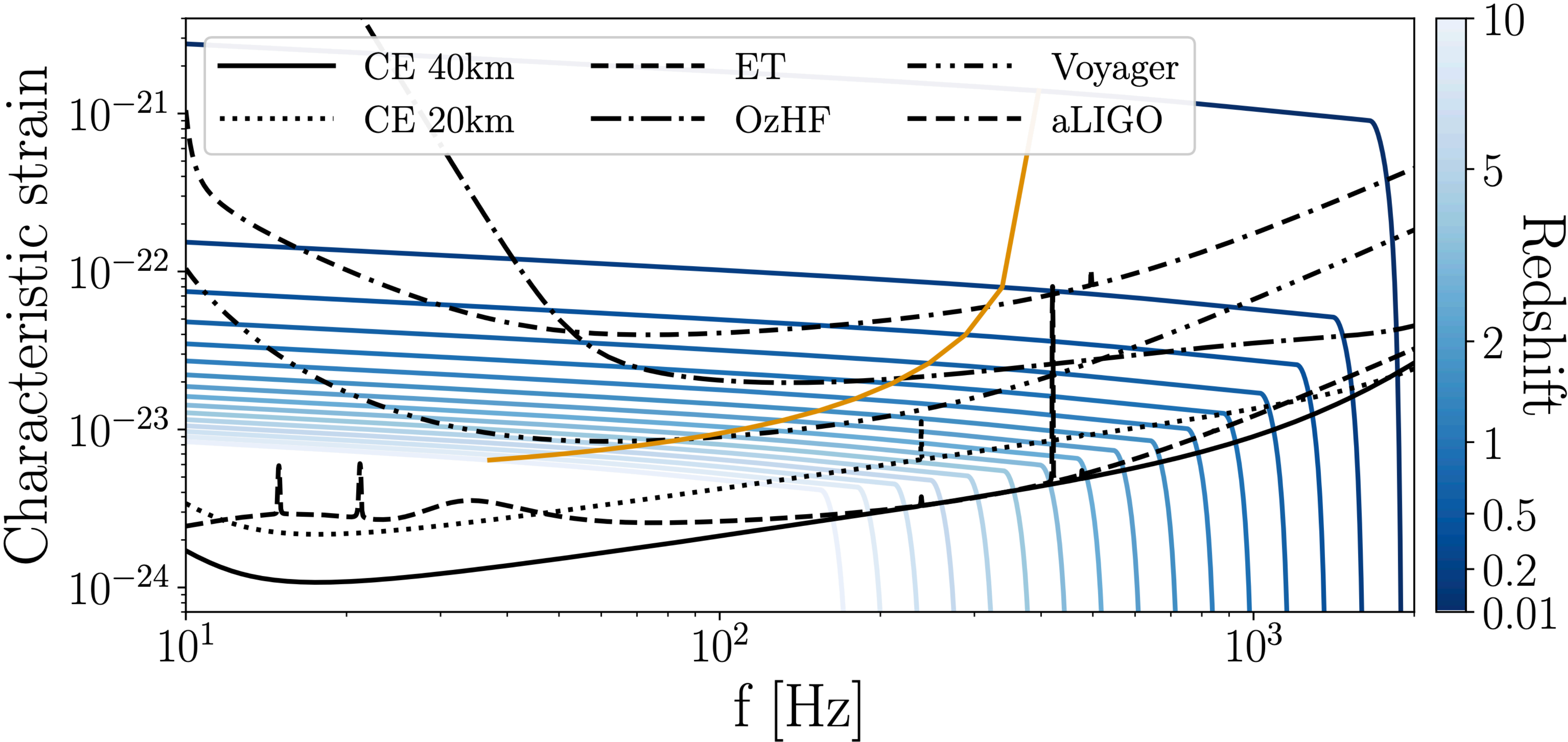
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- ▶ Systematics in waveforms

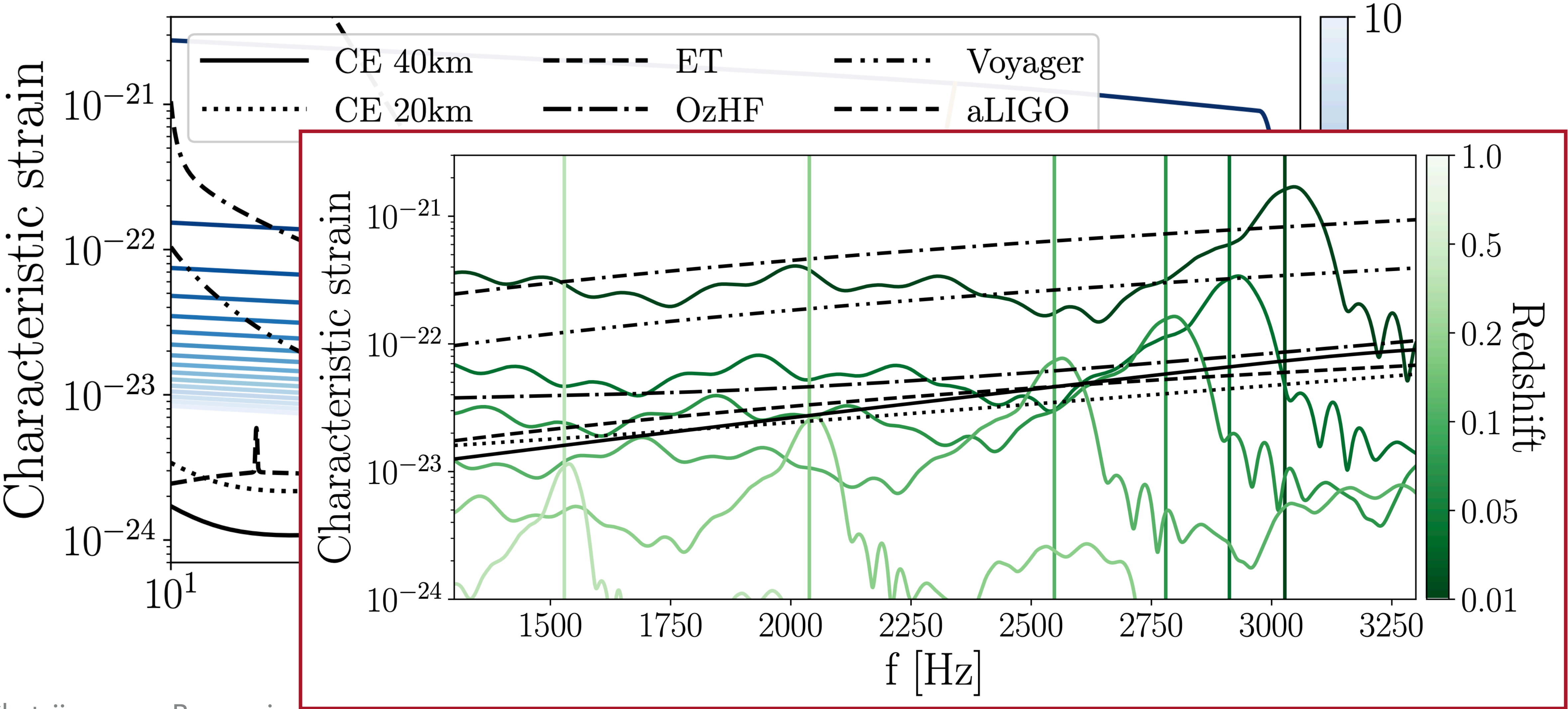




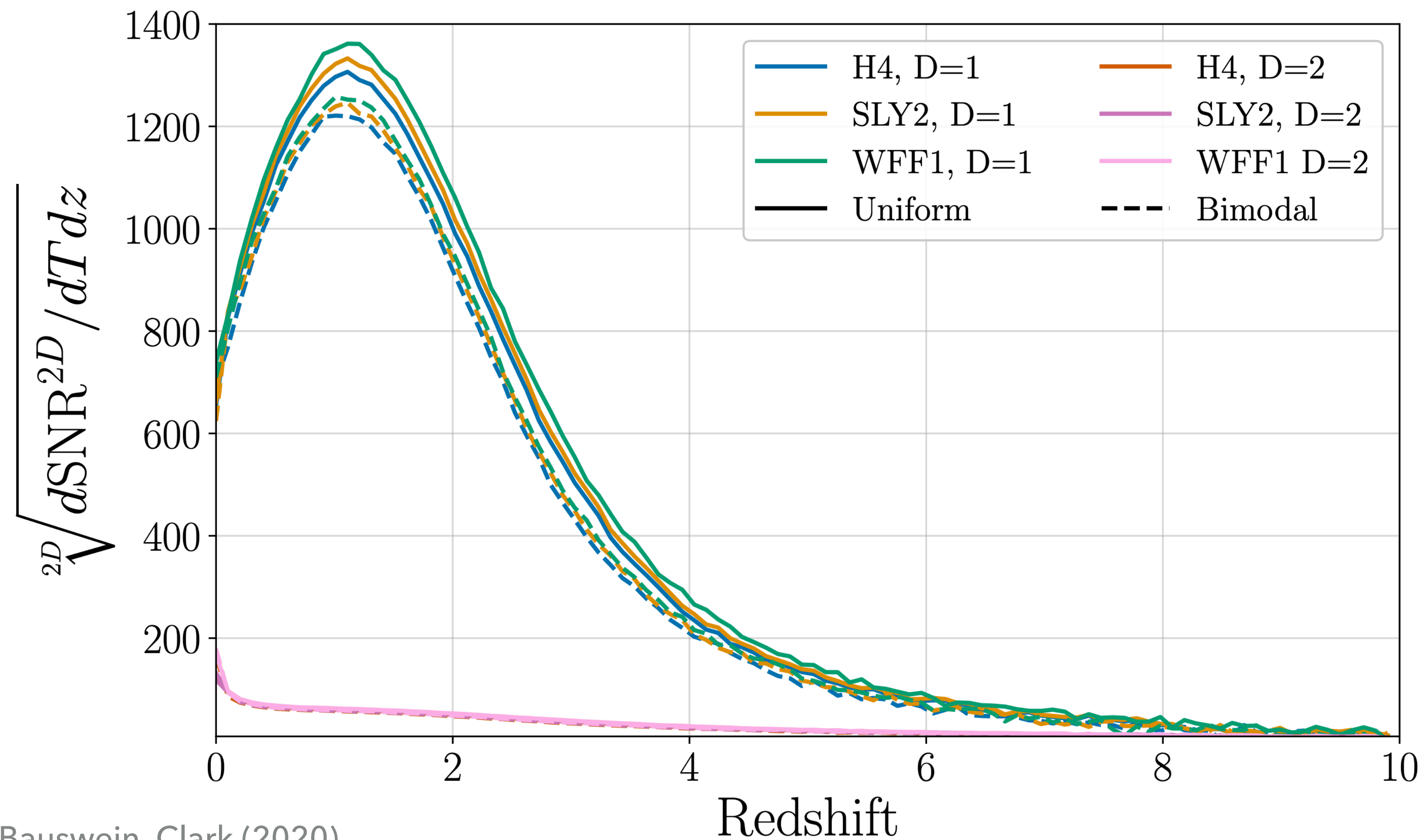
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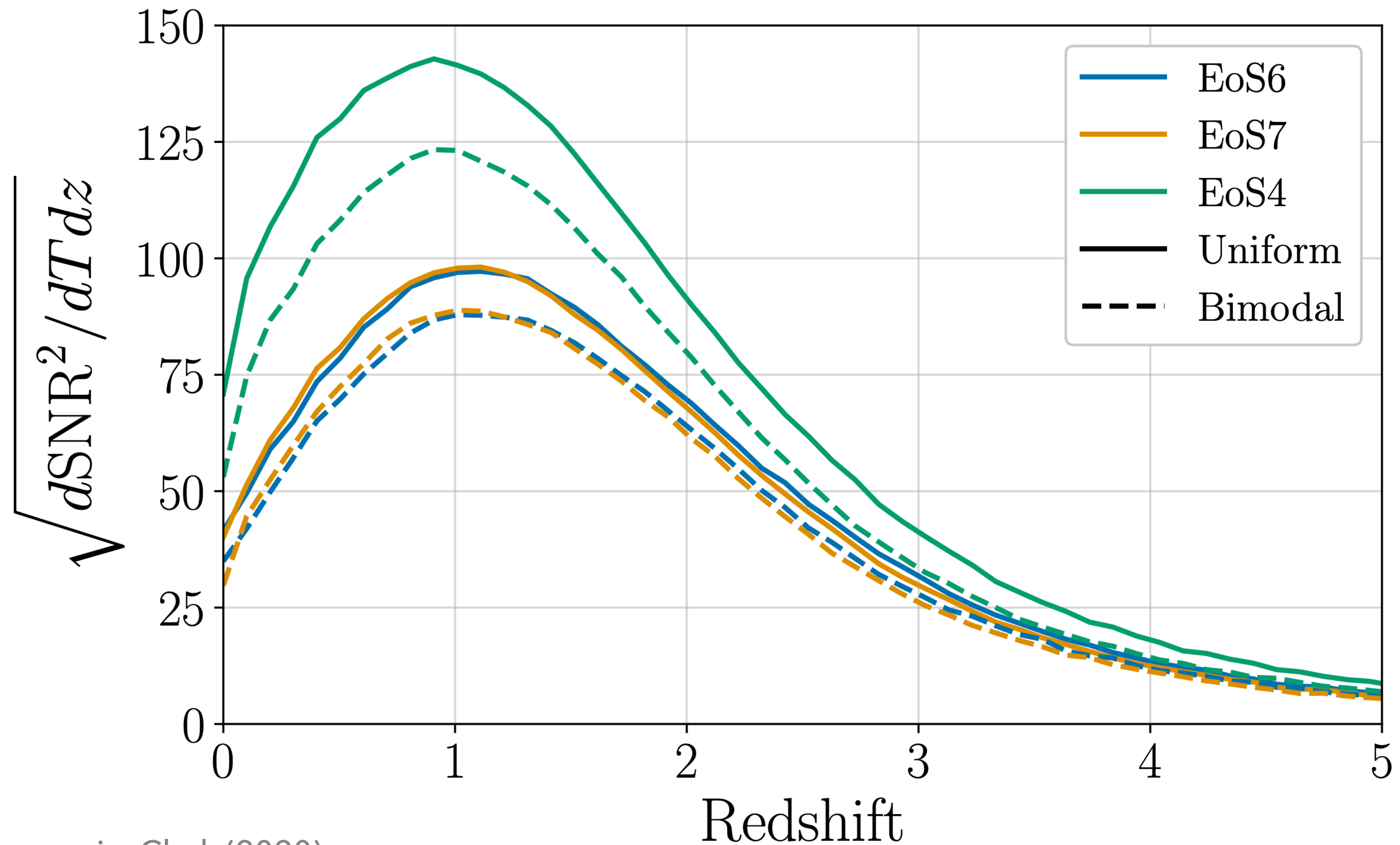


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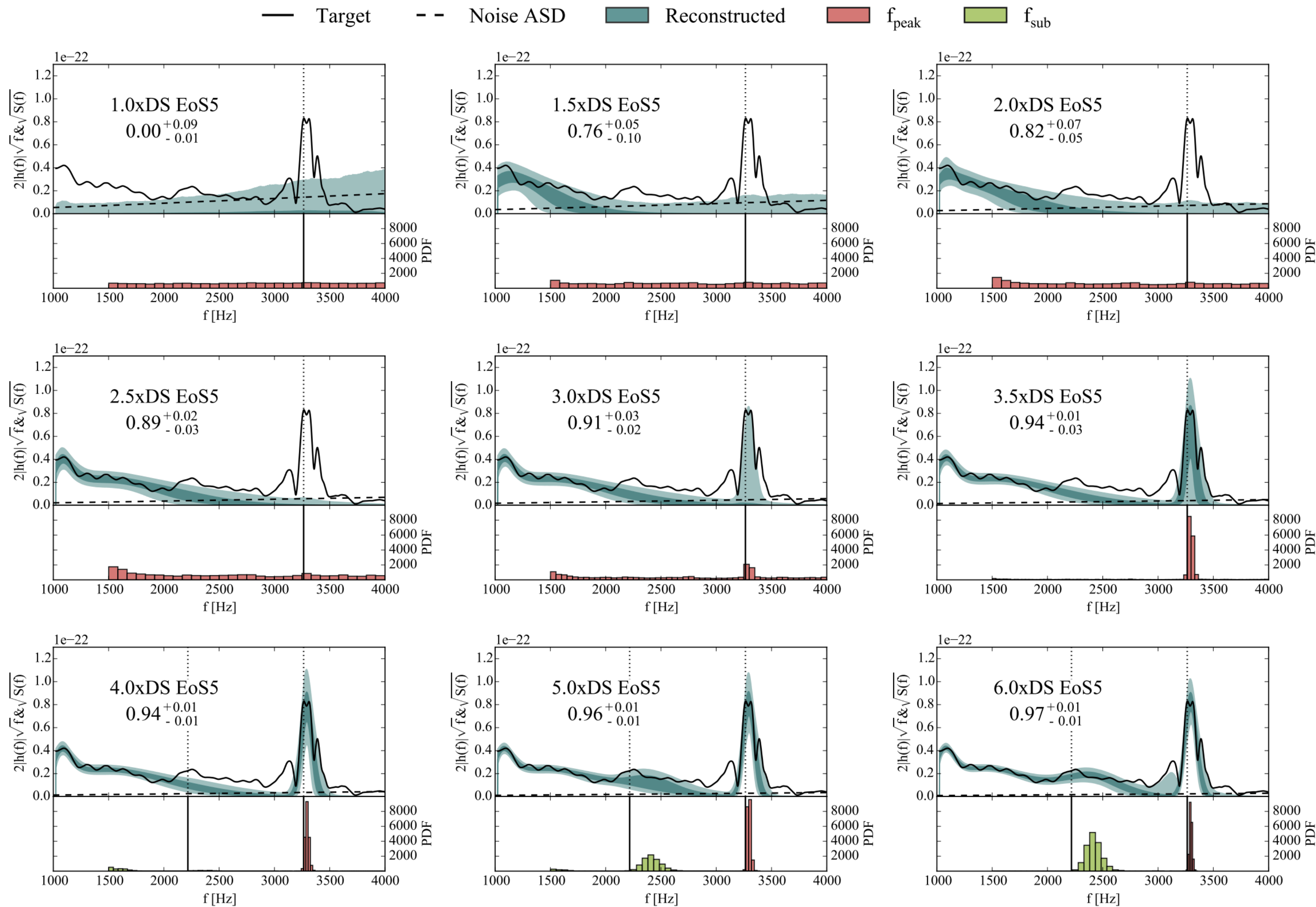




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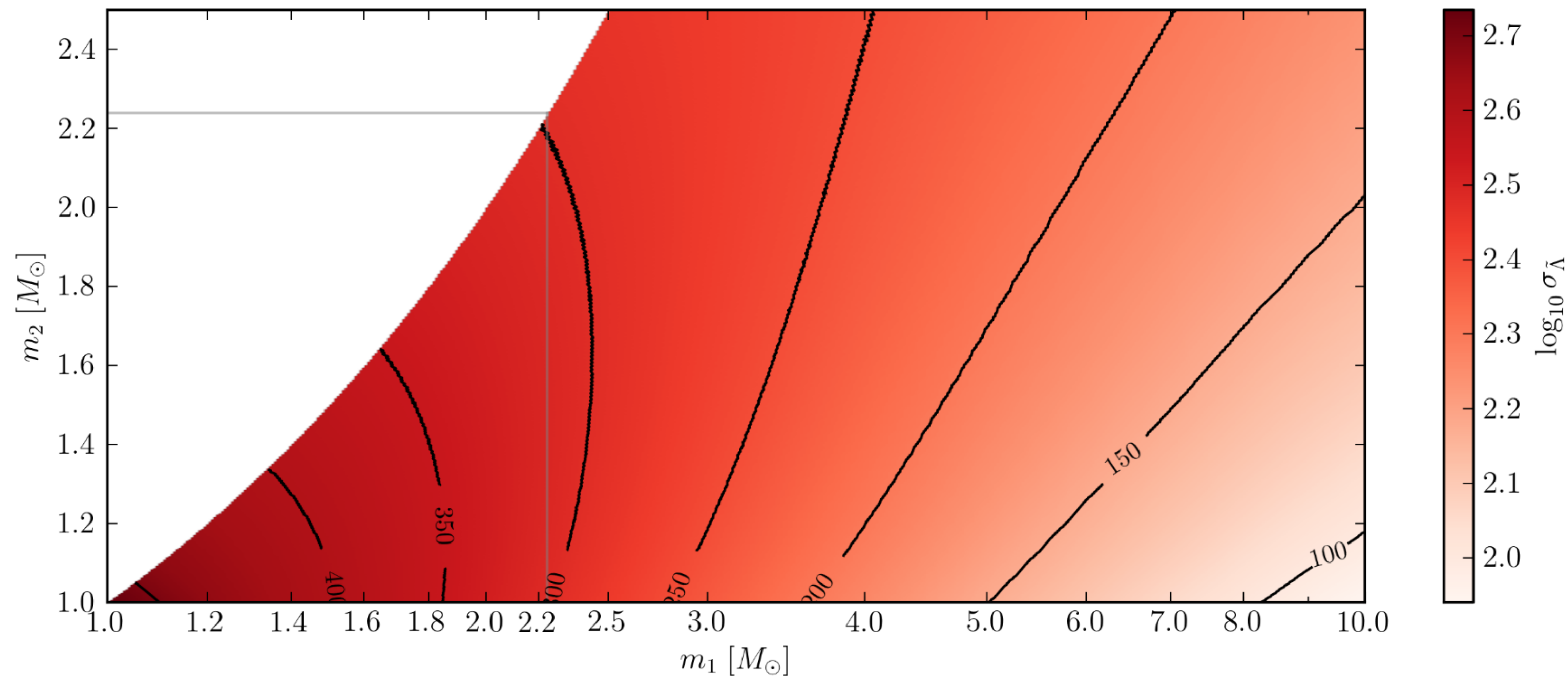


POST-MERGER  
RECONSTRUCTION



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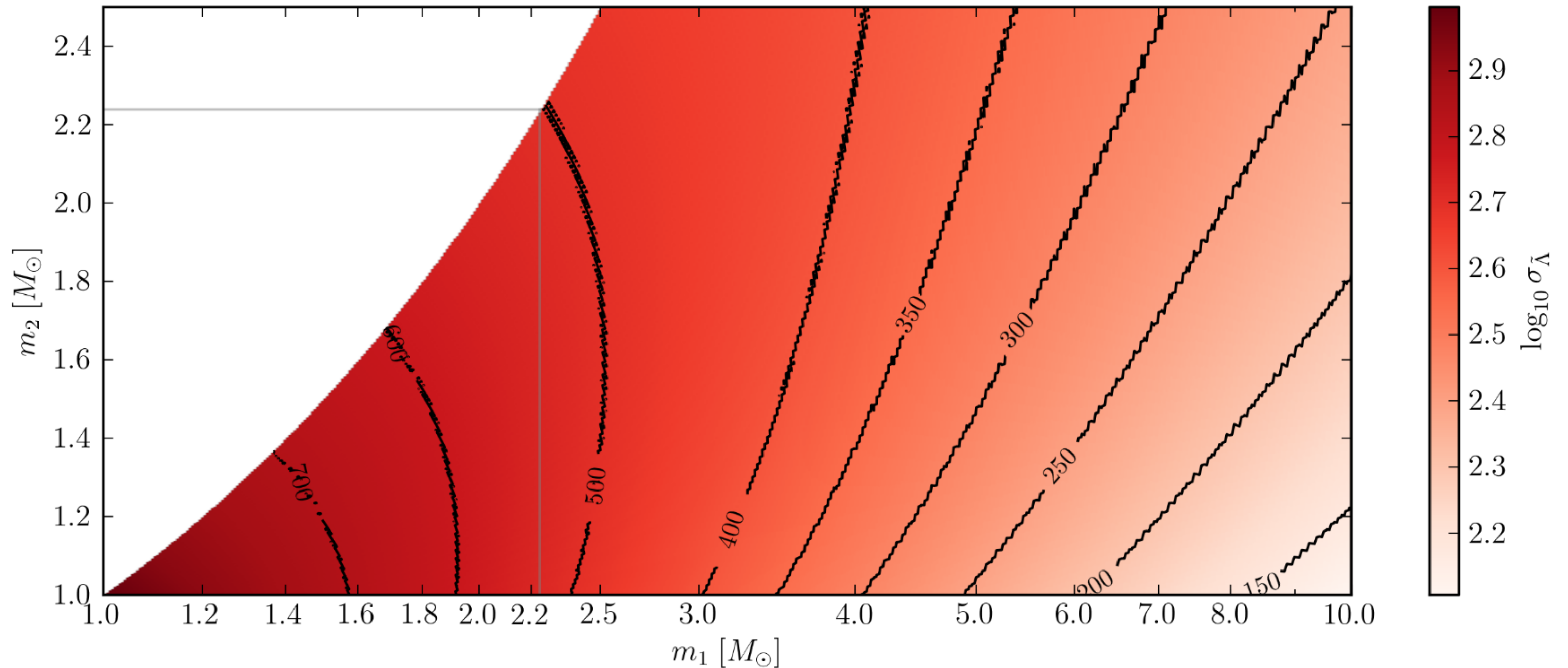
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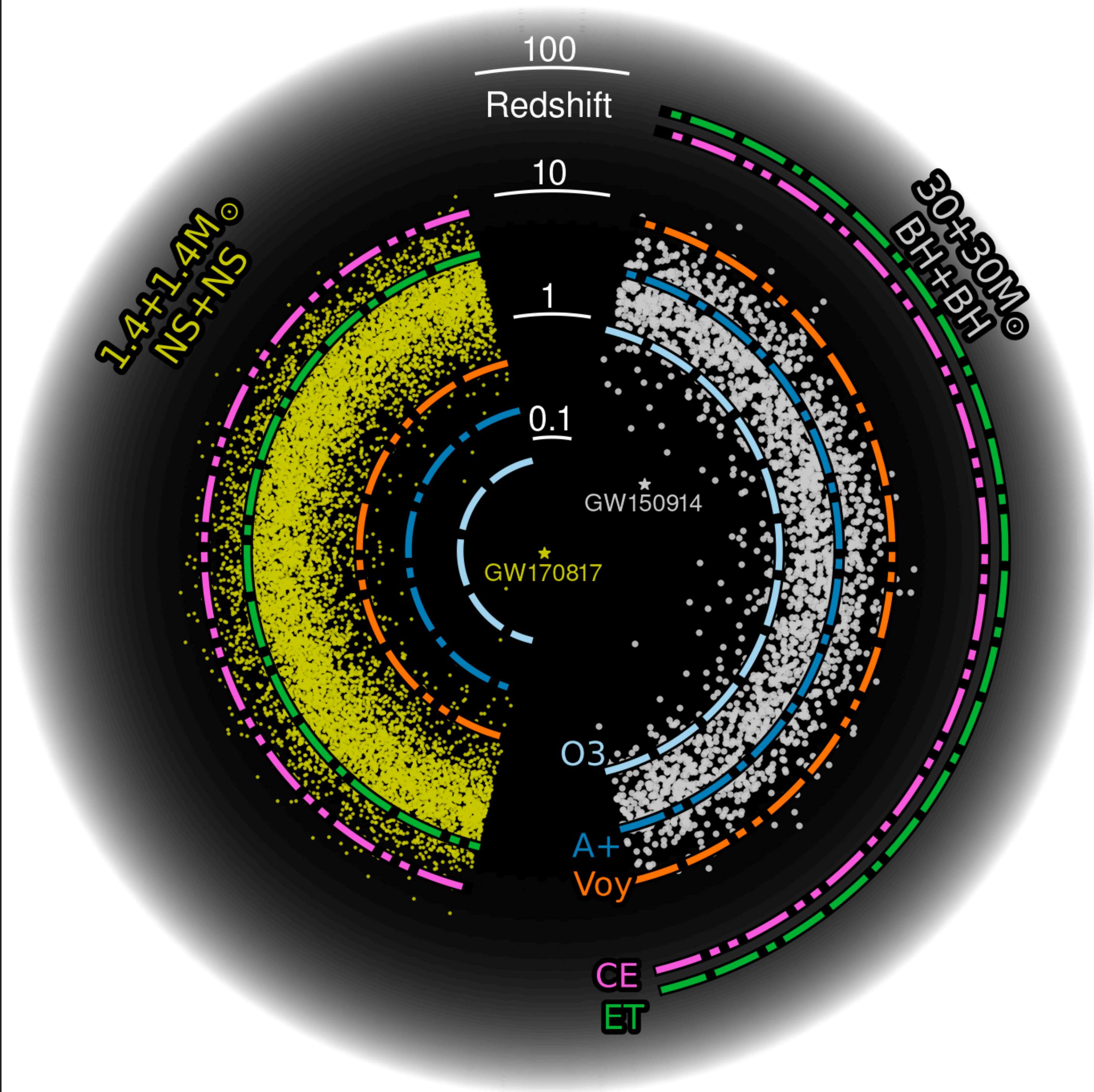




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- ▶ Inform EoS modelling where more/most focus is needed



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- ▶ Should develop MUSES to update EoS models based off observational data

# SCIENCE