A MONTE CARLO SIMULATION OF THE STARS OF THE GALAXY

IMF: CHABRIER SINGLE 2005

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INTRODUCTION

Monte Carlo statistical model

Simulated stars using IMF of Chabrier 2005

Diverse sample of stars:
100, 1.000, 10.000, 100.000 and 1 million

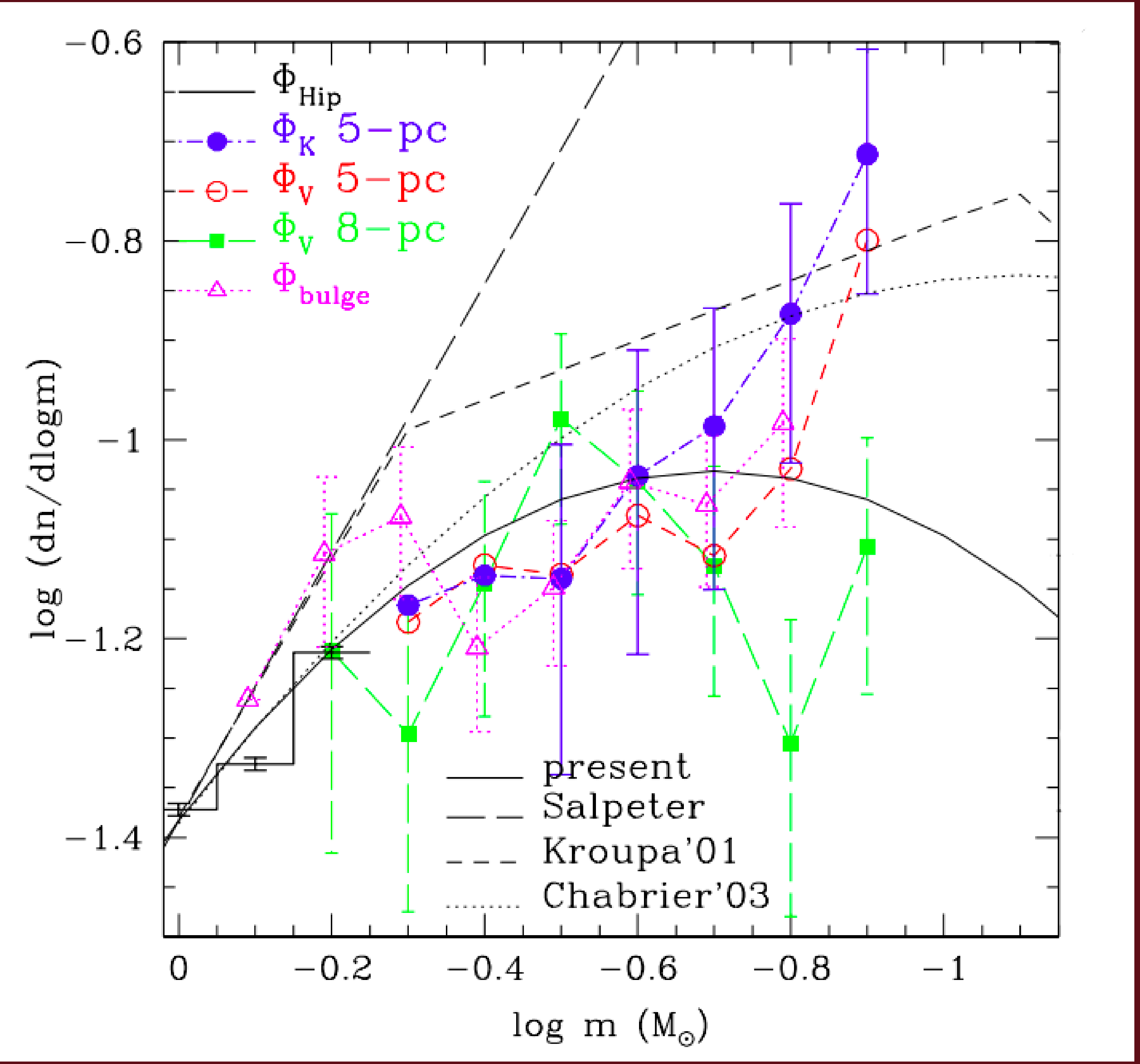
Study of stars on the MS and the object they will become upon leaving it

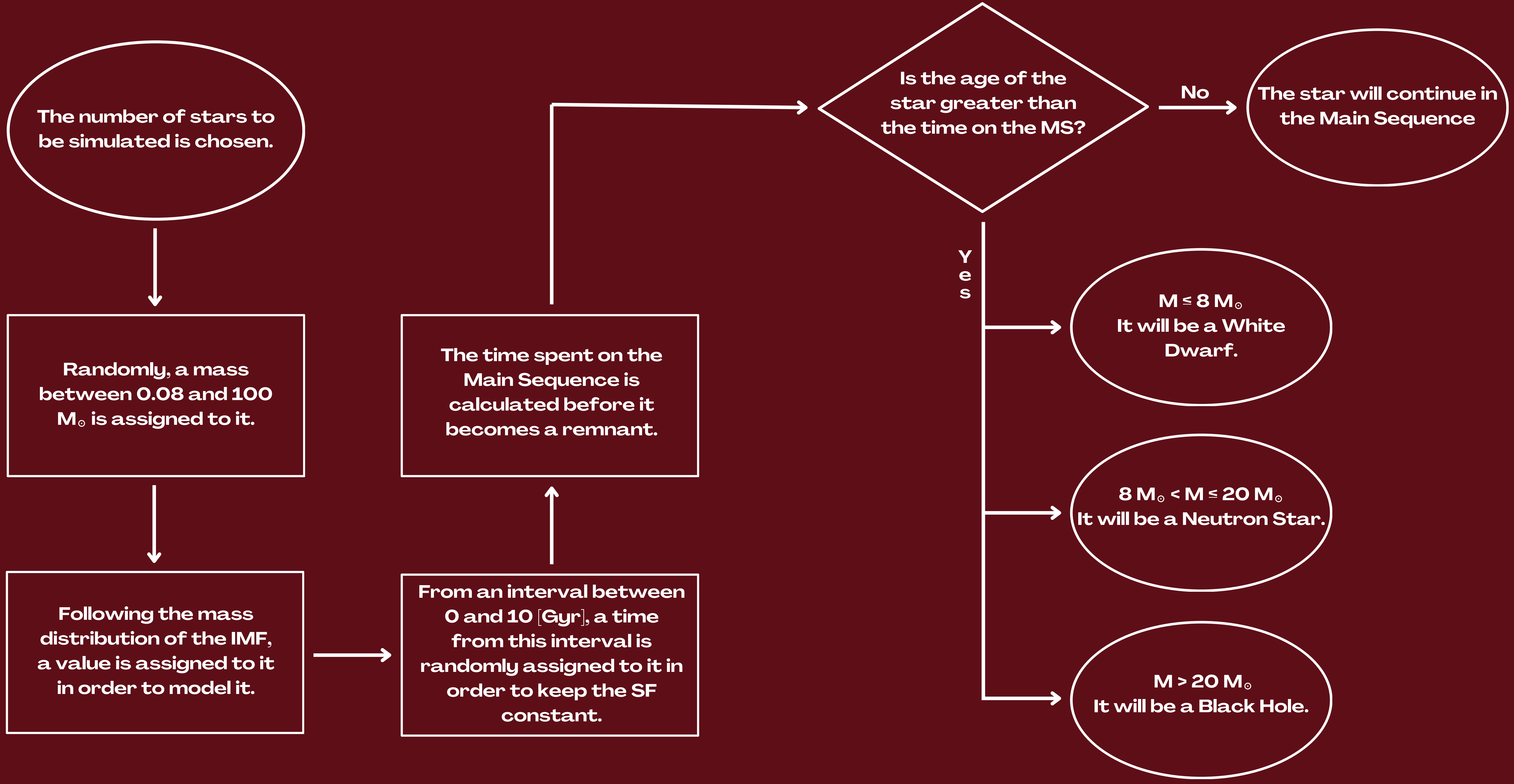
Initial Mass Function (IMF)

Chabrier S 2005

- Focused on individual stars
- It arises with the aim of properly characterizing brown dwarfs.
- Its mass distribution is more constant than that of the other IMFs.
- The log-normal form for low masses is well supported observationally

$$\xi(\log m) = 0.093 \times \exp\left[\frac{-(\log m - \log 0.2^2)}{2 \times (0.55)^2}\right], \quad m \le 1M_\odot$$
$$= 0.041\, m^{-1.35}, \quad m \ge 1M_\odot$$





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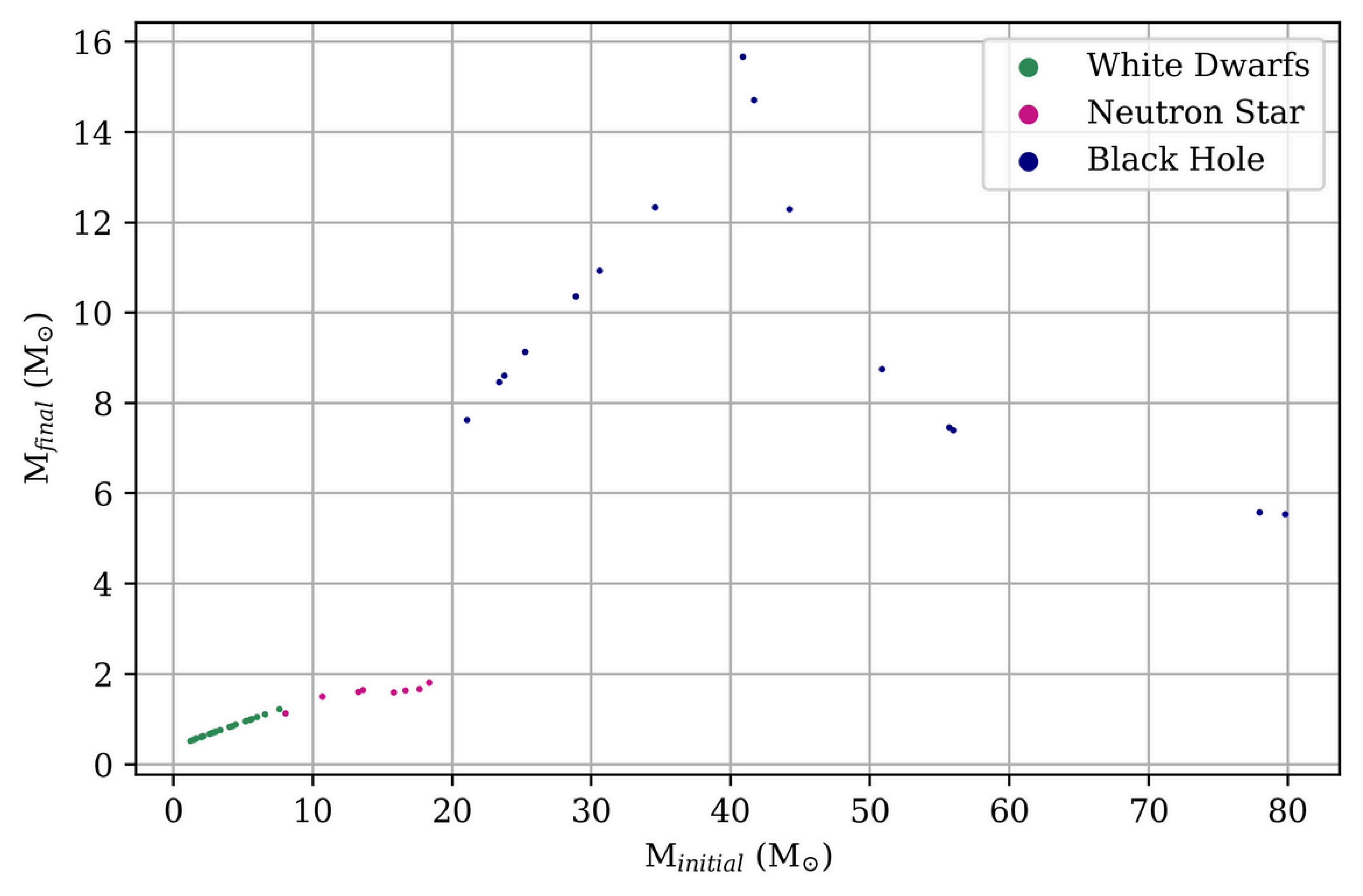
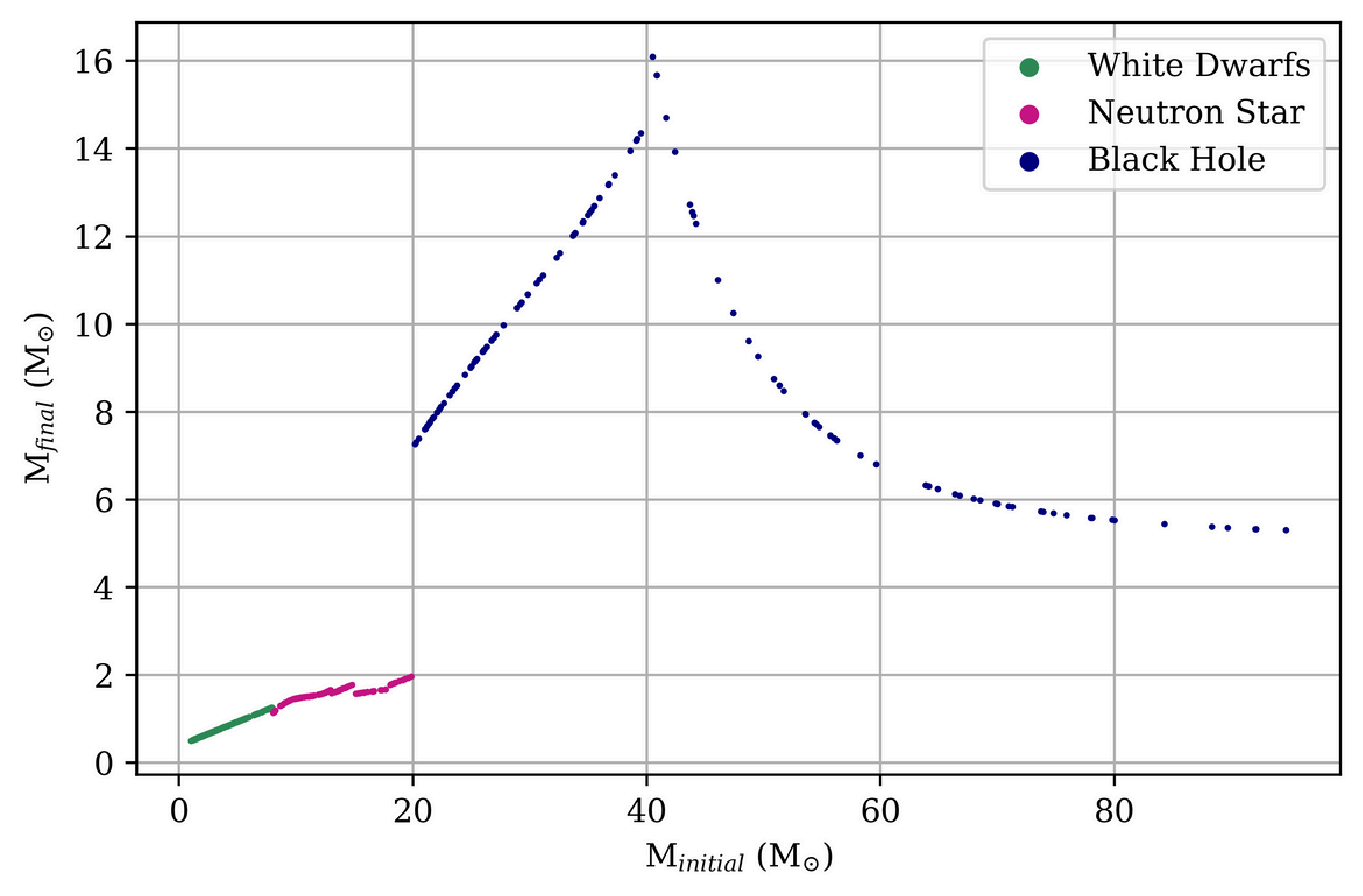
OUR RESULTS

RESIDUAL MASSES

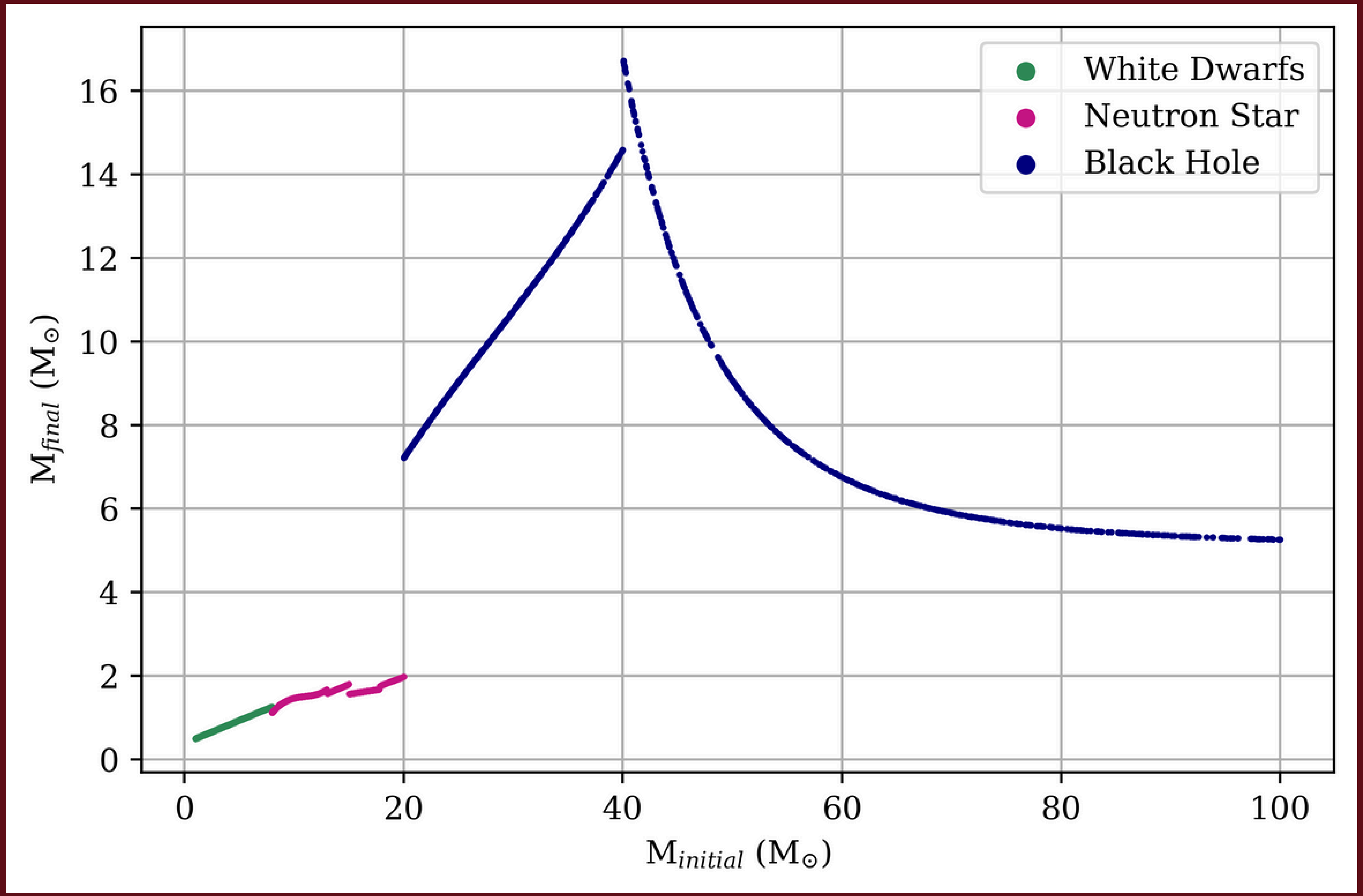


100 Stars

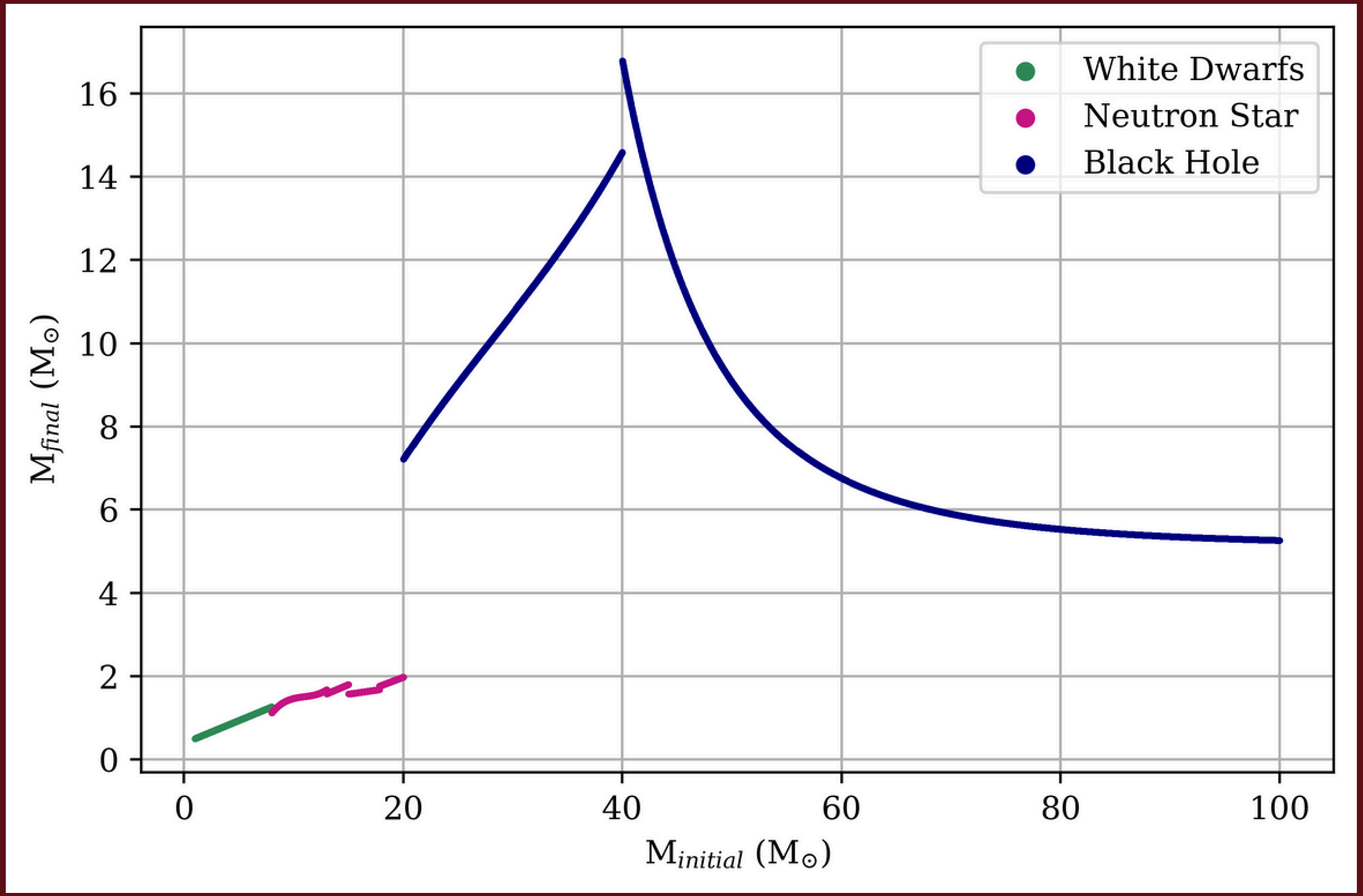


1.000 Stars

RESIDUAL MASSES

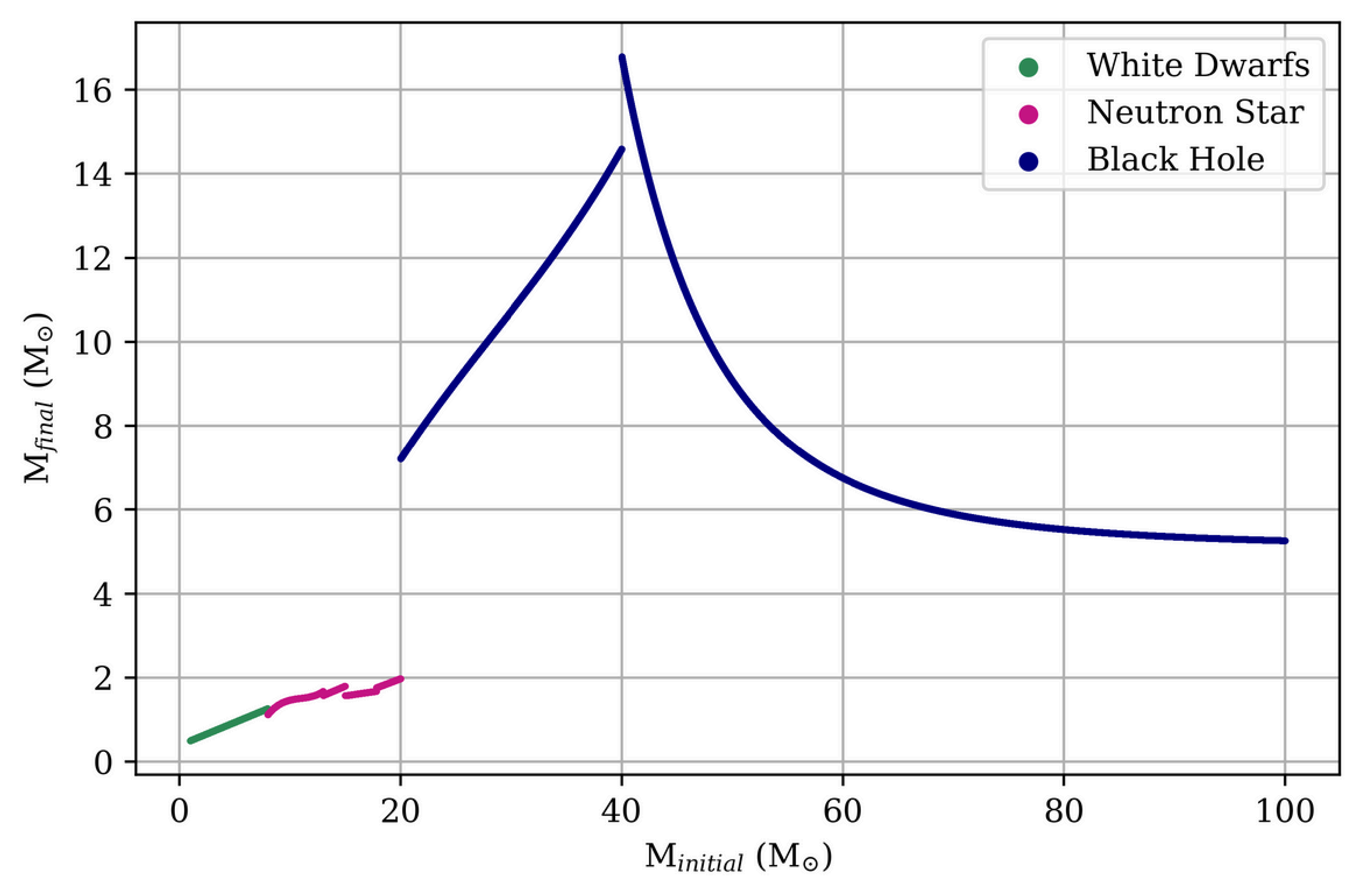


10.000 Stars



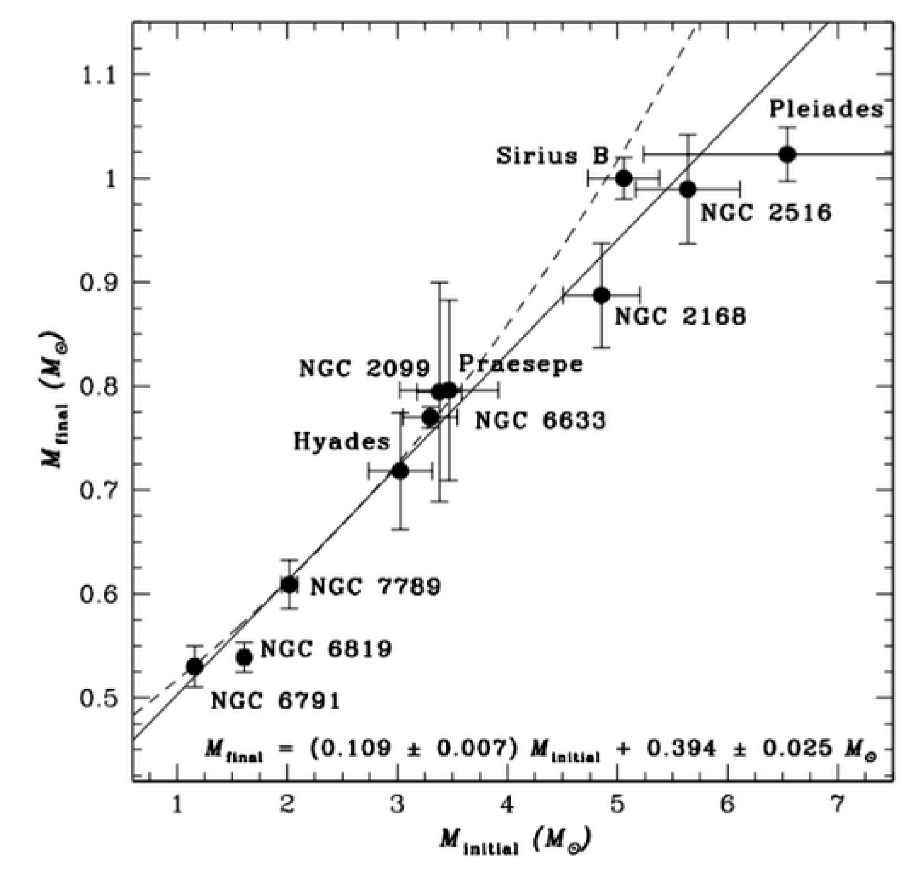
100.000 Stars

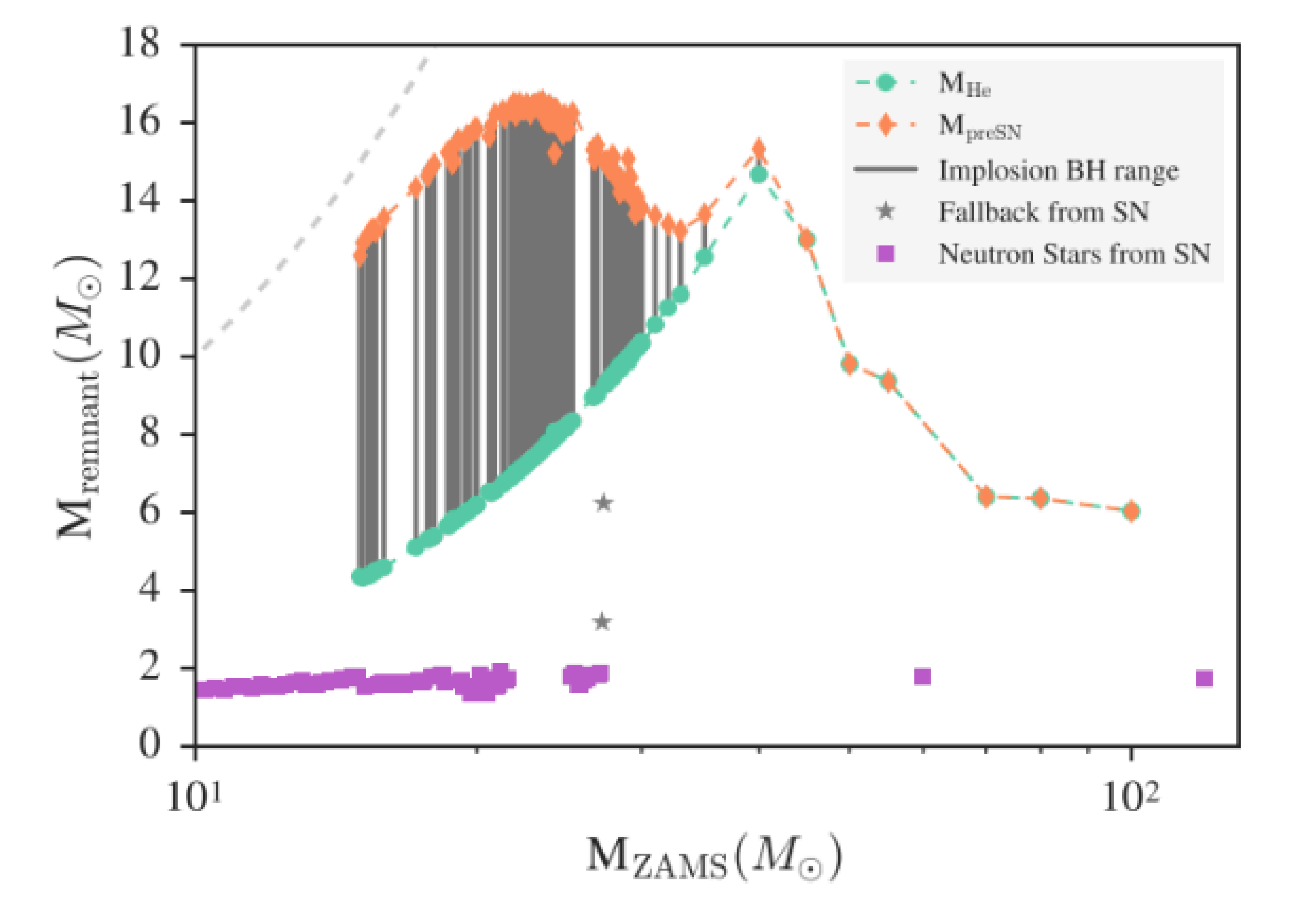
RESIDUAL MASSES



1.000.000 Stars

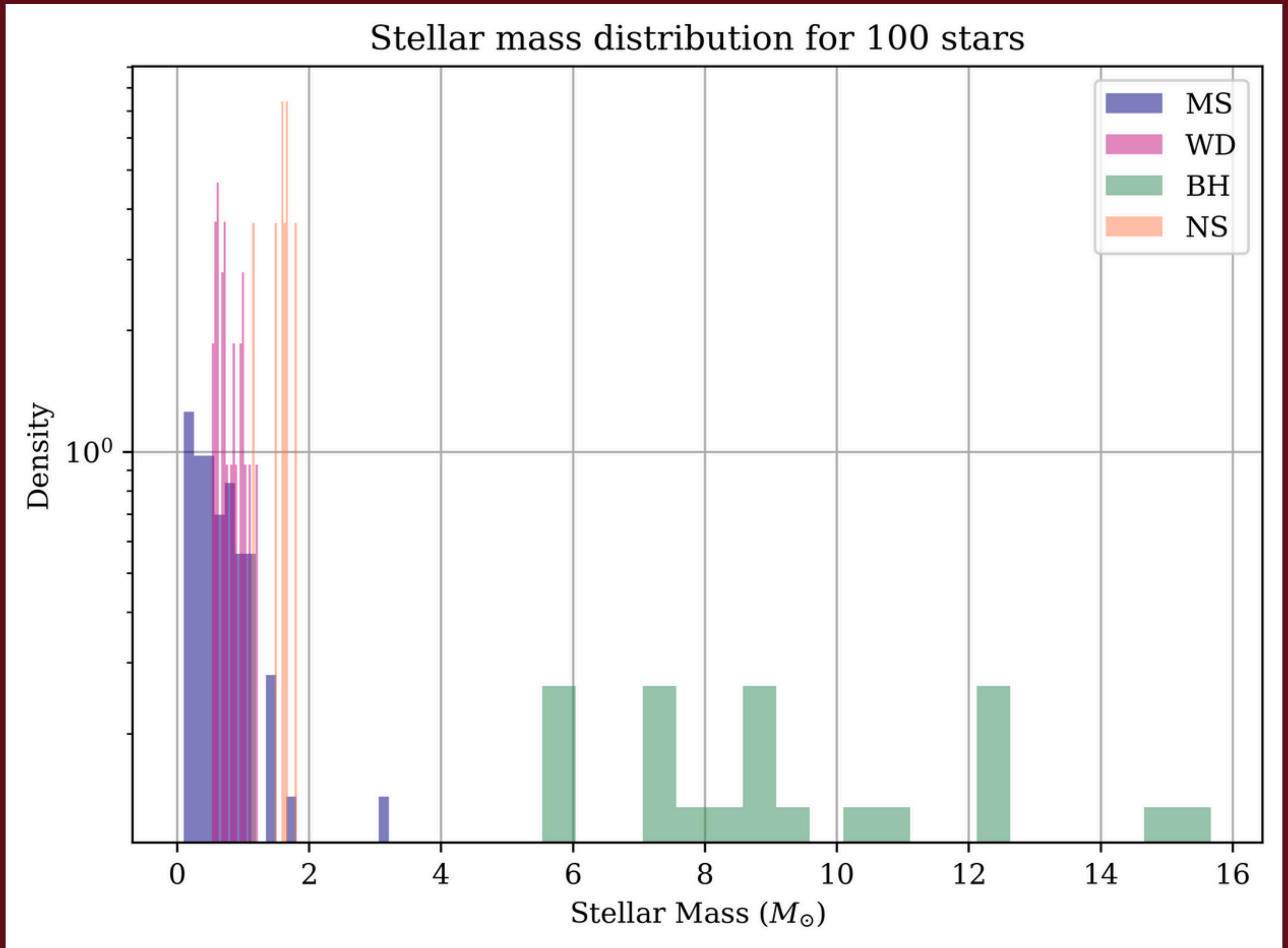
Kalirai et al. (2008)

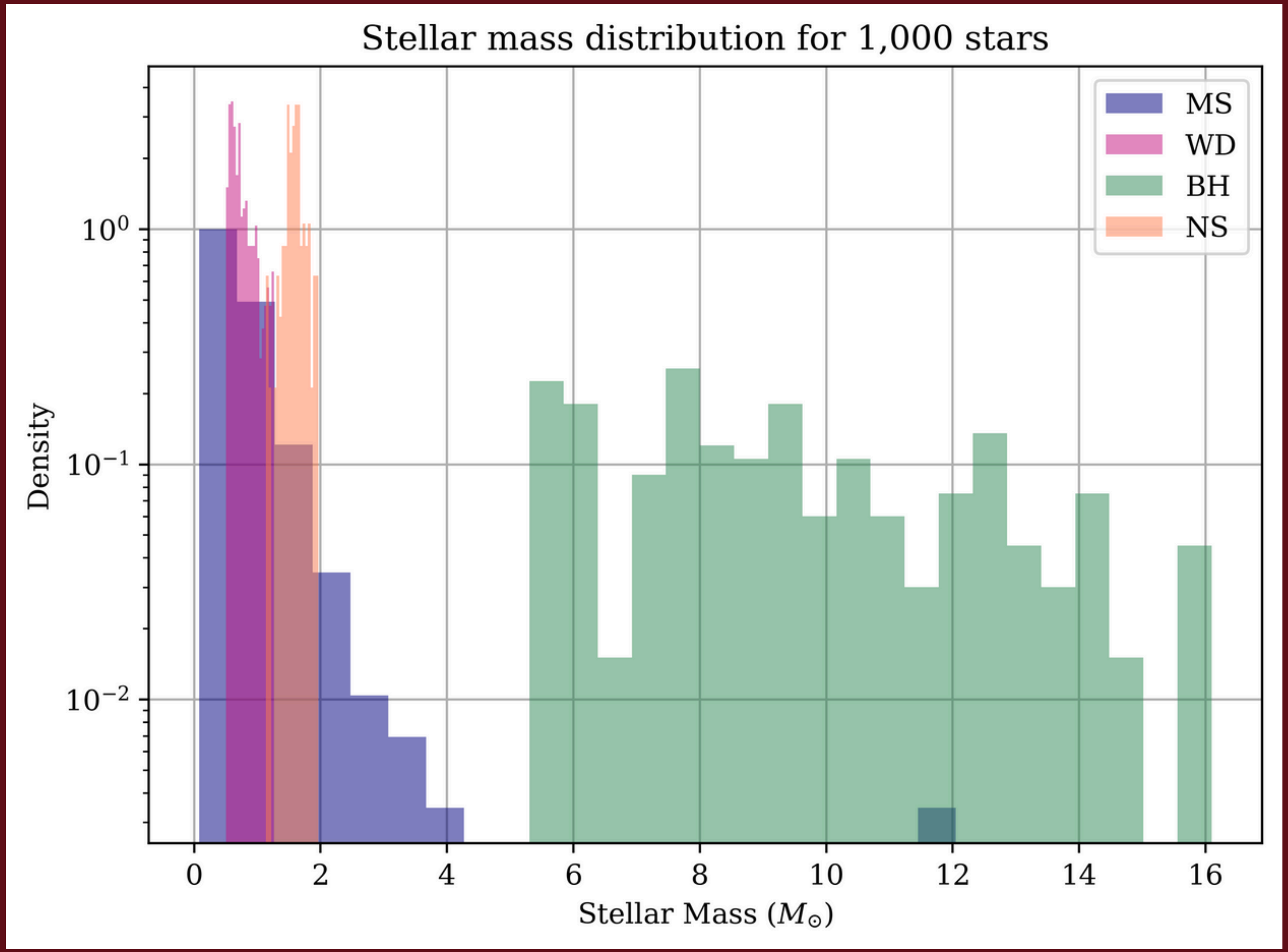




Raithel et al. (2018)

FINAL MASSES DISTRIBUTION





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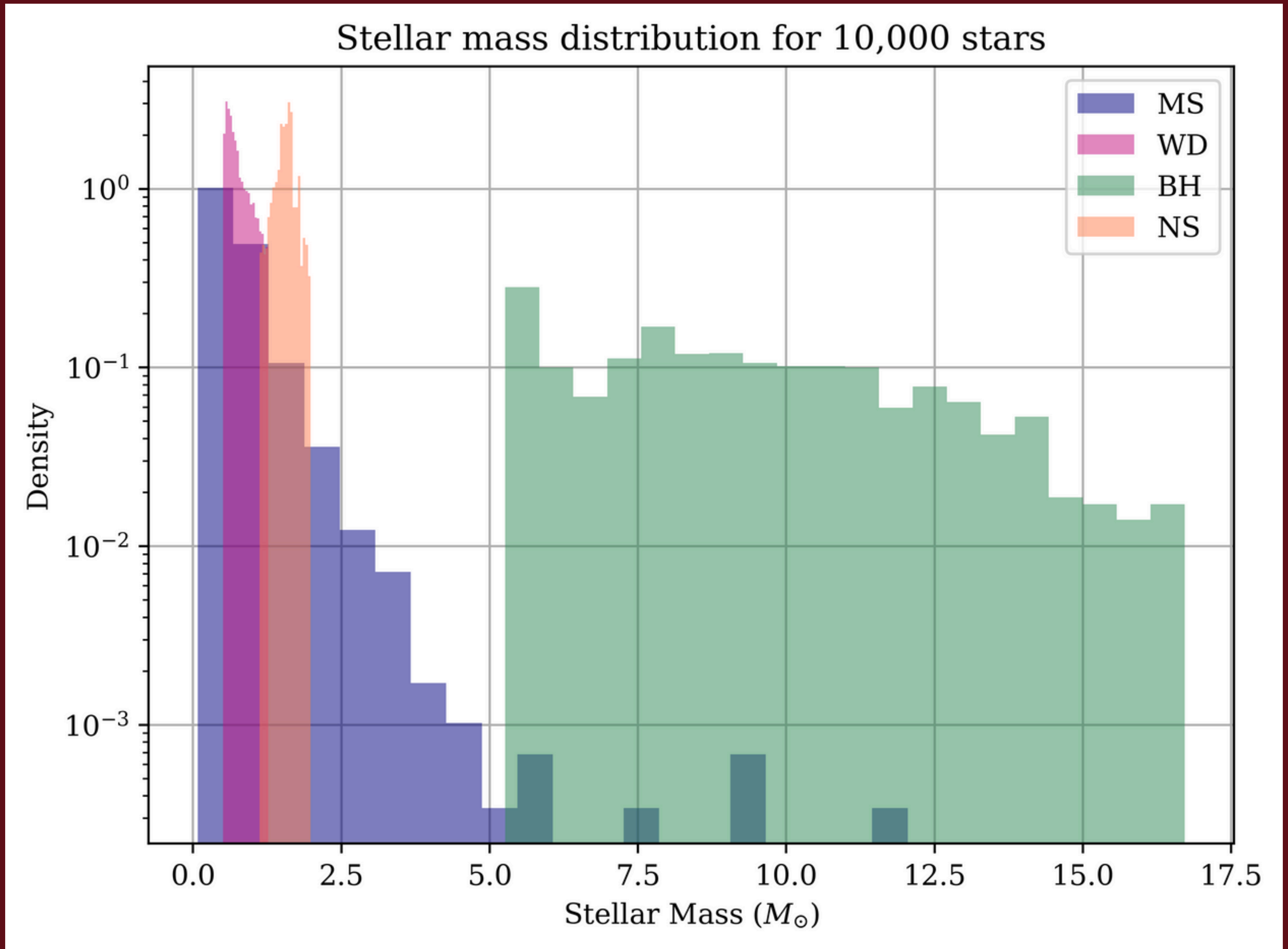

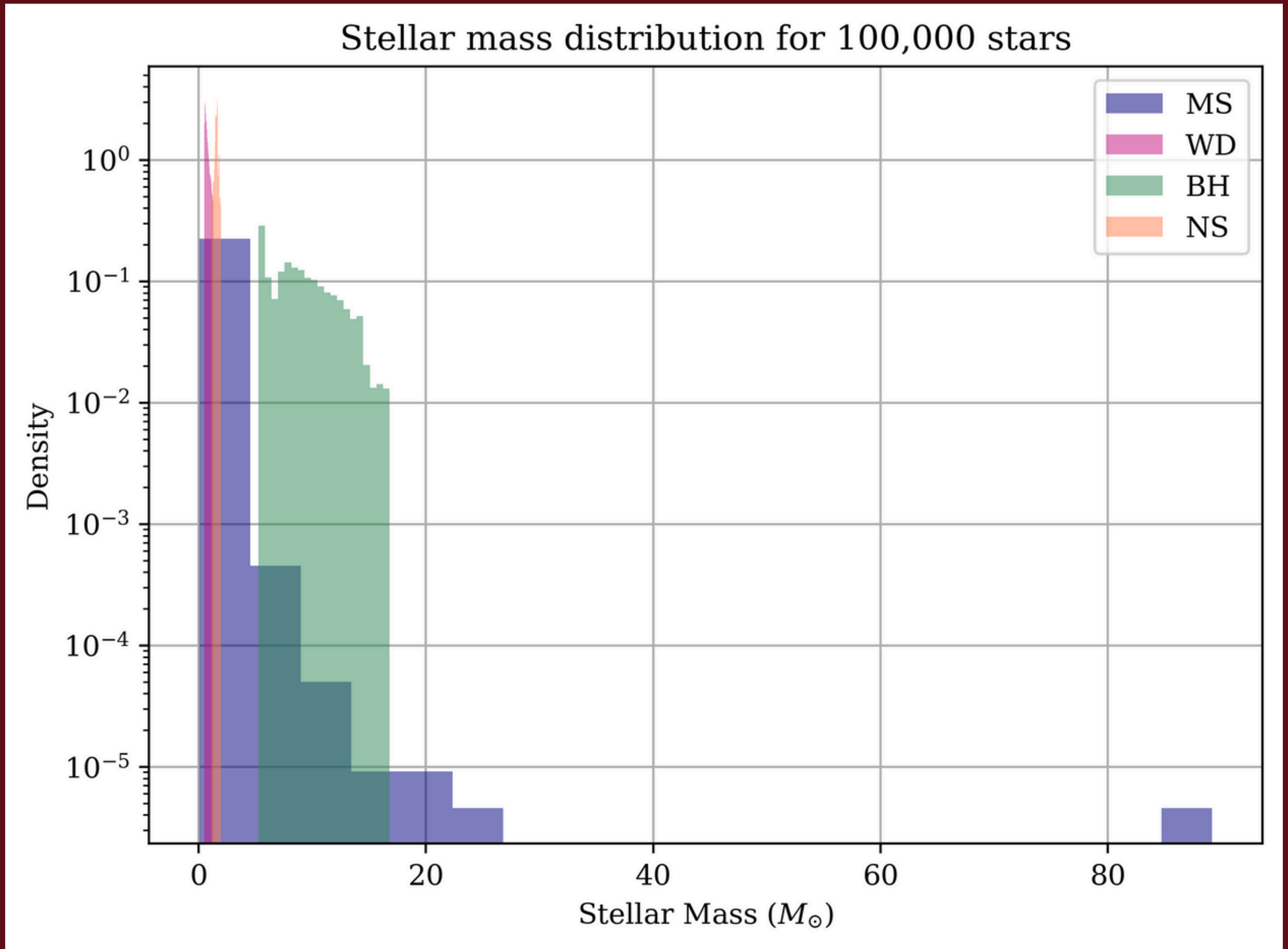

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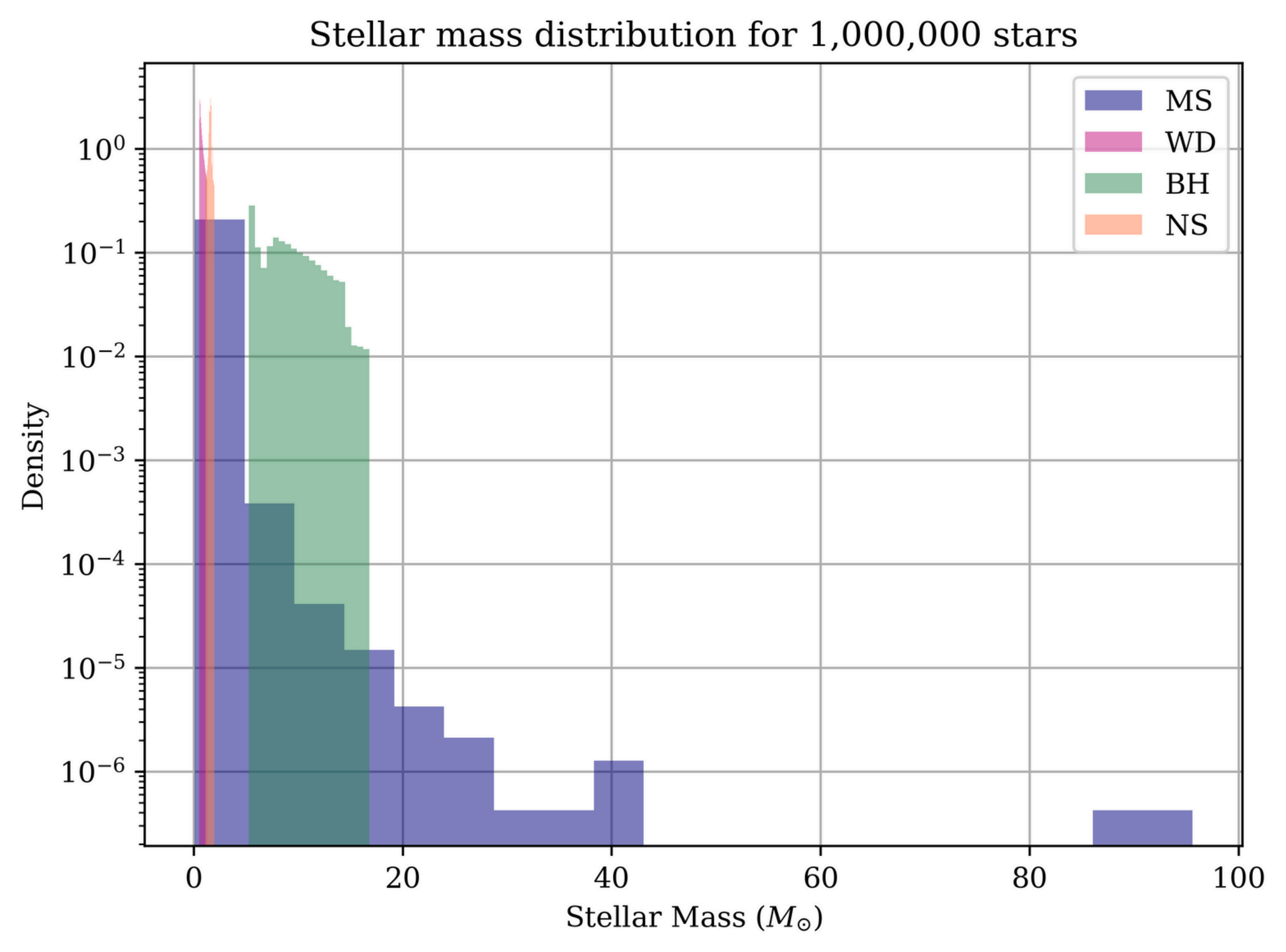
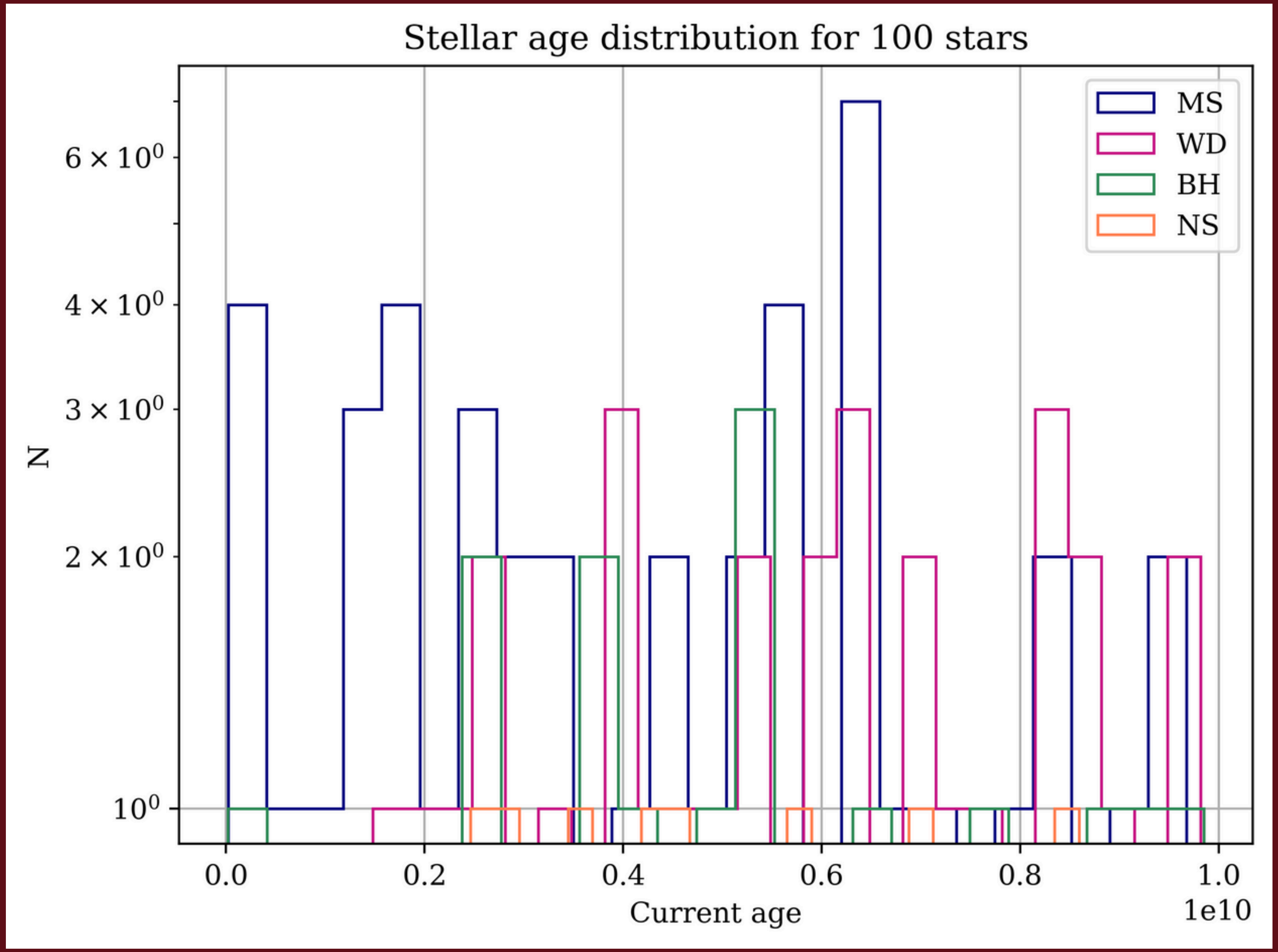
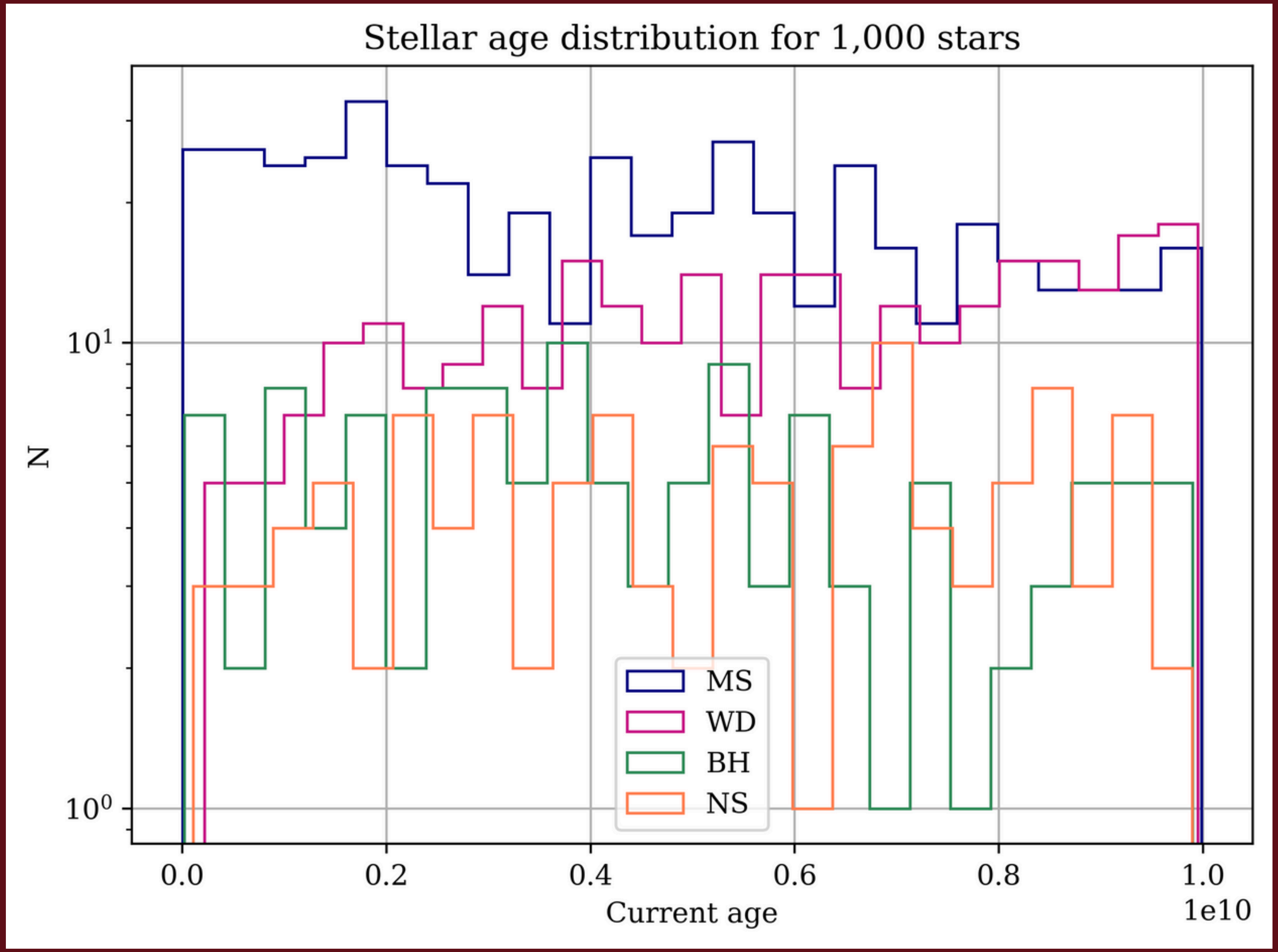


AGE DISTRIBUTION





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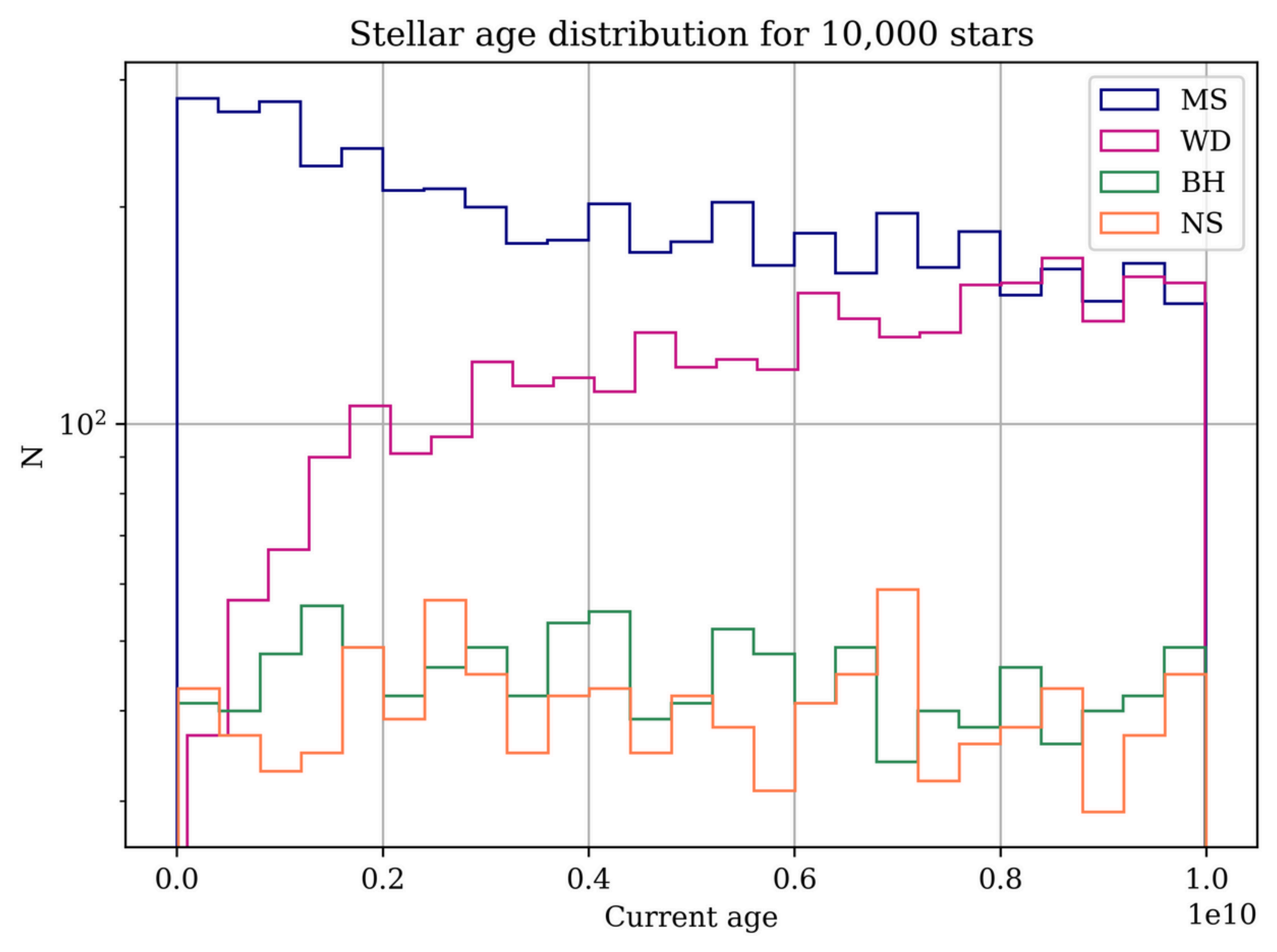

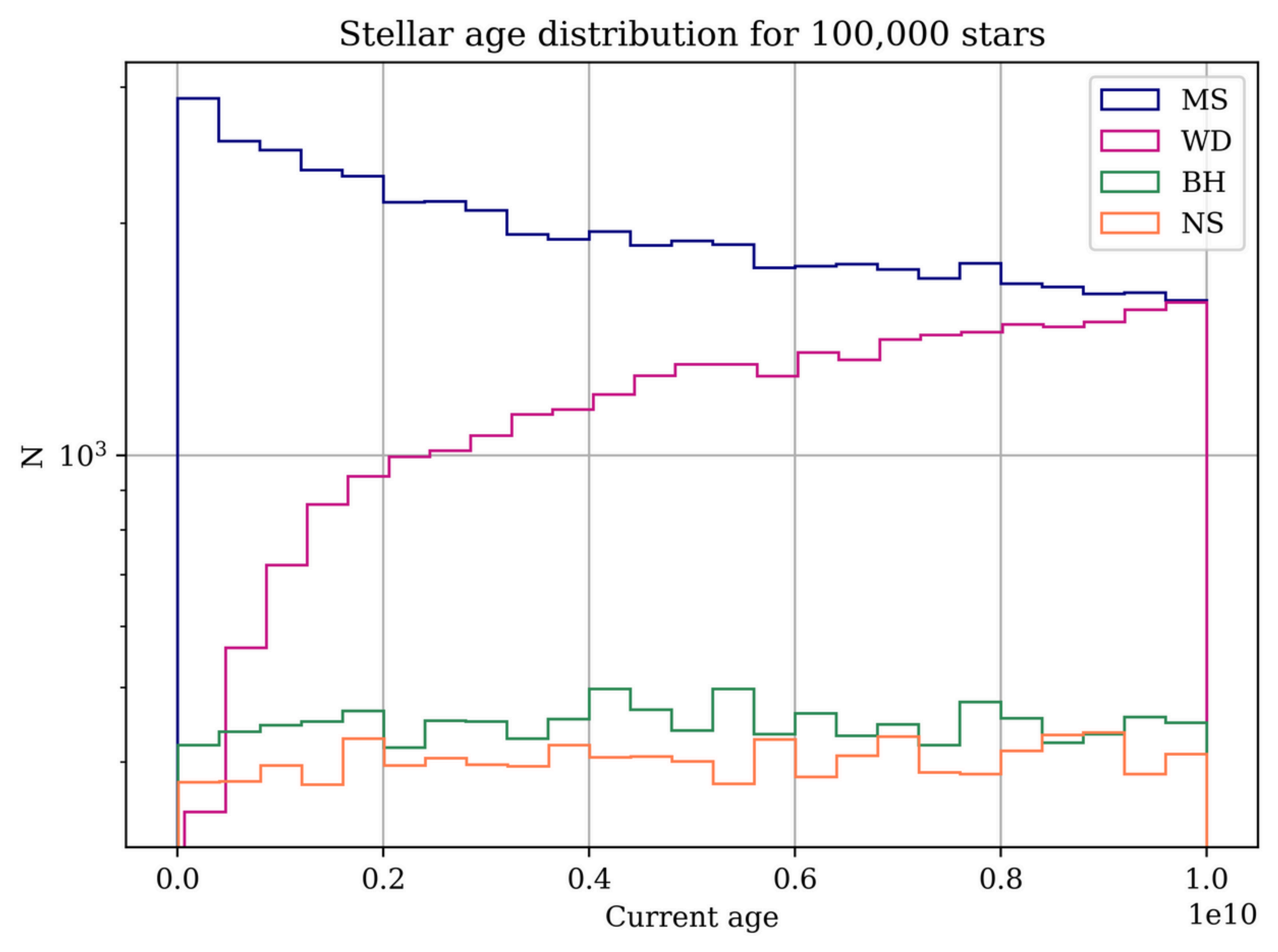

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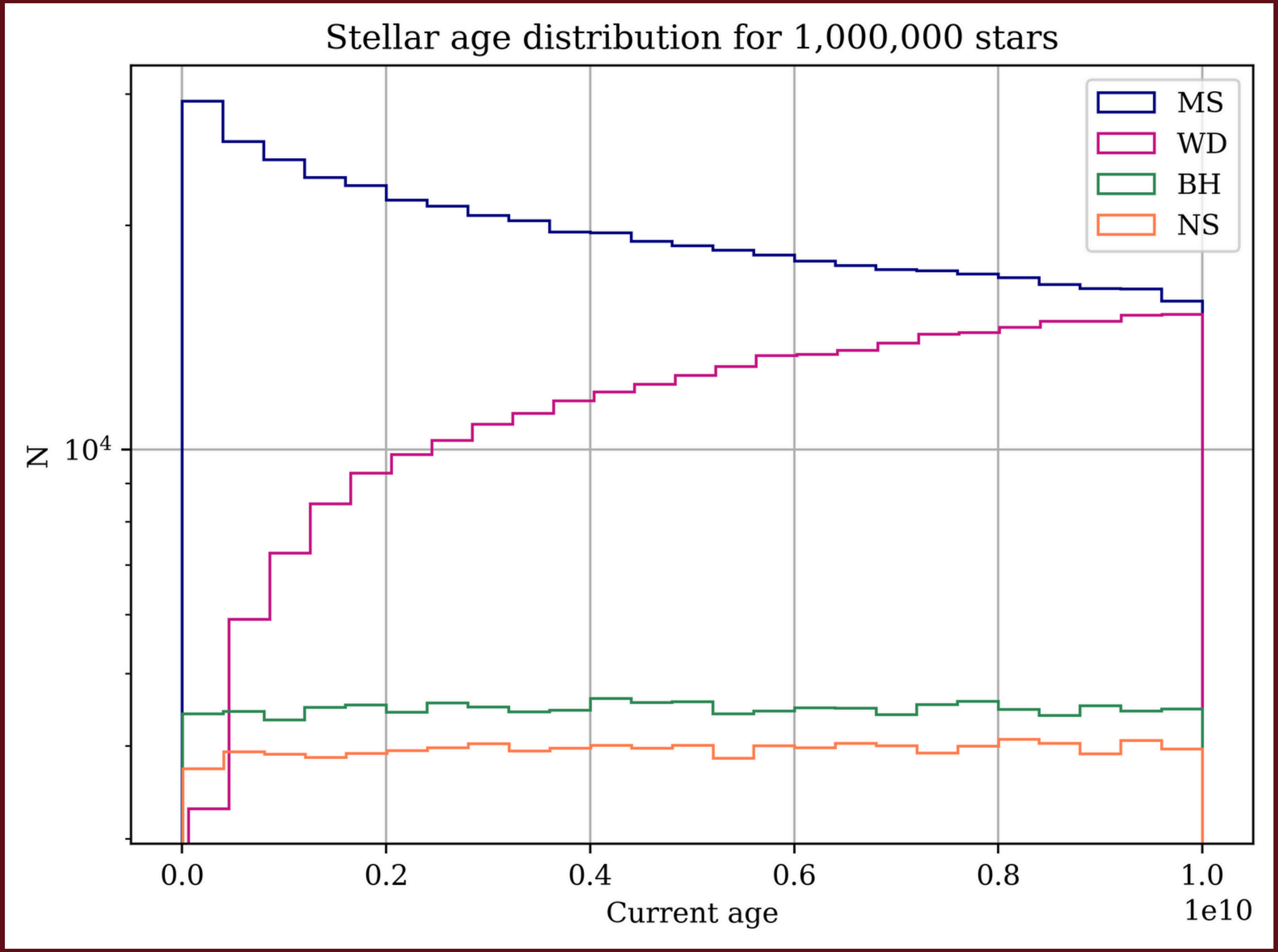
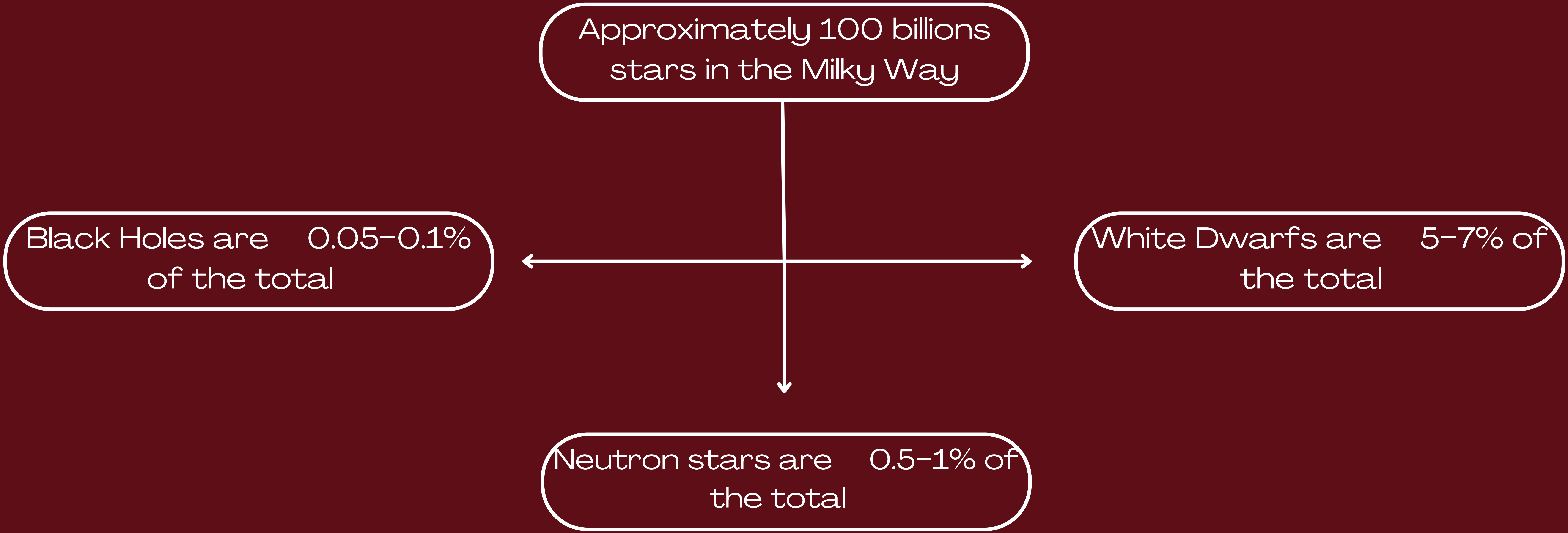


COMPARISON WITH THE MW



COMPARISON WITH THE MW

Number of stars	BH fraction	NS fraction	WD fraction	MS fraction
100	15.00 %	8.00%	31.00%	46.00%
1.000	12.30%	11.40%	28.10%	48.20%
10.000	11.16%	10.09	29.99%	48.76%
100.000	11.24%	10.06%	29.68%	49.02%
1.000.000	11.22 %	9.90%	29.54%	49.33%

CONCLUTIONS

Using the Monte Carlo statistical model, it was possible to generate various analyses for the stellar distribution based on the initial mass function of Chabrier (2005).

It was possible to observe the impact this IMF has on the stellar mass distribution, which is the objective for which it was created.

The results obtained indicate that it is indeed a good regime for low-mass stars, such as brown dwarfs, but not for more massive stars, ultimately predicting a much higher value than expected for BHs in the Milky Way. This value is superior to 10% in all cases.

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THANK YOU!

Questions?