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MW+M31 Stellar Major Merger Remnant: Stellar disk particle distribution/morphology

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Abstract

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1. Introduction

In approximately 4 billion years, the Milky Way and M31, also known as the Andromeda Galaxy, are anticipated to collide and merge, creating a stellar major merger remnant (van der Marel et al., 2012). This paper aims to investigate the distribution and morphology of stellar disk particles within the resulting remnant formed from the merger between the Milky Way and M31 galaxies. Studying the stellar disk particle distribution is crucial for advancing our understanding of galactic evolution, as mergers are pivotal in determining the morphological and star formation characteristics of galaxies (Barnes Hernquist, 1992; Duc et al., 2013).

Galactic mergers, such as the one predicted between the Milky Way and M31, share similarities with the overall process of galactic evolution, including changes in composition and star formation rates over time. Delving into the stellar disk particle distribution of the merger remnant can elucidate the relationship between galaxy mergers and morphology, as well as the composition of the remnant in connection to its age and the mass ratios of the merging galaxies (Querejeta et al., 2015; Pearson et al., 2019).

Our current knowledge of galaxy mergers stems from both observational data and computational simulations. Toomre Toomre (1972) posited that spiral galaxy mergers often result in elliptical remnants, whereas Querejeta et al. (2015) proposed the formation of S0 galaxies after galactic collisions. Pearson et al. (2019) debated the role of mergers in influencing star formation rates, noting that only 10-20% of mergers exhibit bursts of star formation. Given the substantial masses of both the Milky Way and M31, the merger could potentially be "dry," yielding a remnant dominated by older stars within several million years. It is essential to recognize that while some inferences have been made regarding the remnants of the Andromeda and Milky

Way merger, these conjectures are not exhaustive or entirely accurate. Consequently, many open questions in the field remain, including whether the merger will be dry, the classification of the remnant, and if the remnant will resemble the Milky Way, Andromeda, or neither.

Through the analysis of stellar disk particle distribution and morphology in the remnant of the Milky Way and M31 merger, this study seeks to enhance our understanding of galaxy formation and evolution, particularly in the context of similar-mass barred-spiral galaxy mergers. The insights gleaned from this research will enable a more comprehensive grasp of the impact of mass and structure on the merger remnant and the broader implications for galaxy interactions and mergers in the universe.

2. This Project

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3. Methodology

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3.1 Results

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4. Discussion

paragraph 1

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5. Conclusion

paragraph 1

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6. Acknowledgements

waiting for thanks

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Notes

Appendix 1. Example Appendix Section

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