

Galaxy Morphology

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1. INTRODUCTION

My proposed research topic is how galaxy interactions impact the morphological classification of galaxies. The connection between a galaxy's evolutionary track and its morphology is “a fundamental question in the field of galaxy formation and evolution” (R. Kannan et al. 2015). The Hubble sequence is one of the oldest methods used to classify galaxies, and it is based on morphology. The Hubble ‘tuning fork’ distinguishes between a galaxy's spheroidal bulge and its exponential disk. Gathering information based on the qualities of the bulge and disk are still extremely important today, and represent the crux of the issue surrounding morphology - what can a galaxy's morphology tell us about its past, present, and future?

When studying galaxy evolution, it is often more effective to examine the impacts of galactic mergers than observing a galaxy evolving independent of any disturbances. A galaxy's dynamical evolution during a merger with another galaxy reveals information about its evolutionary track (A. Brooks & C. Christensen 2016).

Our current understanding is that mergers are the origin of classical bulges (like those in an elliptical galaxy) and processes like gravitational instability are the origin of psuedo bulges (like those that align with disk-like profiles) (R. Kannan et al. 2015).

A pressing open question relates to inconsistencies between models and observations. Observations show a sizeable amount of bulgeless galaxies, but this does not align with the predicted findings consistent with the cold dark matter model that is used today.

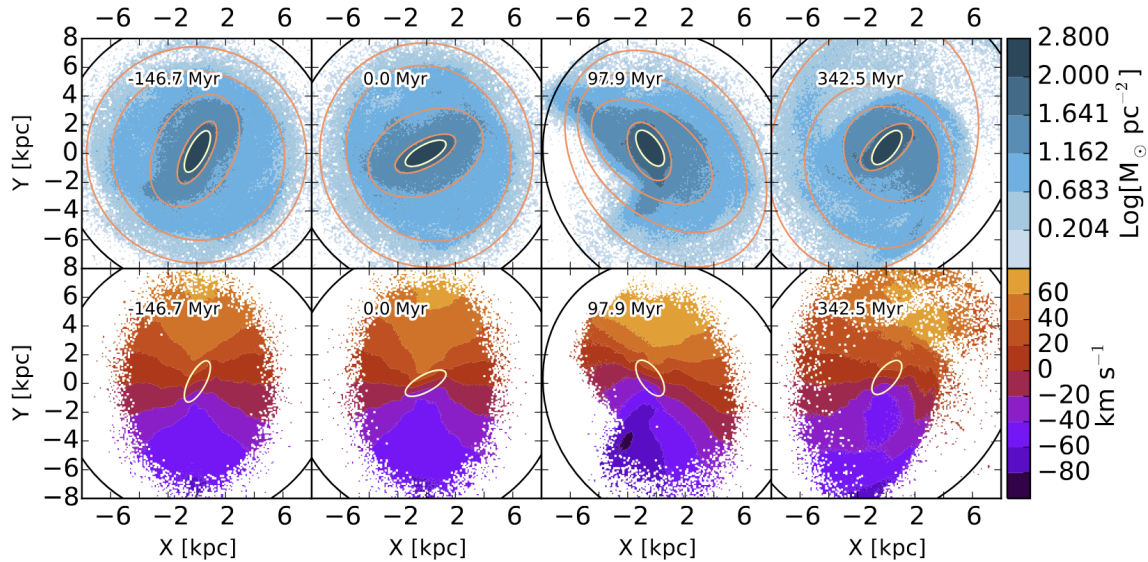


Figure 1. Time evolution of a primary galaxy's disk. At leftmost panel, companion galaxy has not yet been introduced. At 0.0 Myr primary galaxy has closest approach to its perturber. Note the strong effect the companion galaxy has on primary galaxy's morphology. (S. A. Pardy et al. 2016)

2. PROPOSAL

I will be answering the question "how do galaxy interactions impact the morphological classification of galaxies?"
To execute this, I will use a similar procedure to that from Lab 6, in developing a Sersic density profile.

REFERENCES

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