400BResearchAssignment2

YuxuanChen

March 2020

1 Introduction

- 1. Define the Proposed Topic: tidal evolution of M33's Dark Matter Halo and changes to internal dark matter profile.

- 2.During tidal transformation of satellites, the internal structures of stars and dark matter would change. Also, the star evolution and dark matter halo evolution happened in galaxy evolution, which we could regard galaxy evolution is contributed by star evolution and dark matter halo evolution. This is why the topic matters to our understanding of galaxy evolution.But here as the 'assigned topics' in updated profile, my goal is tidal transformation of satellites M33's Dark Matter Halo and changes to internal dark matter profile.If I have enough time, I will try to also combined stellar evolution part.
- 3.According to current understanding, we know what is going on during star evolution, and how it effect the mass loss rate. But for dark matter, we know it only react with gravitational force.
- 4.The open questions in the field:1.How do dark matter halo internal structures and dynamically change impacted tidal transformation during their evolution process. 2.During dark matter halo evolution, how does dark matter mass loss rate changes? 3. How does dark matter mass loss contribute to tidal transformation. If time enough, I would also think about those extra problems:1.How does stellar mass loss change, contribute to dark matter halo. 2. During star evolution, does it impact on dark matter halo? 3.what is the relation ship of tidal transformation beside stellar evolution/mass loss and dark matter halo evolution/mass loss.
- 5.
  - 1.[11pt]article cite Tidal evolution of dwarf spheroidal galaxies and dark matter subhalos Errani, Raphaël July 2019 https://era.ed.ac.uk/handle/1842/36662
  - 2.[11pt]article cite Tidal stripping and the structure of dwarf galaxies in the Local Group Azadeh Fattahi, Julio F Navarro 16 March 2018 https://arxiv.org/pdf/1707.03898.pdf

  - 3.[11pt]article cite The global stability of M33: still a puzzle J A Sellwood, Juntai Shen, Zhi Li July 2019 https://arxiv.org/pdf/1902.07222.pdf

- 6. [scale=2]massprofile.png

2 The Proposal

- 1. a.I have to combine mass loss rate, what we learned from 400A and the dark matter tidal evolution what we have in journals papers, to get a result, which could contribute to M33 tidal transformation of satellites.b. I have to combine some result, which we get from class homework, with the journal papers to get the result we need.

- 2.I would use the data and program we got from class and class homework to support the assignment.Then We could get a relation of mass loss rate in M33 during the period. And I have the dark matter halo profile and disk profile of M33, the only thing I have to do is combined those code to simulate the data we need for this assignment.

- 3.The figure come from Homework56 related to M33.

- 4.I think I will find the relation of mass transfer between dark matter halo and stars, which caused tidal evolution of M33's dark matter halo. Because the angular momentum of the galaxy is conservation, the mass loss from stellar definitely went to dark matter halo for keeping balance.