Grading Rubric : ASTR400B Research Assignment 2

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**A Introduction 9 / 10**

Each of the below points should be a separate paragraph in your introduction.

1. Define the Proposed Topic. 0/1
2. State why this topic matters to our understanding of galaxy evolution. 2/2
3. Overview our current understanding of the topic. 2/2
4. What are the open questions in the field? 2/2
5. Cite at least 3 journal papers. Use BibTex for formatting citations 1/1
6. Include at least one figure with caption from those papers to motivate your work. 2/2

**B. The Proposal 6/ 10**

They must answer each of the below questions as separate subsections.

1. What specific question(s) will you be addressing? 1/1
2. How will you approach the problem using the simulation data? Here you should outline the codes you’d need to write. It can be in general terms. 3/5
3. Include at least one figure that illustrates your methodology. 0/2
4. What is your hypothesis of what you will find? Why do you think this will occur? 2/2

**C. Misc. 4/5**

1. Proper Grammar 0/1
2. Included a bibliography 1/1
3. In Latex and ApJ/MNRAS formatting 2/2
4. On Time/On Github 1/1

**TOTAL** 19**/25**

**Late Penalty:**

* if submitted on due date, but after 5 PM  **(-5 points).**
* Proposals will **not be accepted** after the due date.

**Comments: -1: specify the topic in the introduction, -2: what plots are you going to make to answer the questions ? Need more details on how you plan to use the gaussian filter and how will you study the velocity gradients in the stream after that. -2: need a figure for the methods, -1: grammatical accuracy, latex accuracy and sentence structuring. No subsections using Latex formatting.**

**The methods you have chosen are more complicated than you need. Doing this analysis for as many snapshots as you’ve suggested will be difficult. Consider the following.**

**Q. How do the stellar tidal tails that form during the first encounter of MW/M31 evolve over the merger?**

**Methods:**

1. **Identify a snapshot after the first encounter.**
2. **Make a plot of the stellar disk distribution of the MW and M31 (2D histogram) and visually identify the tidal tails you want to study.**
3. **I would repeat steps 1 and 2 until you find a snapshot where the tidal tail looks easily identifiable by eye.**
4. **Identify tidal tails – how will you do this?**
   1. **You could compute the Jacobi Radius for each galaxy as a proxy for the tidal radius and choose particles outside that.**
   2. **Or you could make a phase diagram with stars from each galaxy (V vs R - see Lab 7) and identify outlier stars that deviate from the rotation curve and are at large radii. You can select the indices for those particles and see if those particles match the tidal tail in position space.**
5. **Time evolution:**
6. **If you are doing this based on stars that are outside the Jacobi Radius. Once you’ve identified them (e.g. by identifying their indices using np.where) the nice thing is that the indices are always the same in every subsequent snapshot so you can track the evolution of those exact particles by selecting the same indices each time.**
7. **If you are doing this analysis using the phase diagram, you can keep making phase diagrams and watch how the outlier stars evolve in time. You could compute the dispersion of those stars also.**