Reviewer 1

The author would like to thank the reviewer for the revision suggestions provided in the review. These suggestions will be implemented onto the final version of the paper and will be reflected as such. The responses to the major/minor revision suggestions can be found below:

Major:

1. **All surveys and demographics mentioned as well as anything that is not an original idea or result need citations.**
    a. Thank you for the suggestion. The final paper now reflects this change.
2. **Goal of the study remains unclear as the sections within the paper mention different objectives.**
    a. The introduction has been revised to accurately state the true objective of the study and is consistent with the objectives set later on in the paper. The factors that have been gathered have all been backed up by previous literature and through the statistical tests performed in this study, the objective is to identify which factor is most influential across both racial groups. Although AIP contains the word *physics*, it does not limit the research to solely undergraduate physics majors. Any of the survey questions that specifically mention anything related to physics has already been omitted.
3. **In the abstract and introduction, the author needs to highlight the importance of this research. Why is it necessary to determine the factors contributing to race gaps in astronomy?**
    a. The reviewer's request to revise has been completed.
4. **The first sentence of the abstract does not accurately represent the research. "The purpose of the study was to determine which factor is most influential towards a student's decision..." The research did not determine these factors but used another source that determined them. This issue severely compromises the integrity of the research.**
    a. Actually the first sentence perfectly represents the research. Through the statistical tests performed, the results would reveal which factor, statistically, is

most influential across both groups. There is no compromise of integrity anywhere.

5. **The introduction focuses largely on disparities in representation for Black and Latinx individuals, but the methodology and results focus on only Black students. The introduction should be adjusted to better match the results of the paper, i.e., demographics regarding Latinx individuals should not be mentioned. The introduction should only focus on Black representation compared to White representation.**
    a. Thank you for this comment; the appropriate changes have been made.
6. **The basis of this paper is the 2007 Nelson Diversity Survey compared to 2007 US Census data for the racial demographics presented. However, these data are from 14 years ago, so the author is assuming that the demographics then accurately represent the state of diversity in astronomy in 2021. This is a very large assumption that does not have much merit.**
    a. Although the data is from 14 years ago, there has not been further research done to bridge this data gap. The literature of this study was difficult because of how little numbers of studies like this have been performed since then. There is no assumption done as demographics that date back 2-3 years accurately represent the state of diversity in astronomy. Backed by this data, there is a lot of merit actually.
7. **"It was of vital importance that each one be introduced with equal importance." Can this assumption be made? Don't some factors carry a greater impact than others? This needs further justification.**
    a. If the objective of the research is to determine which factor is most influential, it would not be wise to state some of them carry a greater impact than others off the bat. This would already insert a level of bias into the study and would not yield accurate results.
8. **This section needs a lot more detail as to what the facts contributing to the race gap is, who the undergrad students interviewed were (any similarities between them) and how the sample of students was taken (random sampling, cluster, stratified, etc.). Also, specific details need to be better explained, such as the Likert scale,**

which is mentioned but not explained. This needs to be much more fleshed out for the results to be reproducible. Related to this, do the 167 students that were surveyed represent a specific group of students (specific graduation year, area of the country, etc.)? How well does the sample reflect the demographic of all astronomy students in the US?

a. The revisions request were made. As for more information on the identity of the undergraduate students who were interviewed, all entries were anonymous and assuming AIP were to provide data points, this information would not be provided. It is just a random sampling.

9. **The author mentions implementing a linear regression model to check for correlation between factors. However, this is a very large assumption as the correlation, if it exists, can be curved or some other kind of relationship, not necessarily linear.**
    a. The linear regression model is not meant to be the test that determines correlation, but is necessary to conduct the other statistical tests that will reveal correlation.
10. **This section uses language such as "the scope of this project will shift" or has paragraphs talking about failed attempts to contact AIP or conduct analysis. These have no place in the final report of results, and only the methodology relating to how the final results were actually obtained should be stated.**
    a. This change has been implemented
11. **In Figure 5, there is a value listed as the "p-value." P-value determines the statistical significance of a result. I could be interpreting the methods incorrectly, but it seems like all that is needed to understand which factors are significantly contributing to the race gap is the p-value of each factor. If this is the case, then there is no merit for conducting the proposed research project in determining the significance of the factors because the significance is already determined and stated by the study used. However, this could not be the case and I am not understanding the table or methods properly.**
    a. The reviewer is misunderstanding the table and methods properly as the p values will **not** be the same due to the fact we are performing tests in a different method than AIP has done.

12. **This section also suffers from a severe lack of detail. What is the 7 Classical Assumptions of Ordinary Least Squares? This is mentioned as if it were a source that is cited (but has no citation), and if this is the case, seems like a very specific source and needs to be explained and justified a lot more. Also, the statistical tests used all need to be explained in way more detail, and any specific parameters or numbers used need to be mentioned in order to make the results reproducible. Also, what Python packages or libraries were used?**
    a. The changes have been implemented.
13. **The title has a footnote that says, "Released on March 1st, 2021". This is the wrong date.**
    a. The change has been implemented.
14. **The short title and short authors at the top of each page are incorrect.**
    a. The change has been implemented.
15. **There are a few sentences throughout the paper that are phrased as questions, such as "if the disparity persists as early as the graduate school level, how might the undergraduate level look like?" These sentences give the paper a colloquial tone and can be removed from the narrative.**
    a. The change has been implemented.
16. **The tables should be remade into LaTeX tables and references as Tables instead of Figures.**
    a. The change has been implemented.
17. **The results not being listed in the abstract is understandable as the author will determine these results later. However, the parameters/factors used from the AIP report should be listed in the abstract as well (or at least some or the most important factors should be listed).**
    a. The change has been implemented.
18. **In paragraph 1, the author mentions the racial demographic of faculty members in the top 50 US astronomy schools. It should be clear if this represents all faculty, such as post-docs and administrative staff.**
    a. The change has been implemented.

19. **In paragraph 1, in citing the demographics of the US census, it should be clarified if these include only citizens or residents of the US.**
    a. The change has been implemented.
20. **In paragraph 2, the second sentence is unnecessary.**
    a. The change has been implemented.
21. **In paragraph 2, the sentence starting "Assuming the undergraduate pool is more diverse..." can be removed. It is explained in the next paragraph that this does not need to be an assumption as it is backed up by data from APS.**
    a. The change has been implemented.
22. **"The trend within both of these graphs indicate that the percentage will only increase." How can the author make this assumption?**
    a. The change has been implemented.
23. **Figures 3 and 4 do not show astronomy majors on the graph when the paper is about demographics in astronomy. They should be removed, or it should be thoroughly explained how they relate to astronomy majors.**
    a. The change has been implemented.
24. **This section can be reworded and moved to the end of the introduction as an outline of the paper.**
    a. The change has been implemented.
25. **It says that 187 undergrad students were interviewed in the survey, but the table in Figure 5 says 167. I think this is just a typo.**
    a. The change has been implemented.
26. **Table 1 is referenced, but there is no Table 1.**
    a. The change has been implemented.
27. **The author uses the mean and standard deviation from the AIP data to create mock data. I'm assuming he created Gaussian distributions, and that the sample size is sufficiently large to assume this. This should be explicitly mentioned.**
    a. The change has been implemented.
28. **What is "correctness of a functional form?"**
    a. The change has been implemented.

Reviewer 2

The author would like to thank the reviewer for the revision suggestions provided in the review. These suggestions will be implemented onto the final version of the paper and will be reflected as such. The responses to the major/minor revision suggestions can be found below:

Major

1. **There are some formatting issues that must be fixed. On the first page, the footnote mentions that the paper was released March 1st, 2021, this must be removed. Also, the header on each page which should alternate between the author's name and the title of the paper are incorrect. These need to be corrected.**
    a. The change has been made.
2. **The introduction does not seem completely connected to the rest of the paper. The goal of the paper is to use results from the AIP survey and use different tests to determine the most influential factors that lead black astronomy students away from the major. The objectives set at the end of the introduction are not the objectives completed in the rest of the project. The introduction needs to be re-worked to better encapsulate the goals of the project and give a better background. There should be more background given on the literature and previous studies.**
    a. The change has been made.
3. **In section 3.3, the 7 Classical Assumptions of Ordinary Least Squares and the three tests need to be explained more. The reader does not know what these tests do or how they work. The author also needs to explain how they used these tests, their methods need to be clearly explained in the paper.**
    a. The change has been made.
4. **There needs to be an explanation for how this study differs from the AIP survey study. It seems that this project utilizes different tests than the AIP study, but what makes these tests different from the ones employed by AIP? It needs to be clear to the reader how this study is different from past studies.**
    a. This change has been made.

Minor

1. **The table in Figure 1 should be enlarged since the inputs are hard to read**
    a. The change has been made.
2. **The plots displayed in Figure 3 and 4 do not contain astronomy as one of the degrees. These plots do highlight the racial disparity in other STEM fields and thus still demonstrate the racial diversity issues in STEM, but the focus of this project is astronomy. Plots depicting the diversity issues for astronomy degrees would be beneficial to the reader.**
    a. The requested change has been made.

Reviewer 3

The author would like to thank the reviewer for the revision suggestions provided in the review. These suggestions will be implemented onto the final version of the paper and will be reflected as such. The responses to the major/minor revision suggestions can be found below:

Major

1. **In the abstract, by saying that the biggest factor which causes people to drop is related to the racial gap, the author is assuming right off the bat that race has to do with the biggest factor which generally causes a student to stay or drop the major. This can honestly be an entire other research project in itself. It is very important to first determine the significance of race in how often people drop rather than just stating that they are not mutually exclusive.**
    a. The changes have been made.
2. **There is barely any literature cited in this entire paper. There are dozens of unsupported claims the author makes which have no basis at all since they are not cited. And the few citations that the author does have are not in the correct citation format.**
    a. It would be more helpful if the reviewer had mentioned a few of the instances in which unsupported claims take place and where the erroneous citation occurs. Nonetheless, a second look will be given to identify these areas.

3. **One very large thing that was not considered in this process was the percent of people who actually reported their diversity information. In the 2007 Diversity Survey for example, he says it takes into account every faculty member. It is tough to believe this if I do not know a quantitative percentage, with a source, of people that reported their own data. Also, how many people are in these top 50 astronomy schools? If I do not have reason to believe that they are representative of the entire population of astronomy schools then the argument somewhat becomes invalid and insignificant.**
    a. I do not understand what the reviewer is trying to say to this point. All the information necessary can be found on *Figure 1*.
4. **There is a big issue with the 2007 Nelson Diversity Survey. The author uses this study and assumes that diversity has not changed over the last 14 years, which is incredibly difficult to believe. Unless he can find a similar survey done within the last 5 years or so, I think that this section of the paper should be taken out because it is so outdated and likely not at all representative of the current day diversity statistics.**
    a. Though mentioned beforehand, there is no assumption that diversity has not changed over the last 14 years. The reviewer would be right in this being hard to believe, which is why no assumptions were made. Present-day studies still show a racial gap within astronomy.
5. **The focus of the study is very inconsistent in a variety of ways. First of all, if the author did not end up focusing on Latinx data, why mention it at all in the introduction? I was prepared to see an analysis based on Black and Latinx students, and then he mentions that the study will no longer focus on Latinx students, which is very misleading. Also, the point of the paper is to look at students in astronomy, but then the focus seems to shift to physics. Figures 3 and 4 don't even mention astronomy at all, and physics and astronomy departments are likely quite different. Finally, the paper is inconsistent because the author does not seem to really understand his own objectives. It seemed like the purpose of this paper ended up being to use statistical tests to determine which factor is the most important in explaining why people drop their degrees in astronomy, even though the objectives**

were stated as determining where the large racial gap occurs on a path to tenure and looking at the effectiveness of the current diversity programs in place. I am generally just very confused on what the point of this project was actually supposed to be. Even though there are more results that need to come in, it seems like this project was a little bit scattered and that the author was trying to figure out what he was doing as he went along, but he did not leave enough time to actually figure it out.

a. Yes, the paper has been modified to reflect these suggestions. There has also been no shift to physics at any point.

Minor

1. **Many sentences are worded in ways that make the ideas they want to convey very unclear. Some sentences have to be more concise and it often took a long time for me to decipher what the main point was.**
    a. It would be most helpful to the author if the reviewer had mentioned the location within the paper in which confusion ensues.
2. **What is the citation on the title that says released on March 1?**
    a. This change has been made.
3. **I think the title is too broad. It needs to be more representative of what he is actually analyzing, the race gap within undergraduate and graduate astronomy departments.**
    a. Thank you for the suggestion, but I believe that information would be better suited within the Introduction.
4. **There are a few things that are quite vague. For example, in the abstract he says "series of questions." What do the questions entail? What are they asking? What aspects are being compared?**
    a. The changes have been made.
5. **There are some formatting things that should be fixed, like it says Schwartz et al at the top of page 2, and in Figure 1, there is already a caption saying "Table 4."**
    a. This change has been made.

6. **At the end of the introduction, the author talks about social programs in departments to help combat the race gap. The social programs should be stated here so that the reader has a good idea of what he is talking about.**
    a. This change has been made.
7. **One of the objectives mentions tenure, however, that is the only time tenure is brought up in the entire paper. I am not sure if one of the objectives was actually supposed to be tenure or if it was a mistake to include that.**
    a. This change has been made.
8. **Figure 5 seems to be very important, however, I do not really understand what it is saying. What are the units of the mean and standard deviation (what is being measured)? What does each category in the Table actually mean? Also, the Table says that 167 undergraduate students were surveyed. How significant is that compared to the total number of physics and astronomy students in the country? How do I trust that this pool of students is big enough to represent everybody and every department?**
    a. Unfortunately, this is the only survey of its kind and thus the number of participants could always be more. For now though, these 167 data points are significant.
9. **Some of the tests should be defined, like the Likert Scale.**
    a. This change has been made.
10. **At the end of the data retrieval section, the author talks about some issues that he had in the process of completing the research. I do not think that these issues are necessary to talk about. Everybody has issues and runs into roadblocks with their projects, but they do not need to be stated in the paper since they are not necessary for the understanding of the results.**
    a. The changes have been made.
11. **At the end of the data retrieval section, the author says that Table 1 talks about the parameters used to create mock data points, but there is no Table 1 and no description of this process at all.**
    a. This change has been made.

Reviewer 4

The author would like to thank the reviewer for the revision suggestions provided in the review. These suggestions will be implemented onto the final version of the paper and will be reflected as such. The responses to the major/minor revision suggestions can be found below:

Major

1. **"With this information, python was utilized to create individual mock student responses that followed those constraints.": I was concerned with how this moc responses can be representatively enough to study the correlation in each factor. It seems like the survey does not specify the distribution of the data (if yes, the author should state that in the text), thus it is even harder to produce the individual mock responses accurately. I suggested the author should try to get the actual answers from AIP and then use those data to continue.**
    a. This change has been made.
2. **"Table 1 contains ..." : there is no Table 1 in the paper. Also, if the author uses the parameters from the survey, he should refer to Figure 5 rather than making a new table repeating the numbers.**
    a. This change has been made in the paper.

Minor

1. **"... a series of questions.": the author should specify what types of questions.**
    a. This change has been made
2. **"... racial diversity among their demographics.": need citation. "The 2007 Nelson Diversity Survey highlights ...": needs citation.**
    a. These changes have been made.
3. **"Figure 2 is of the U.S census throughout the years..: needs citation. Also, I suggest that only the year 2007 in the Figure is needed, because the Nelson Diversity Survey only has data in 2007.**
    a. The change has been made.
4. **Figure 2: the "number (in thousands)" term should be in the middle of the line.**

a. This change has been made.

5. **“As suspected, the racial disparity is not as severe in the undergraduate level.”: needs citation, or the author should refer to Figure 3 and 4.**
    a. This change has been made.
6. **“... bachelor degrees than in the two previous areas.”: the author should specify what type of bachelor degrees that are mentioned here.**
    a. This change has been made.
7. **“Figure 3 displays ... same for the Latinx group.”: this should be stated in the beginning of the paragraph. Also, the author should state where those these figures are adopted from (or if he make it, the author should specify what data he uses).**
    a. This change has been made
8. **“... creating task forces meant to place importance on diversity and inclusion.”: need citation.**
    a. This change has been made.
9. **“... the American Institute of Physics was utilized.”: a short description of the data is needed. “... but is also backed up by various literature.”: some citations are needed to illustrate this point.**
    a. These changes have been made.
10. **“... will shift to these two racial groups.”: if the scope of the project only focuses on the White and the Black students, the introduction should not mention too much on the Latinx student as it is right now, but rather only focuses on the Black students.**
    a. This change has been made.
11. **“Figure 5 displays...”: the author should state that it is adopted from the report.**
12. **“A Likert scale was utilized ...”: explanations and citations for this scale are needed.**
    a. The changes have been made.
13. **“The AIP report presented...”: the full phrase of AIP should be stated first (for example, in the beginning of the section, the author should add “(AIP)” after the phrase “American Institute of Physics”.)**
    a. The changes has been made.
14. **“Statistical tests are then performed with...”: the author should specify which tests he uses.**

a. As mentioned in the paper, the name of the tests are provided.

15. **Figure 5: citation is needed in the caption.**
    a. This change has been made.
16. **“To ensure this, the 7 Classical Assumptions of Ordinary Least Squares was consulted.”: need citation**
    a. This change has been made.

Reviewer 5

The author would like to thank the reviewer for the revision suggestions provided in the review. These suggestions will be implemented onto the final version of the paper and will be reflected as such. The responses to the major/minor revision suggestions can be found below:

Major Points

1. **The three major tests used on the potential data (Breusch-Pagan, Breusch-Godfrey, and RESET) are not at all explained in depth.**
    a. I agree and as such, more details have been given to these tests.
2. **Lack of data.**
    a. Due to time, there is nothing that can be done regarding a lack of real-world data.
3. **Lack of discussion on the actual factors.**
    a. This change has been slightly made, as too many factors are present for discussion.

Minor Points

1. **“Schwarz et al.” listed at the top of each page instead of the author’s name.**
    a. This change is reflected onto the final version paper.
2. **Introduction: “...and approximately 1% identified as Black or Latinx.”**
3. **Although it is important that we acknowledge the plight of Latinx people in the field of astrophysics, perhaps since the focus of the study has turned to the disparity between white and black, the mention of specific Latinx data makes the introduction convoluted with unnecessary data.**

    a. This change has been made.
4. **Section 2.2: “A Likert scale was utilized for the participants to record...”**
5. **Section 2.3: “...as a checklist that the survey data must satisfy so as to yield the best possible estimates.”**
    a. These changes have been implemented onto the paper.

Reviewer 6

The author would like to thank the reviewer for the revision suggestions provided in the review. These suggestions will be implemented onto the final version of the paper and will be reflected as such. The responses to the major/minor revision suggestions can be found below:

Major Points

1. **Many values in the introduction are not cited**
    a. This change has been made
2. **The introduction spends time talking about Latinx but the project later focuses on Black only**
    a. This change has been made.
3. **Data has not been acquired**
    a. This was an unfortunate event that was beyond the author. Nothing could be done to remedy this.
4. **Results not mentioned for both real world data as well as mock data.**
    a. This change has been made.
5. **At this stage there is no conclusion and the paper has no results**
    a. This change has been made.

Minor Points

1. **Figure 1 is small and hard to read**
    a. This change has been made.
2. **Figure 5 is blurry**
    a. This is as large as the image can be while still retaining legibility.

3. **§2.1 an explanation of why the factors need to be introduced with equal importance. Could they not be unbalanced in their nature?**
    a. This change has been implemented.
4. **§2.2 author mentions a Likert scale was utilized but no explanation of what a Likert scale is is provided**
    a. This change has been implemented.
5. **The Breusch-Godfrey and RESET tests are mentioned in §2.3 but never referred to earlier as being used**
    a. This change has been made.
6. **There might be more than one main factor to take into account for the conclusion**
    a. Correct, but due to lack of time only 1 factor will be classified as such.
7. **Paper would benefit from an additional proofread**
    a. I plan on executing more proofreads.

Reviewer 7

The author would like to thank the reviewer for the revision suggestions provided in the review. These suggestions will be implemented onto the final version of the paper and will be reflected as such. The responses to the major/minor revision suggestions can be found below:

Major Points

1. **The data analysis is incomplete. The results from the proposed data analysis must be completed and discussed in order for the paper to be considered for publication. The paper lacks a discussion of the results because of the incomplete data analysis section.**
    a. This change has been implemented.
2. **Although the paper will be easier to understand once the author completes the data analysis, more explanation on the statistical techniques could be given even without results. The exact plan of action needs more explanation. Some terms need more explanation to avoid confusion for the reader. These terms include: the Likert scale,**

the 7 Classical Assumptions of Ordinary Least Squares, the BREUSCH test, the Breusch & Pagan test, and the Ramsey test. Again, some of these might become clearer once the data analysis is complete as long as the author provides a detailed explanation of how he applied the tests.

a. This change has been added.

Minor Points

1. **The tables should be enlarged. It is difficult to read some of the numbers, especially in the first table from the 2007 Nelson Diversity Survey.**
    a. This change has been implemented.
2. **The first page states that the paper was released on March 1st, 2021. This needs to be removed until the paper is released.**
    a. This change has been added.