Lab Report Notes SS Bootis

This page has notes specific to writing up a lab on the star SS Bootis. Many of these items should have been in the lab manual. This activity does have a lot of potential. The bold faced terms set off with quotation marks are key terms you would be wise to use in writing your report.

Title page

I think everyone has this down.

Introduction

Here we say in broad terms that we are using "**observations**" of two types published in the "**literature**". We will extract the "**data**" we need from those observations to calculate the "**physical parameters**" of the two stars.

Theory

Here we begin by noting our method allow us to derive the "**masses and radii**" of the two stars. We get the "**sum of the masses**" from "**Kepler's third law**". Long term observations of this star system have established the period of the orbit very accurately. All the rest of the work we did was to get the semi-major axis of the system. Then we give a good explanation of Kepler's third law. To do this we should research this topic in our textbook and online and be sure to list our textbook the other references in the bibliography. Don't wait until the end to enter items in the bibliography. Go ahead and put our lab manual in there now and add other items as you go. That way it is done when the report is done and you aren't scrambling around at the deadline trying to find the right way to make the bibliographic entry. Your first equation should be the astronomer's version of Kepler's third law.

The other part of the theory you should develop for the reader is the idea that the "**photometric data**" gives us the "**timing of events**", that is the time of specific locations in the orbit of the star system, while the "**spectroscopic data**" provides the "**velocities**" of the stars in their orbit. Time and velocity allow the calculation of "**distance**" and that is how we get both the value of the semi-major axis and the radii of the stars. Think about this idea that is poorly explained in the lab manual:

1. It takes roughly 7.6 days for the stars to orbit and they are traveling roughly 75 km/sec.
2. The product of those two numbers is the circumference and is about 49 million kilometers.
3. If we have the circumference of a circle we have its radius and
4. The radius of a circle is its semimajor axis. Ta da! The lab manual really should say that.

Other equations? The circumference/radius equation and distance/velocity/time equations are too simple to include. We assume everyone reading your report knows those equations. **There might be a few more and I will add them here as I think of them.**

Those topics are the kinds of things in the theory section. It is the most important section in your lab report in the view of this instructor. Hint, hint.

Procedure

For this study the procedure is really the "**data reduction**". So in this section you lead the reader through the steps of the data acquisition and reduction. You should make reference to the appendix that I will help you update to better reflect for the reader what we did.

Data

Here we present our raw data in tables for the reader to examine. We introduce the tables with at least one sentence describing what is in the table and how we obtained the numbers. Every table should have a number in Roman numerals and a title. At the end of this section is a sample Table I showing layout and formatting.

This is actually a difficult data set to put into a good table. I did a lot of thinking about this one. There are other ways to do this as well. I made the table in Excel and then copied and pasted it here. That approach usually works better for me than doing it in Word which defaults to a horrible bunch of unnecessary lines. There should be three lines. One at the top of the header row and one at the bottom and one after the last line of data. There are no other lines in the usual table and no vertical ones for sure.

Table I

Timing Data from the Light Curve

parameter	value	units
orbital period	7.60614	days
time, first contact	331.778	days[1]
time, second contact	331.947	days[1]
time, third contact	332.153	days[1]

[1] = JD – 2,444,000

Results and Conclusion

Again here we present a table with the results introduced with at least one sentence describing what is in the table and how we obtained the numbers.

Here you explain what you found and how it agreed and differed from what might have been expected. You also offer an explanation of possible causes for the difference from the expected result and how the study might be repeated in the future perhaps with new data.

Bibliography

Using standard bibliographic format, cite all the published sources you consulted during the conduct of the experiment and the preparation of your laboratory report. This section might have only two entries, the lab manual and your textbook.

Appendix

For this lab report the page of data reduction computations from Excel would go here.

Other Terms Expected in the Report

period,
semimajor axis
solar masses, M_{Sun}
solar radii, R_{Sun}
sum of the masses
mass ratio
radial velocity