SAS Honors Seminar 256: Extraterrestrial Life

10/11/2011

Reading for Thursday (10/13)

Bennett & Shostak 7.1, 10.1-10.5, 11.3 – background on "habitable zones" in and beyond our Solar system

Endl & Kürster (2008) – research on the possibility of a planet around Proxima Centauri

Lineweaver et al. (2004) – concept of a habitable zone within the Milky Way

Cheat sheet is already on the website.

Response paper for Tuesday (10/18)

Explain whether and/or how you think that study of the other planets (and their satellites) in the solar system has improved, or can in the future improve, our understanding of our own world.

Stylistic advice for response papers (I)

Problem:

Copernicus developed the heliocentric model. This was very important for the field of astronomy.

Solution:

Copernicus developed the heliocentric model. This advance was very important for the field of astronomy.

Stylistic advice for response papers (II)

Problem:

As a future astronomer of Polish ancestry, Copernicus serves as something of a role model for me.

Solution:

As a future astronomer of Polish ancestry, I see Copernicus as something of a role model.

Stylistic advice for response papers (III)

Problem:

Copernicus's work is qualitatively similar to modern theoretical astrophysicists.

Solutions:

Copernicus's work is qualitatively similar to that of modern theoretical astrophysicists.

Copernicus's work is qualitatively similar to modern theoretical astrophysicists'.

Stylistic advice for response papers (IV)

Problem:

***De revolutionibus orbium coelestium* was an idea**
that revolutionized our understanding of science.

Solutions:

***De revolutionibus orbium coelestium* contained**
ideas that revolutionized our understanding of science.

***De revolutionibus orbium coelestium* was a book**
that revolutionized our understanding of science.

Mid-term projects

Main idea:

I give you some data.

You perform a quantitative analysis of the data.

You write up a 2-3 page summary of your analysis and turn it in November 3rd (email me any spreadsheet, mathematical analysis, program, etc. you used).

Frank advice: don't leave analysis until night before!

You will have three options... Make your final choice by this Thursday in class!

Option #1: Radial velocity planet detection

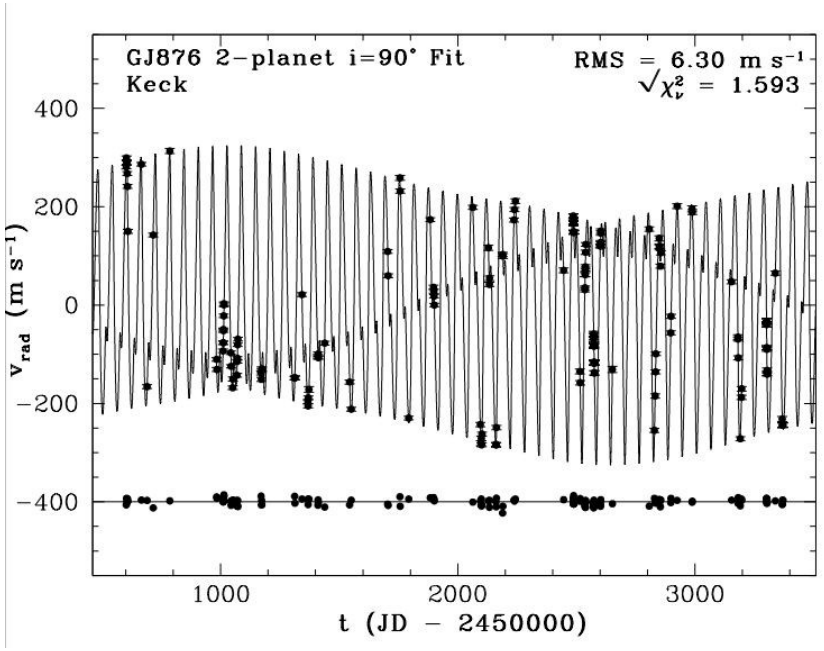
You will be given a time series of radial velocity measurements of a star about which at least one planet is orbiting. (I will not tell you the star.)

Your task: determine the orbital period of the planet!

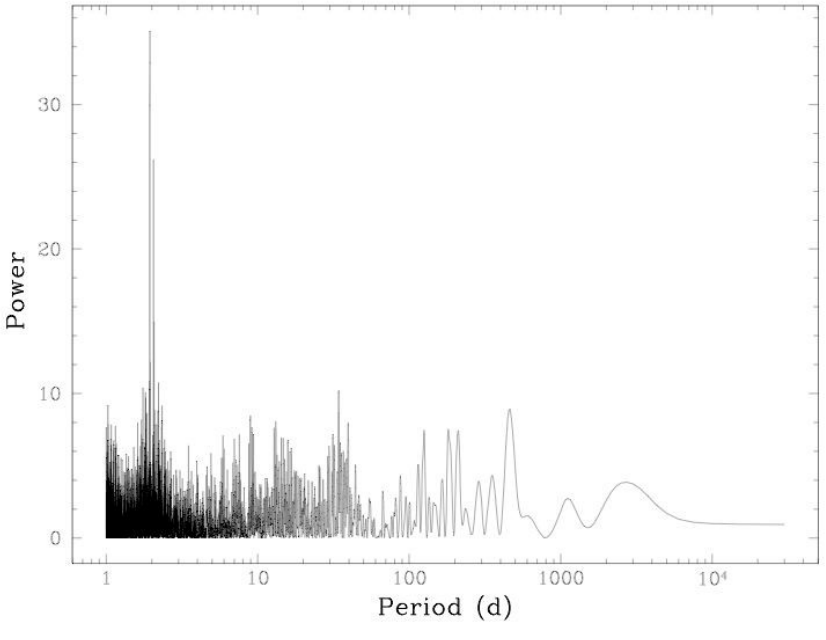
Method: calculate a periodogram from the data you are given.

Option #1: Radial velocity planet detection

Rivera et al. (2005): residuals to a two-planet fit to radial velocities...



...show a definite periodicity at 1.94 days! Hello, third planet.



Option #2: Which stars have planets?

You will be given a table providing comprehensive information about a large sample of stars, all of which have been searched for planets – but not all of which have planets!

Your task: determine whether there are any properties of a star per se that improve the odds of its having at least one planet.

Option #3: Exoplanet properties vs. time

You will be given a table providing comprehensive information about a large sample of exoplanets, including the dates when they were discovered.

Your task: determine whether there are any properties of an expolanet that correlate with the date when it was discovered.