SAS Honors Seminar 259:
Extraterrestrial Life

10/6/2008

Reading for Wednesday (10/8)

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

Endl & Kürster (2008) – new research result on the possibility of a planet around Proxima Centauri (5 pages; cheat sheet already on website)

Response paper for Monday (10/13)

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.

Scheduling for next two weeks

Mon 10/13: physics department faculty meeting ⇒
    main course meeting will be 7:40-9:00pm with food provided;
    please let me know by email whether you will come then
    or at the regular time (when I'll be late...), and food preferences

Mon 10/20: guest teacher = Prof. Chuck Keeton

Wed 10/22: flight from Madrid lands at Newark at 2pm!; I would
    like to have at least one cell phone number so that I can let
    you know if I will be delayed

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 October 29th (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 Wednesday 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.)

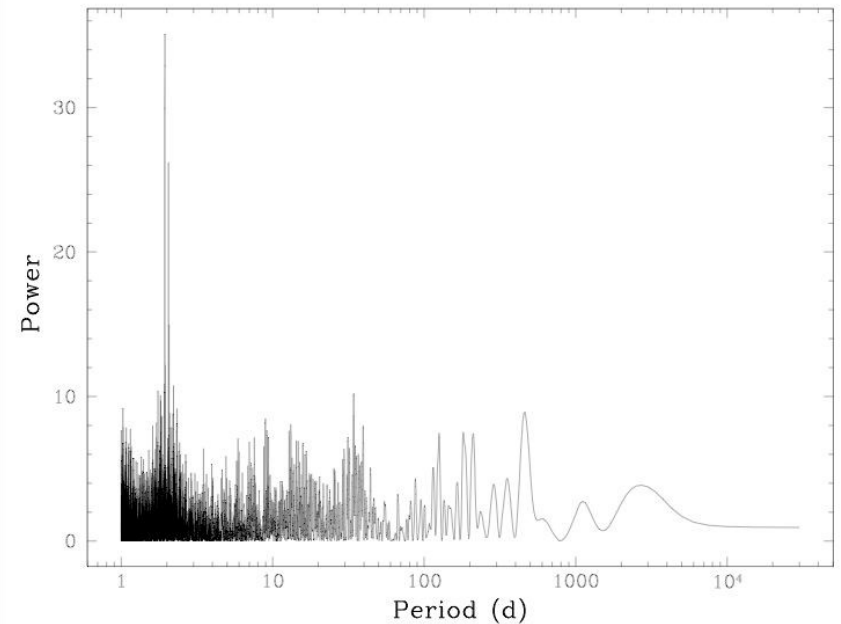Your task: determine the orbital period of the planet!

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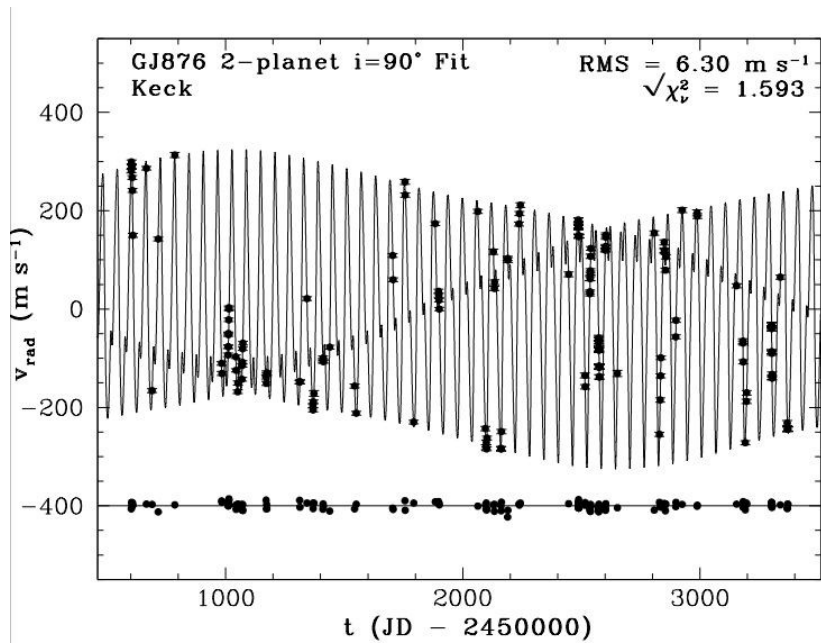
...show a definite periodicity at 1.94 days! Hello, third planet.

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.