Physics of Planetary Systems — Exercises — Set 4

Problem 4.1 *(2 points)*

The HARPS spectrograph can achieve a radial velocity precision of 1 m/s in a 30 min exposure on a 9th mag G2 star. What is the expected measurement precision on a 15th magnitude G2 star with the same rotational velocity in a one hour exposure?

Bonus problem 4.2 *(2 extra points)*

Give 2 techniques for measuring precise stellar radial velocities. Note 2 advantages and 2 disadvantages for each.

Problem 4.3 *(1 point)*

Figure 1 shows a transit light curve from a CoRoT planet candidate with an orbital period of 13.68 days. Estimate the radius of the host star assuming a stellar mass $M_* = 1\ M_\odot$. Is this a good candidate for being a planet?
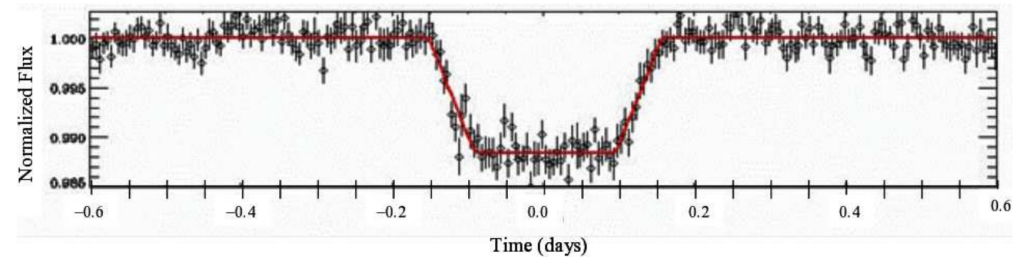

Figure 1: Transit light curve from a CoRoT planet

Problem 4.4 *(3 points)*

Find *all* possible power-law stationary solutions for surface density Σ, temperature T, and viscosity ν of accretion disks. Which of them are physical and which are not?