Physics of Planetary Systems — Exercises — Set 1

Problem 1.1 *(1 point)*

Why are there so many different exoplanet detection methods in use?

Problem 1.2 *(3 points)*

Go to
`http://www.exoplanet.eu`
or
`https://exoplanetarchive.ipac.caltech.edu`
and plot the orbital periods versus semi-major axes for planets discovered via radial velocity surveys.

(a) Why is there such a strong correlation?

(b) Why is there scatter about the correlation?

Bonus point: what does this tell you about the sample of planet host stars?

Problem 1.3 *(1 point)*

The typical mass of a giant molecular cloud is $10^4 ... 10^6 M_\odot$, the typical size is 10...100 pc. Estimate the mean stellar density of stars in the midplane of the Milky Way (i. e. the number of stars per pc^3). What limits the accuracy of your estimate?

Figure 1: The Great Nebula in the constellation of Orion. The Orion Nebula harbors many so-called stellar nurseries, which contain hydrogen gas, hot young stars, protoplanetary disks, and stellar jets. (Image: hubblesite.org)

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