Effect of Planetary Amplitude on Planet Detectability

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Project Goal:

- Investigate if it is more difficult to detect smaller amplitude planetary signals or large amplitude?
    - Use GP regression modeling
    - A planet with a period of 10 days (a=0.092 AU)
    - Orbiting a Sun-like star
    - Star is near the solar maximum
- What is the threshold amplitude for detection?

John

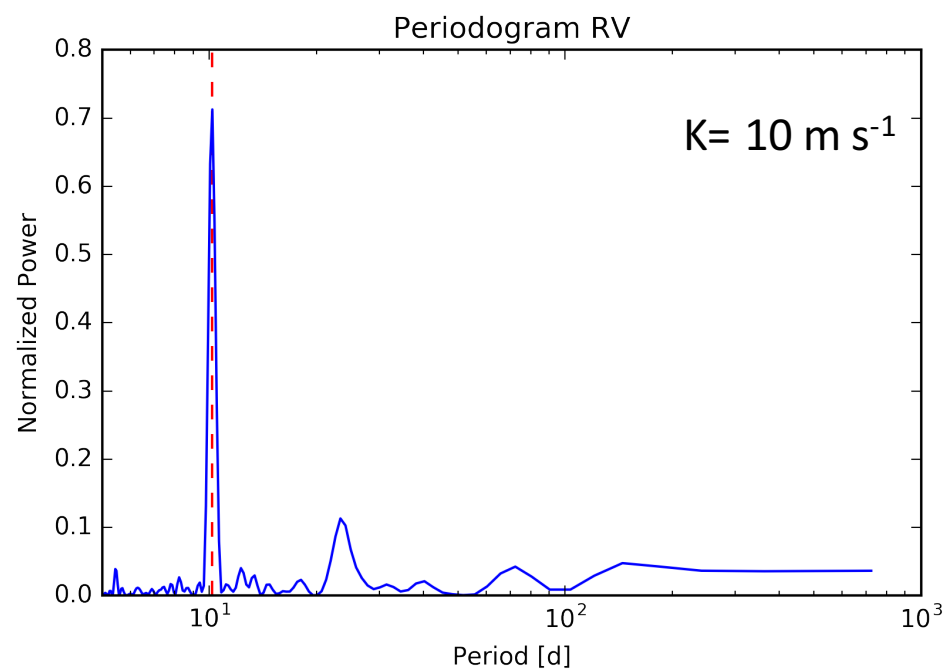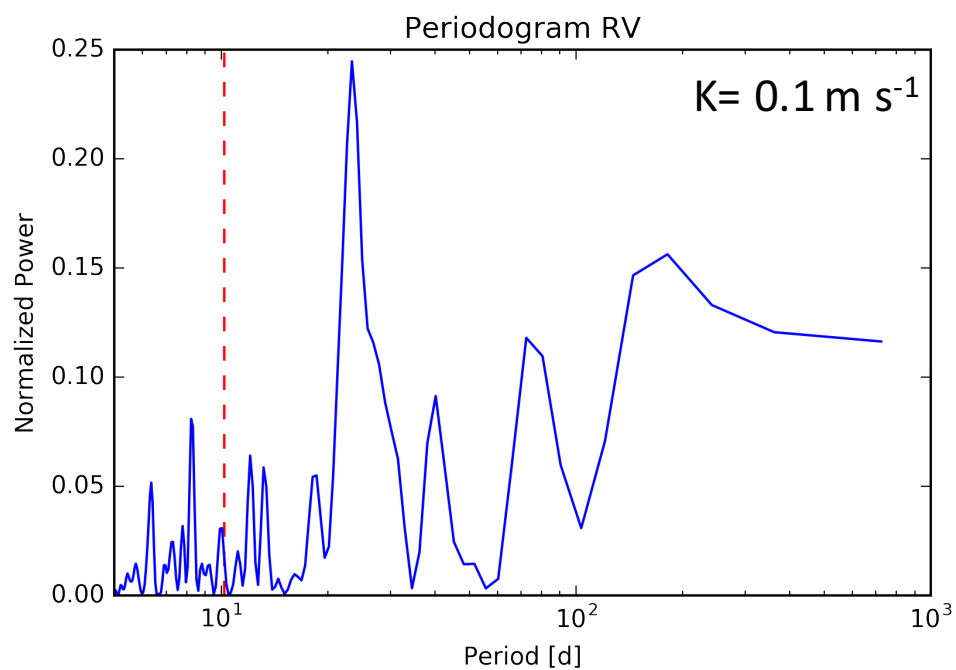# Effect of Planetary Amplitude on Planet Detectability

Hypothesis:

- Large mass (amplitude) planets should be easier to detect than small mass (amplitude) planets.

Methodology:

- Run several models, adjusting the K-amplitude from 0 m s^{-1} to 10 m s^{-1} while keeping the period fixed to 10.2 days.
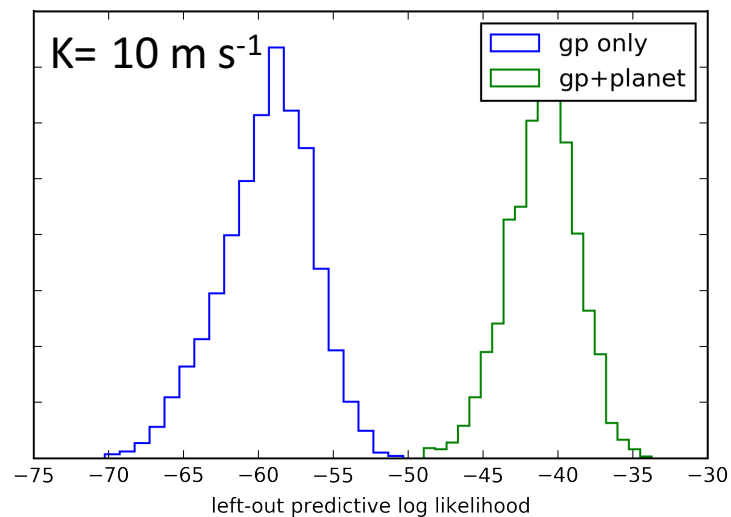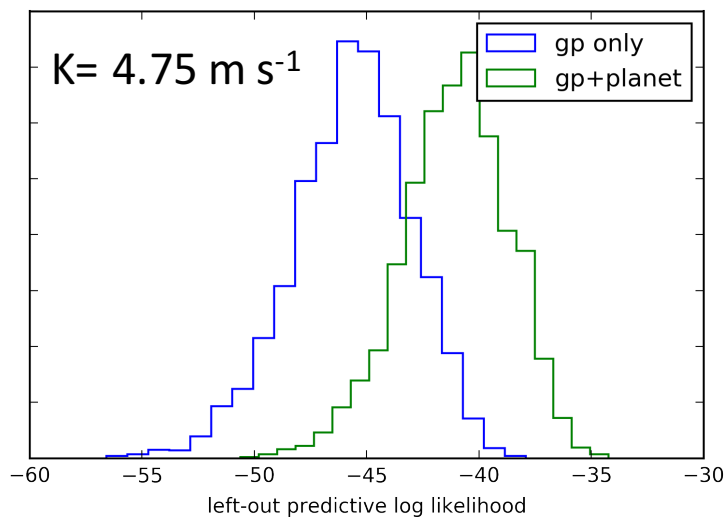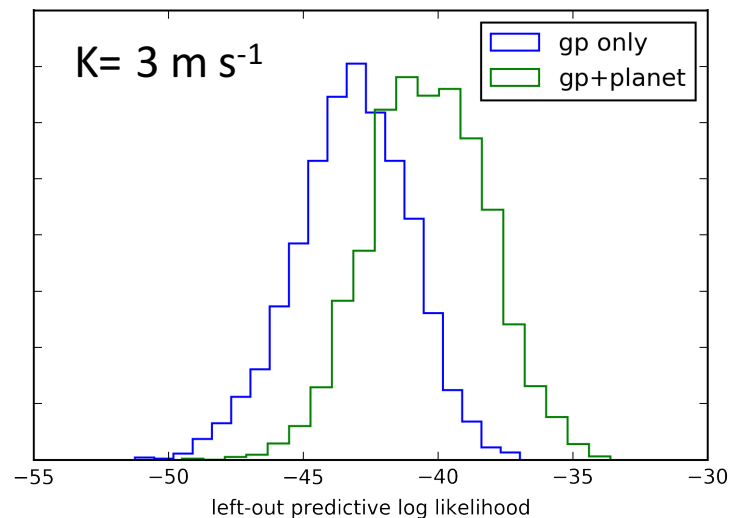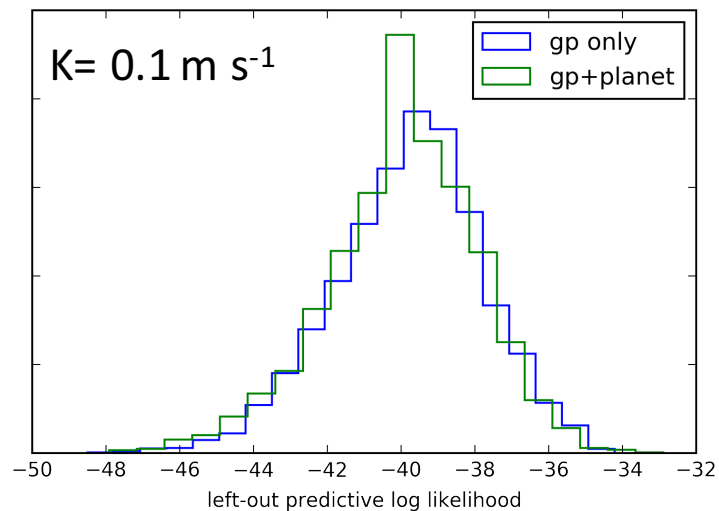
Jingjing

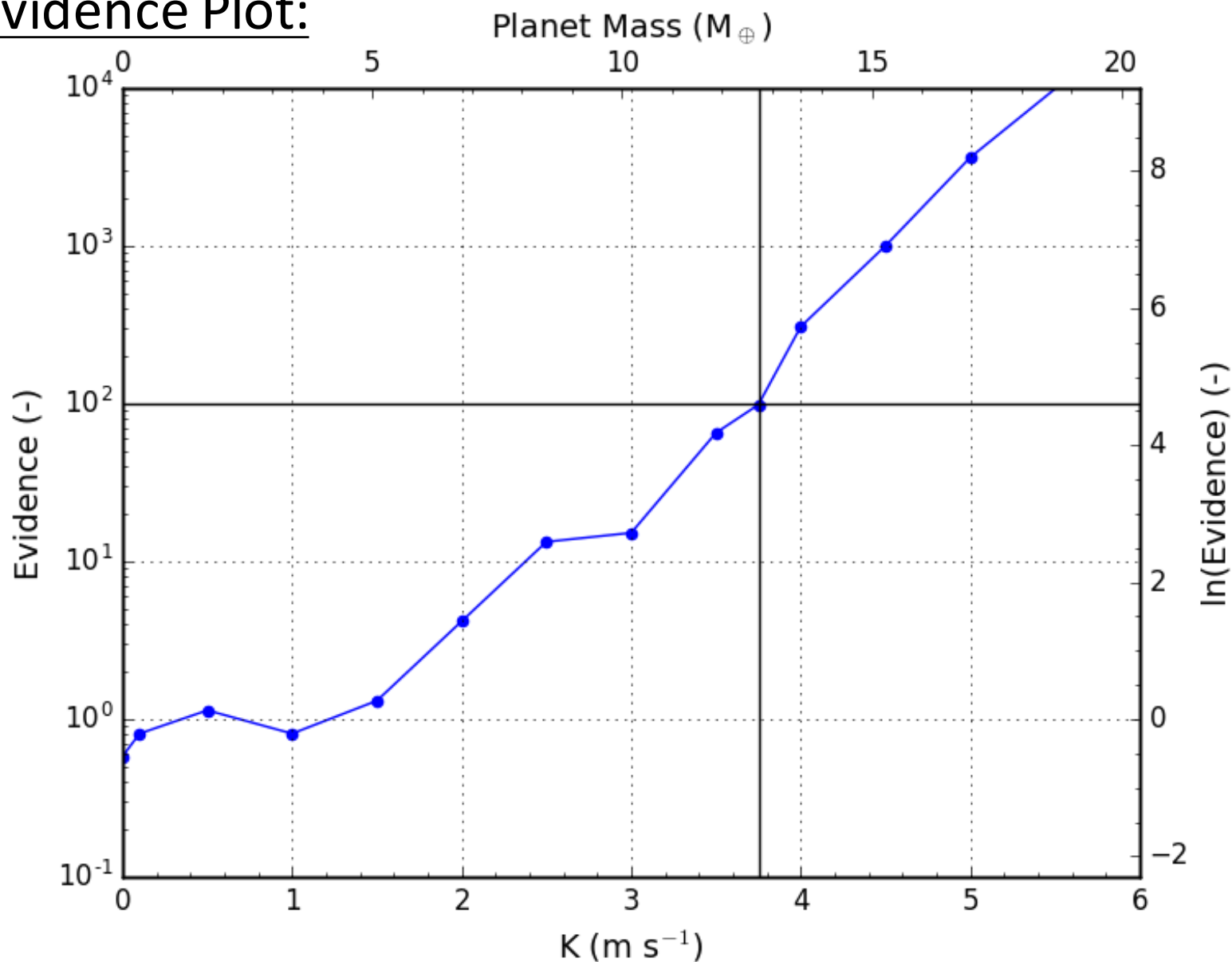# Effect of Planetary Amplitude on Planet Detectability

Periodogram Results:

Matteo

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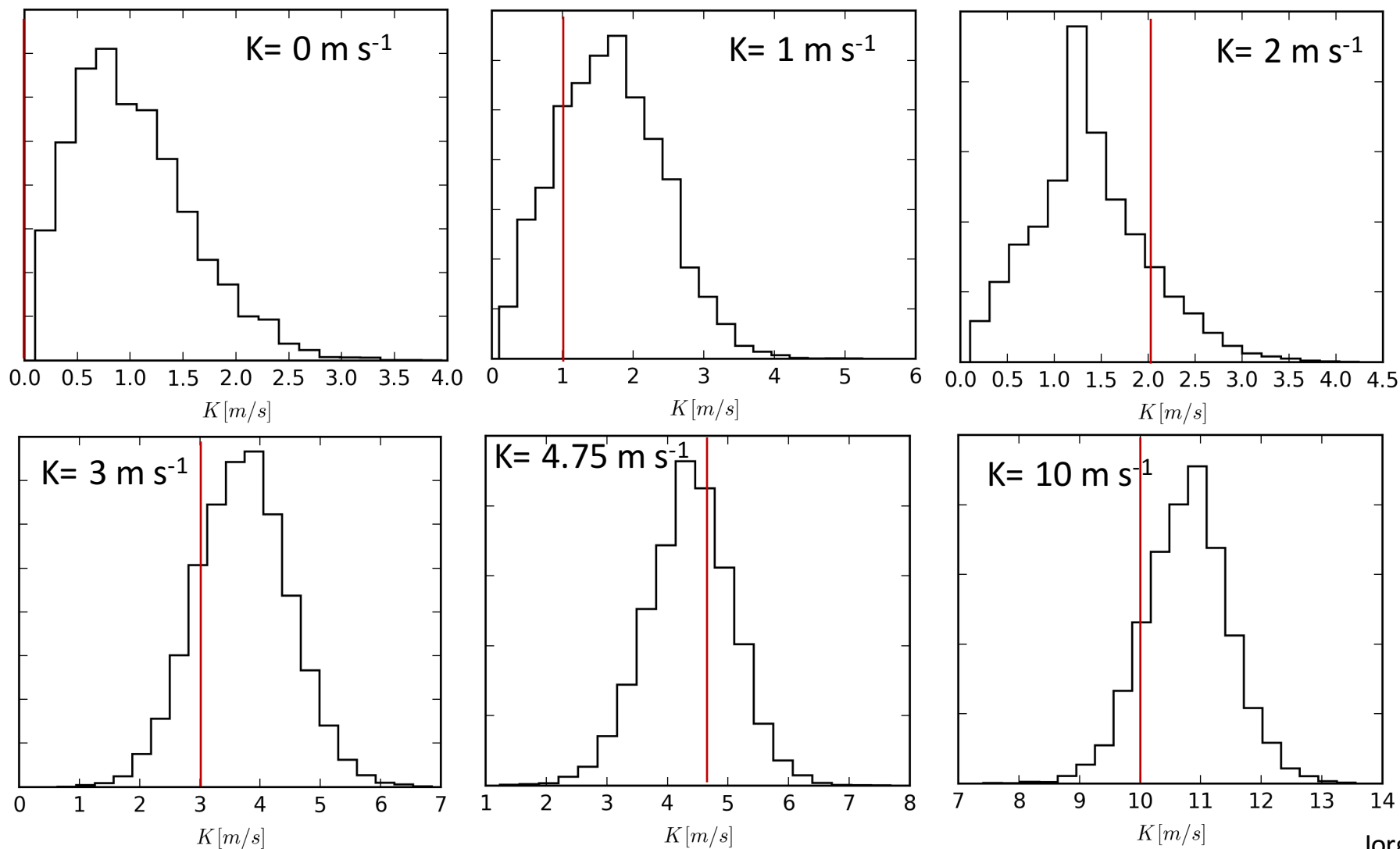
Evidence Histograms:

Jorge

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Evidence Plot:

John

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K Histogram Results:

Jorge

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Conclusions:

- For this activity configuration, we have a detection limit of 4.75 m s^{-1}.

- Observed an amplitude bias possibly caused by "uninformative" priors and that we are forcing the presence of a planetary signal.

Future Perspective:

- Test how does adjusting both the amplitude and period affect the detectability and the evidence.

- Test how different possible spot configurations and phases of the solar cycle affects the detection limit.

Matteo

Reference Documentation

1. Background Information:

   Fischer et al. 2016 - http://adsabs.harvard.edu/abs/2016PASP..128f6001F

2. Hands - On Guide:

   Xavier Dumusque - http://nexsci.caltech.edu/workshop/2016/RV_hands_on_session_guide.pdf