Intro2Astro - Week 2 Assignments

Kaushik P Palavalasa
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I. ASSIGNMENT 1

See the other PDF in the folder.

II. ASSIGNMENT 2

I do not think that I am not familiar with the basics of Python, I took a course on computation for physics in my first sem. I made my own three body grav sim which you can find at GitHub.

III. ASSIGNMENT 3

See the ipynb file in the folder.

IV. ASSIGNMENT 4

1. **Radial Velocity**
   - 1.1. What are the primary limitations of the radial velocity method in detecting exoplanets, particularly concerning orbital inclination and stellar activity?
   - 1.2. How have advances in high-precision spectrographs improved the sensitivity of this detection technique?
2. **Transit Photometry**
   - 2.1. Why is high-precision photometry essential for detecting transiting exoplanets that induce a brightness dip as small as 1% or less?
   - 2.2. What key strengths and weaknesses are associated with space-based observations like those from *Kepler*?
3. **Microlensing**
   - 3.1. How does ultra-wide-field, high-cadence monitoring enable microlensing detections in the Galactic bulge?
   - 3.2. What are the observational advantages and challenges of employing microlensing compared to other methods?
4. **Direct Imaging & Adaptive Optics**
   - 4.1. How have high-contrast coronagraphs and adaptive optics systems enabled the direct detection of planets around other stars?
   - 4.2. What are the current observational constraints and limitations when imaging faint planetary companions directly?
5. **Planet Formation and Evolution**
   - 5.1. Based on current observations, what insights have we gained about planetary formation and evolution across different detection methods?
   - 5.2. How do detection biases from various methods influence our understanding of planet demographics and the architecture of planetary systems?
6. **Future Observation Endeavors**
   - 6.1. What upcoming space- or ground-based missions are highlighted in the paper, and how are they expected to enhance exoplanet discovery?

6.2. How will future instruments and missions help overcome current observational challenges or biases?

7. **Synthesis and Open Questions**

7.1. How does combining multiple detection techniques offer a more comprehensive view of exoplanetary systems?

7.2. What gaps or open questions does the author identify in our current understanding that future research should address?

V. WRITING PROMPT

I'd really like to learn the physics behind astronomy so that I move towards my goal of programming FPGAs for CCDs at observatories around the planet.