Exoplanet Names: _____

Comparing Exoplanet Detection Methods Lab

Now that you've been introduced to five different exoplanet detection methods, the purpose of this lab is to compare and contrast them.

1. To start, come up with a one sentence description of each method in your own words.
    a. Radial Velocity

    b. Transits

    c. Direct Imaging

    d. Microlensing

    e. Astrometry

2. Now for some comparisons. Fill in the table at the end of the lab summarizing the detection methods. Astrometry is filled in for you as an example

Exoplanet Names: _____

3. Consider the Mass-Separation plot that we've been studying this semester, also included at the end of the lab.
    a. Label the Hot-Jupiter, Super Earth, Jupiter-like, and Super Jupiter regions
    b. Draw an arrow for each detection method from the area of the diagram where the method is the **most** sensitive to detecting planets to the area where it is the **least** sensitive and label it with the method.

4. In your own words, describe why the region of the plot containing most of the planets in our own solar system is unpopulated.

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Detection Method	Best at detecting (circle)	Why?	Physical Properties determined	Pros of this Method (at least two)	Cons of this Method (at least two)
RV	close/far big/small				
Transits	close/far big/small				
Direct Imaging	close/far big/small				
Microlensing	close/far big/small				
Astrometry	close/**far** **big**/small	Astrometric detection gets easier whenever a star's orbit around the center of mass of the star+planet system is large. The semi-major axis of the star's orbit increases with increasing planet mass AND with increasing planet distance	Mass Orbital Period	1) Sensitive to systems with a wide range of inclinations, including face on 2) Exact (not minimum) mass determined	1) So far only one planet has been discovered this way 2) Requires long term monitoring by space telescopes → expensive

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