

PHYS178 – Assignment.

Due: Monday 3rd November 2008

This assignment contributes 2% to your final grade. Please write brief answers directly on the sheet in the spaces provided (and on the back if necessary). The assignment should be turned into the PHYS178 assignment box on level 2 of E7A.

1. What do you think is the most important power of a telescope and why?

Light gathering Power.

Small increase in diameter leads to large increase in light collected. Resolution can only be improved for larger telescopes by putting the telescope in space or by the use of adaptive optics since the earth's atmosphere puts a strong limit on resolution for any telescope above 20cm objective diameter

2. Outline some of the major observational difficulties that need to be overcome in detecting extra-solar planets.

The strong glare from the host star makes it extremely difficult to image extra-solar planets directly

The gravitational effect of extra-solar planets (even with many times the mass of Jupiter) as they orbit their host stars are extremely weak. This requires extremely sensitive and accurate spectrographic systems to measure the induced Doppler wobbles.

3. Select one of the current established techniques that have been used to find extra-solar planets and briefly describe how it works.

Doppler shifts. This works by using the observed to-ing and fro-ing of observed absorption lines in the spectrum of a star due to the orbit of planet(s) around the centre of mass of the star-planet system. Extremely accurate measurements at the m/s level are required to detect these effects due to the gravitational pull of the major planet(s) in any system on their host stars.

4. Several hundred extra-solar planets have now been discovered but the planets and planetary systems exhibit a surprising range of properties. Briefly detail some of these 'surprises'.

- Detection of massive Jupiters in close orbit to the host star of our own solar system and short orbital periods
- Extra-solar planets that have highly eccentric orbits compared to our own solar-system
- Some extra-solar planets have density distributions lower than predicted