**<http://www.bbc.co.uk/science/space/universe/key_places/51_pegasi#p009fqdn>**

[**http://en.wikipedia.org/wiki/Barycentric\_coordinates\_%28astronomy%29**](http://en.wikipedia.org/wiki/Barycentric_coordinates_%28astronomy%29)

**Background**

Kepler’s third law:

 

where p = orbital period (years) and a = average orbital distance (AU).

Thus mean orbital velocity = 

Newton’s version of this is:

 

but since Mstar >>> Mplanet

so given *p* measured from the Doppler effect we can find *a* (assuming the star’s mass is known).

Mplanet can be obtained by conservation of momentum i.e. there is no motion relative to the centre of mass of the rotating system:

 

*p* and *v* come directly from the Doppler plots, *a* is calculated as above so we can get *Mplanet*.

**The experiment**

Looking at the masses on a catenary experiment this last bit is relevant i..e conservation of momentum.

In general we can say that  where m is the mass of a body and the relevant *x* is the distance from that body to the centre of mass. That is what the data should show.

However, it looks like they only measured one of the x values. If the distance between the masses was kept constant something can be recovered since, if d is the total distance then

 