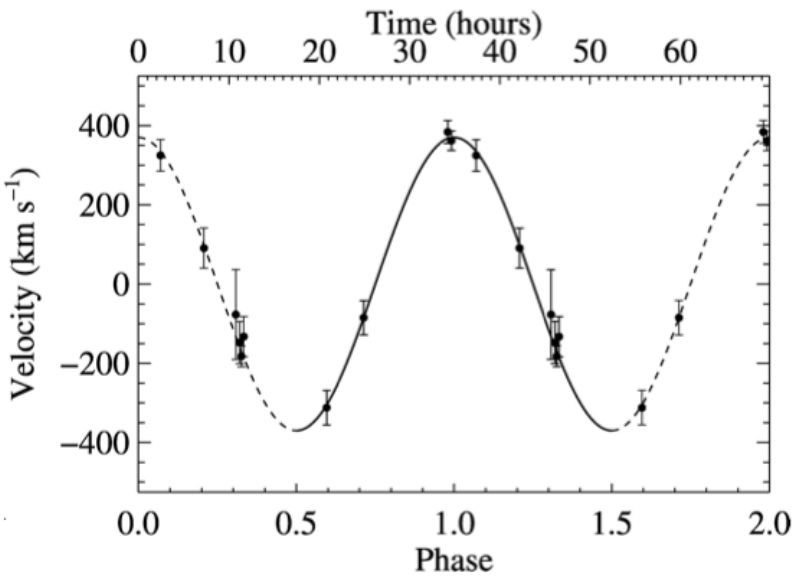
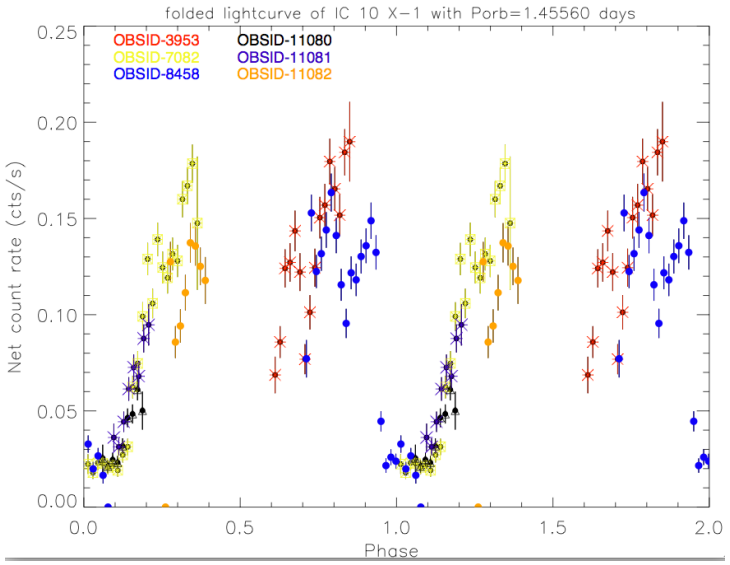


Radial velocity curve of the visible star in the binary



Eclipse lightcurve of the X-ray source, as it passes behind the stellar companion

Assignment:

Just what IS this unusual binary star system?

Consists of a single star, which shows a perfect sinusoidal radial velocity variation (hence we know it is a binary).

In X-rays it resembles an eclipsing binary,

The twist? The X-rays are coming from the invisible star, AND notice that we only have a radial velocity curve for ONE of the stars!

Why is the other star invisible in the optical?

Find:

1. Mass function
2. Absolute Magnitude
3. Luminosity (L/L_{sun})
4. Mass of Each Star
5. Physical size of the primary

V_{mag}= 22.55	(apparent mag)
A_v = 3.0	(extinction)
D=600 kpc	(distance)
B-V= -0.32	(color index)
$M-m=-2.5\log_{10}(f_1/f_2)$	magnitude defn.
$\mu = 5\log_{10}(D_{pc}) - 5$	distance modulus

Assignment: Hints

- In tackling this assignment, think about the last homework, and use the equations given throughout this ppt slide collection.
- The mass function is the minimum possible mass of the unseen star. What does your result imply?
- Although you only have the RV curve for one star, notice that you can find a mass ratio.
- Try to estimate one of the masses from the photometry data (magnitude, distance, extinction). You will need to use the data sheet that you were given, to estimate the mass of the primary (the visible star) from its spectral type.
- With a mass ratio, and with a velocity (from the RV curve) can you find the other mass?
- Is there a relationship between the mass ratio and the ratio of orbital velocities?
- Armed with both orbital velocities and an eclipse lightcurve, can you infer the approximate size of either star?
- Now give an explanation of your findings.