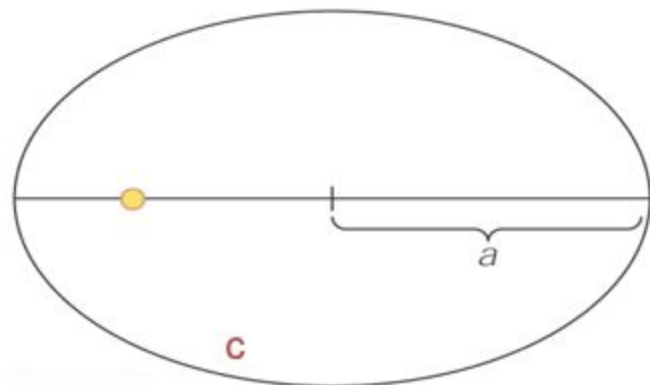


ASTR702

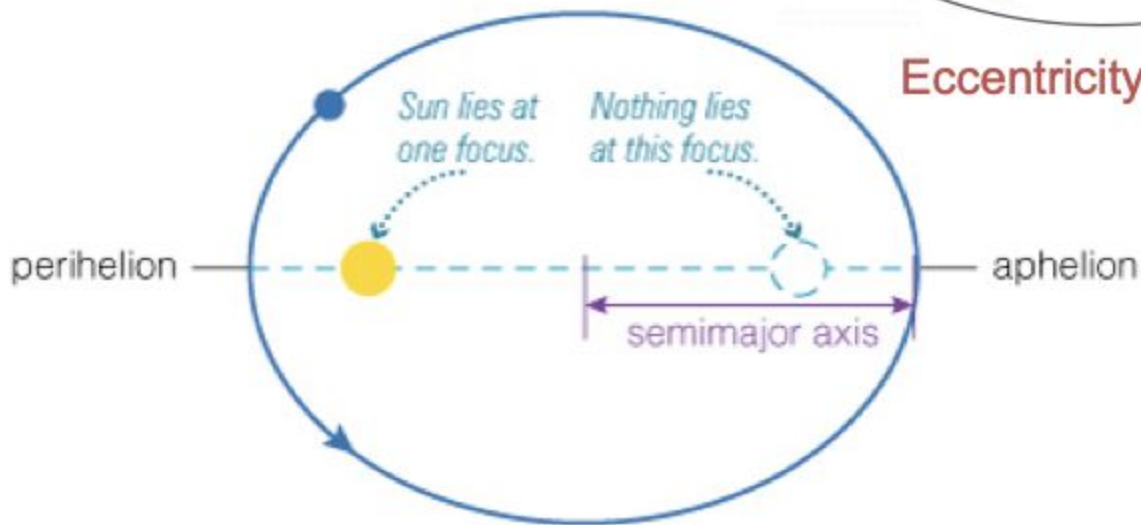
Binaries

Kepler's 1st Law

Law #1: The orbits of the planets are **ellipses** with the Sun at one focus.



$$\text{Eccentricity } e = c/a$$



Eccentricities of Ellipses

1)

$$e = 0.02$$

2)

$$e = 0.1$$

3)

$$e = 0.2$$

4)

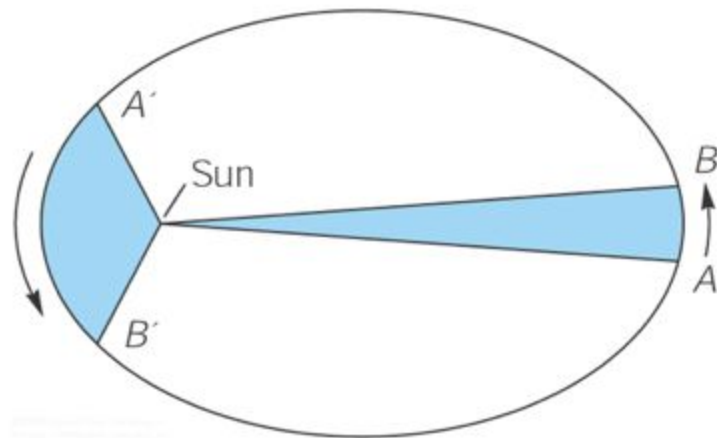
$$e = 0.4$$

5)

$$e = 0.6$$

Kepler's 2nd Law

Law #2: A line from a planet to the sun sweeps over equal areas in equal intervals of time.



Kepler's 3rd Law

A planet's orbital period (P) squared is proportional to its average distance from the sun (a) cubed:

Closer orbits go faster

$$P_y^2 = a_{AU}^3$$

(P_y = period in years;
 a_{AU} = distance in AU)

<http://www.solarsystemscope.com/>

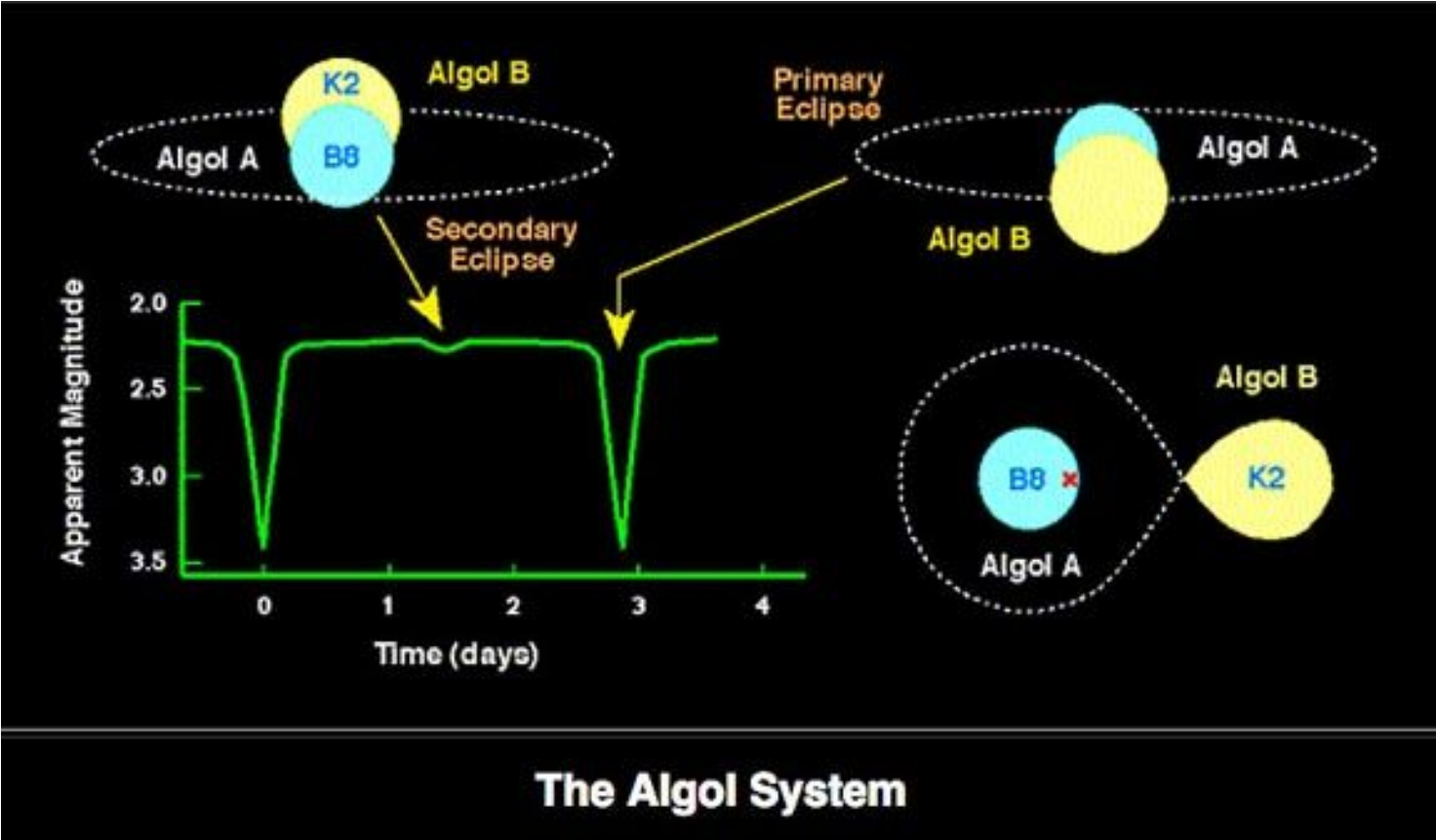
<http://astro.unl.edu/naap/pos/animations/kepler.html>



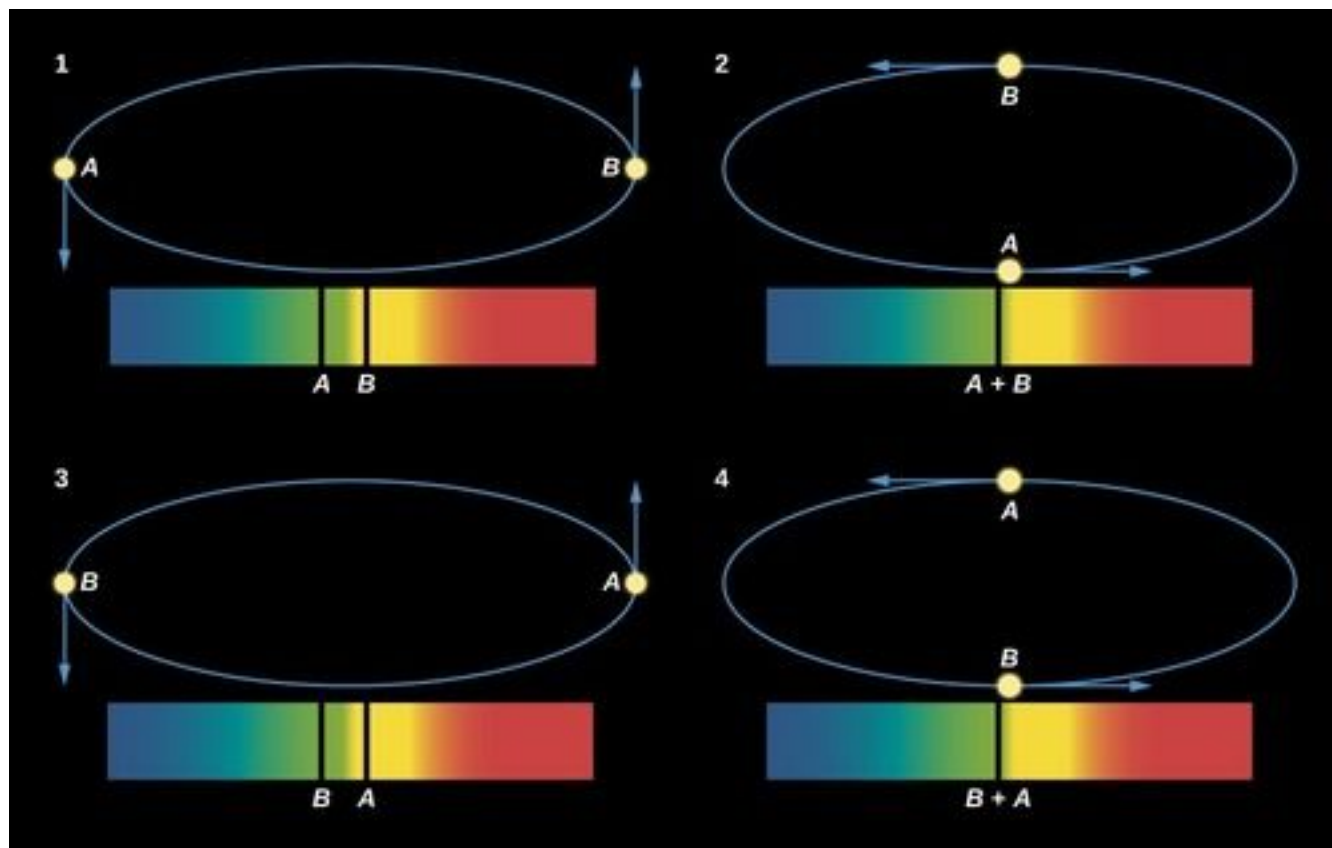
Visual Binaries

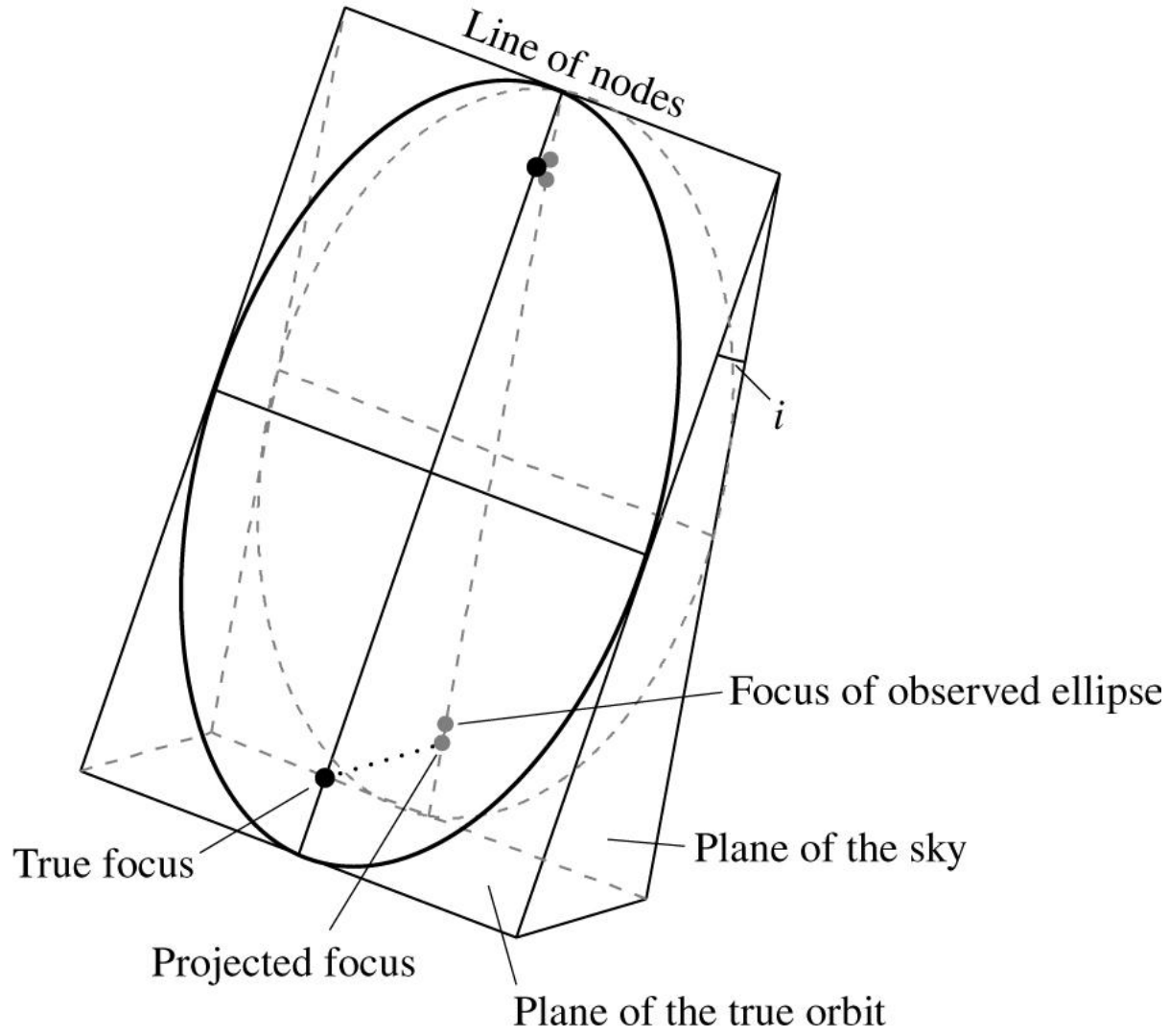


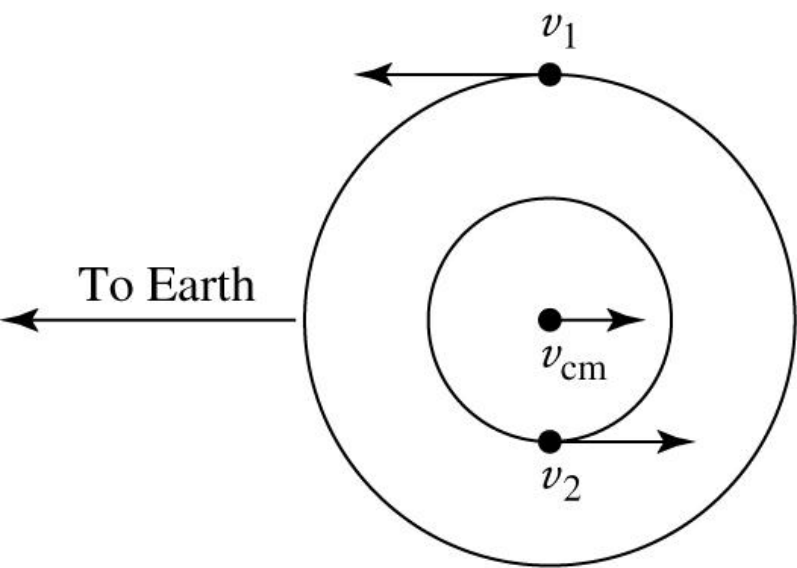
Eclipsing binary



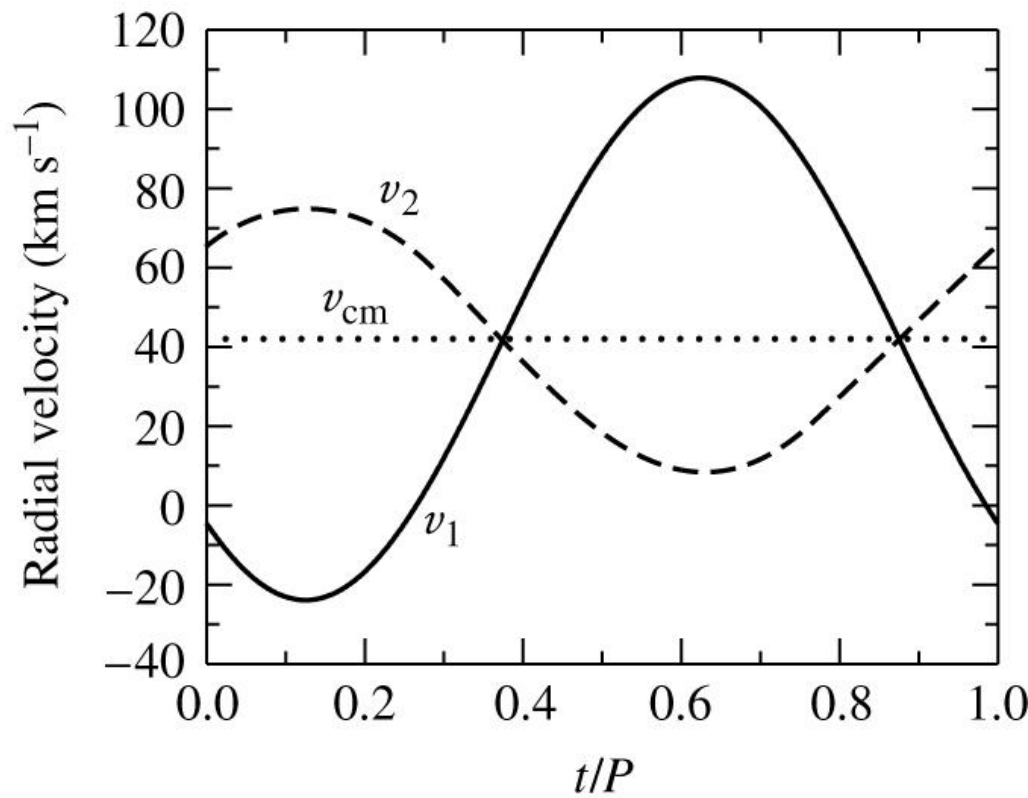
Spectrum Binaries



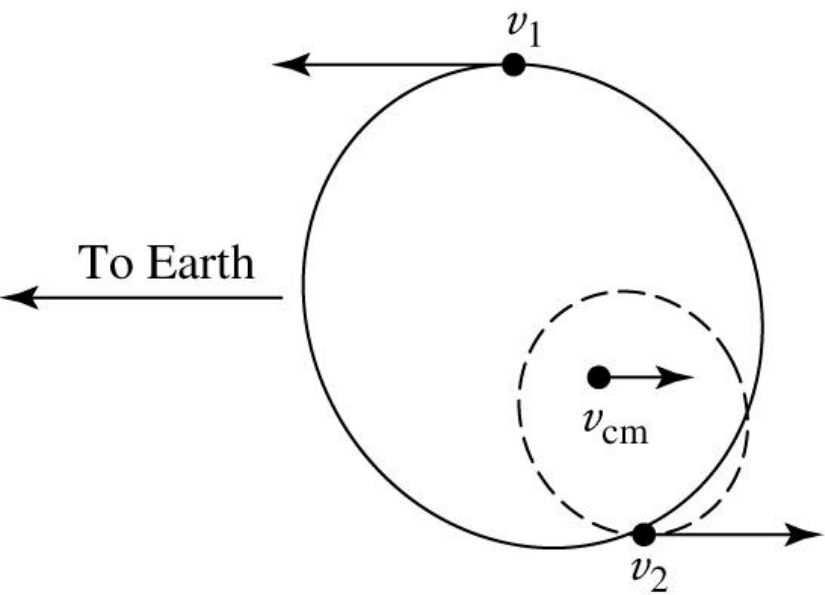




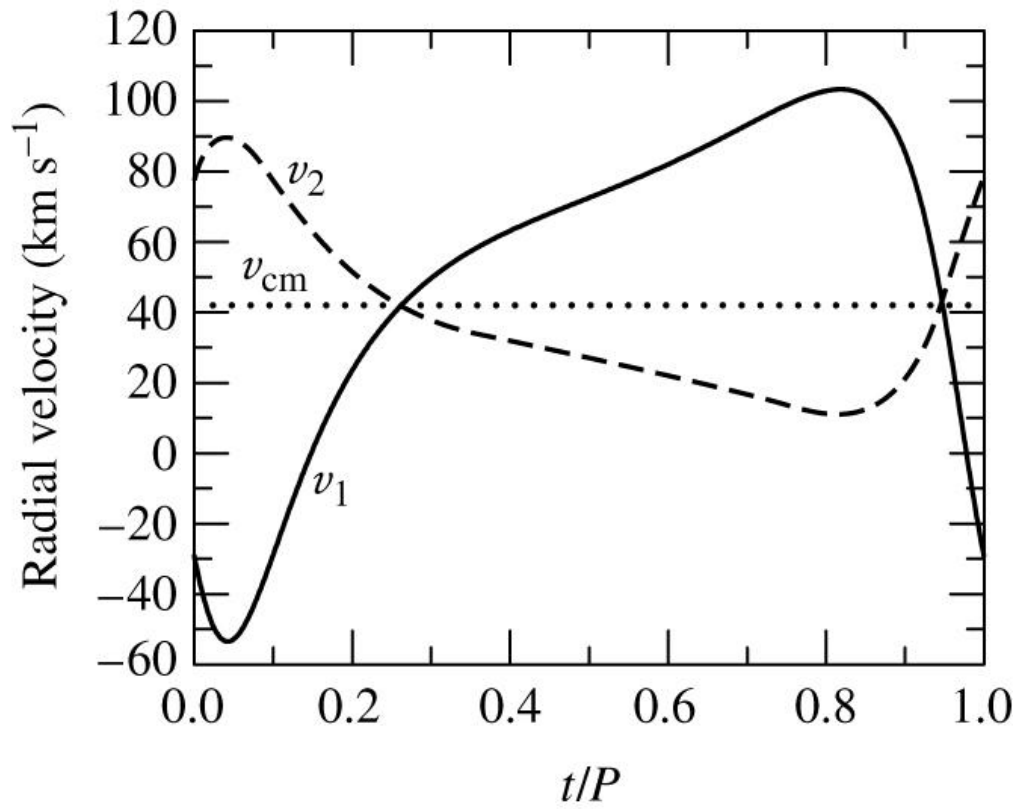
(a)



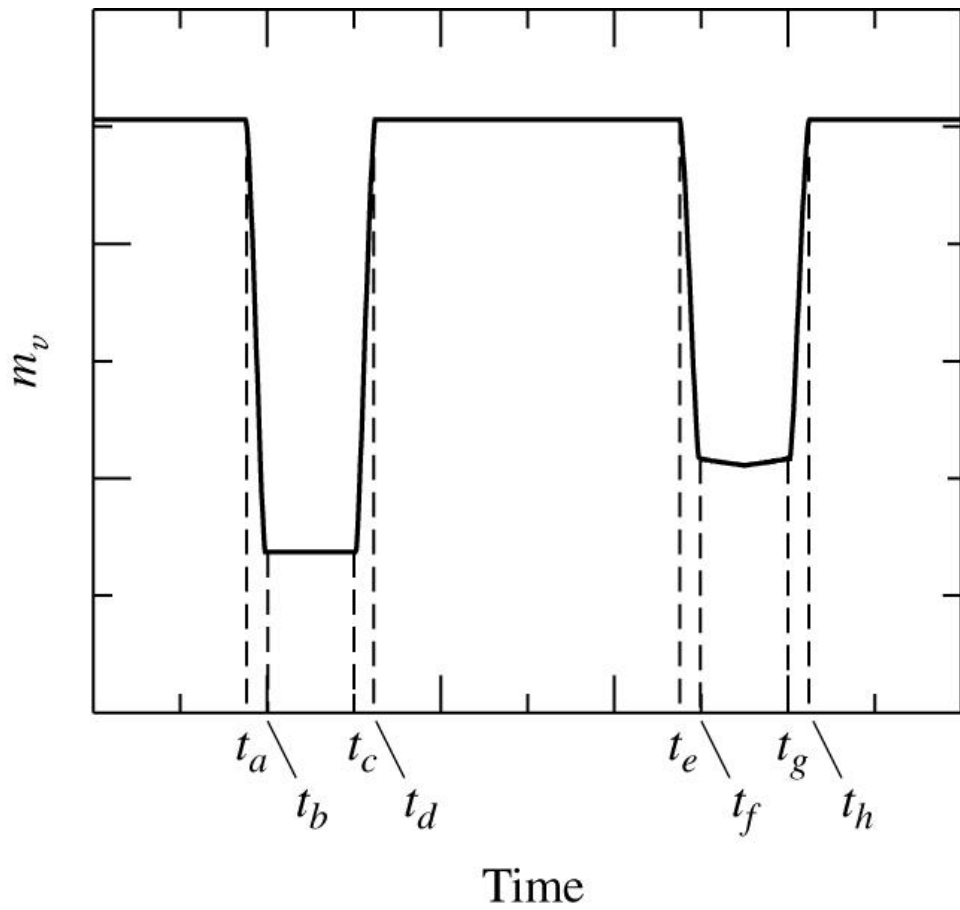
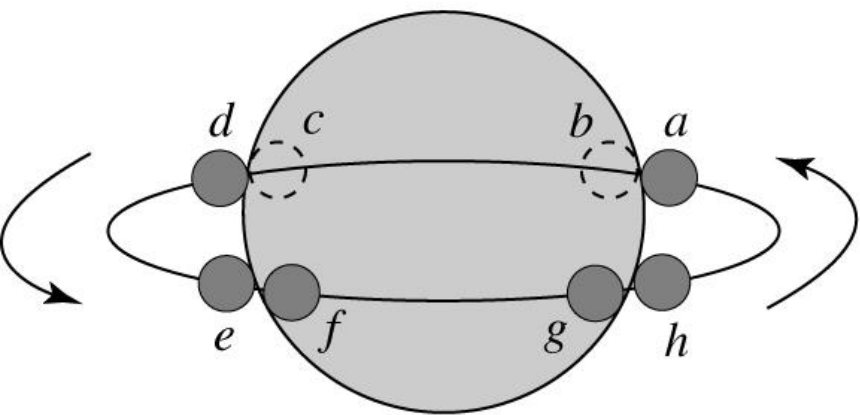
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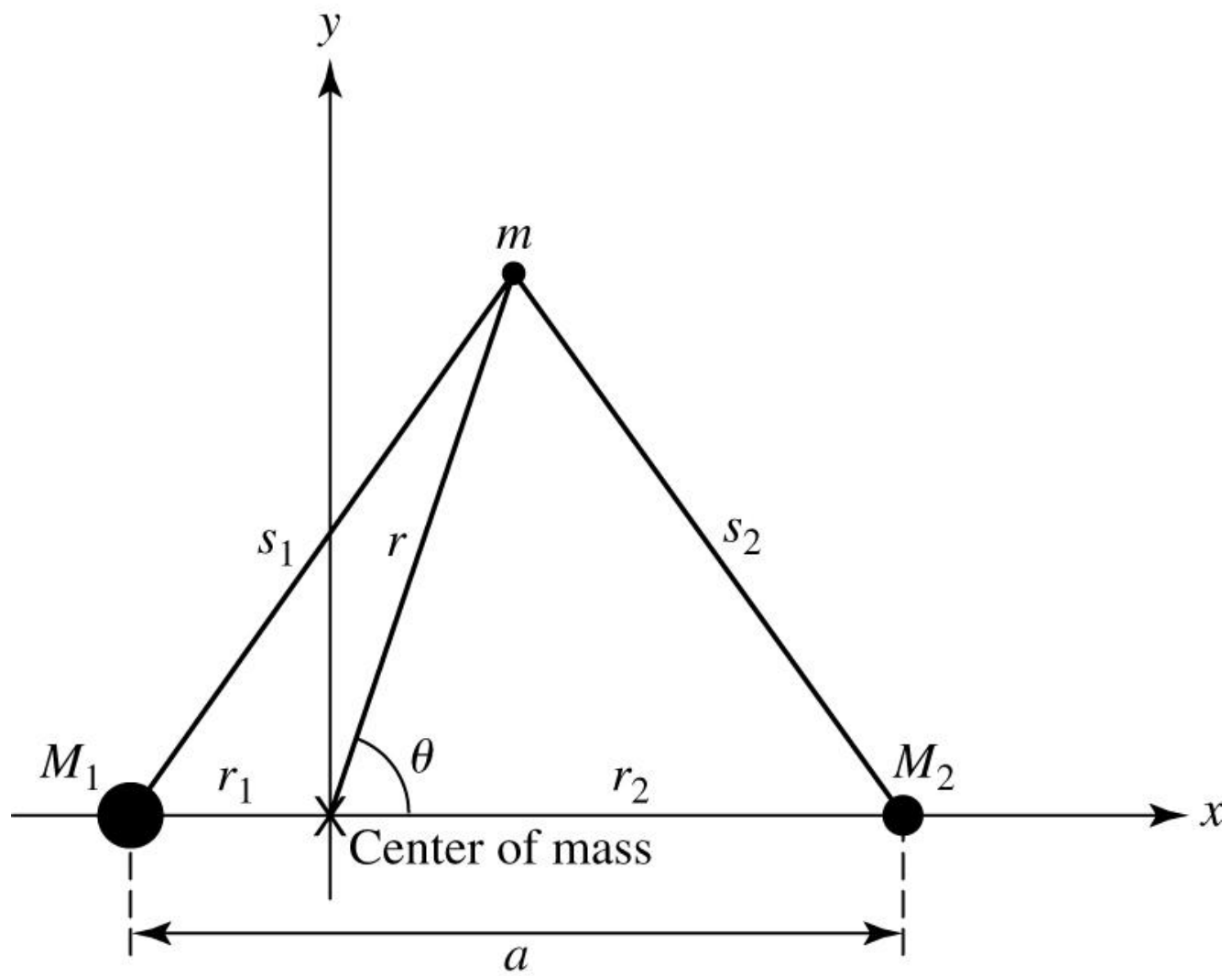


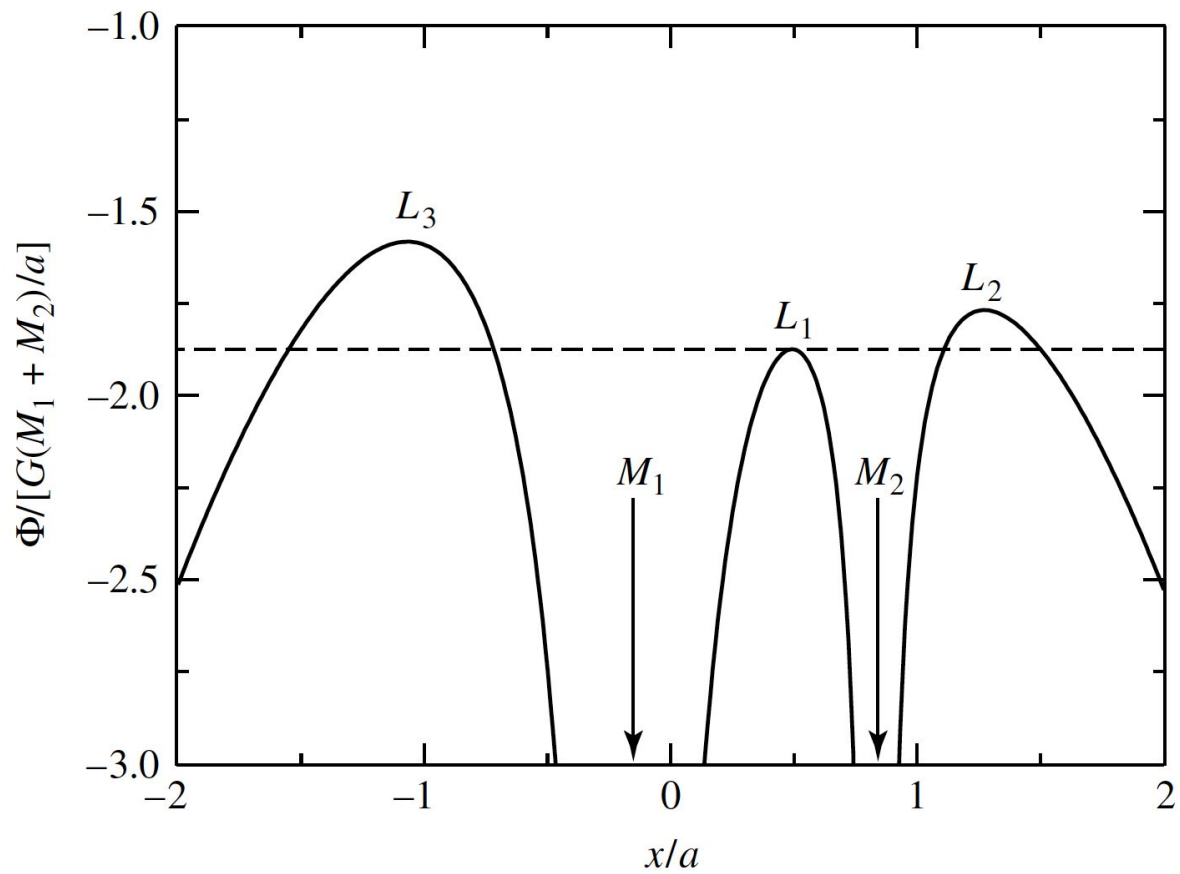
(a)

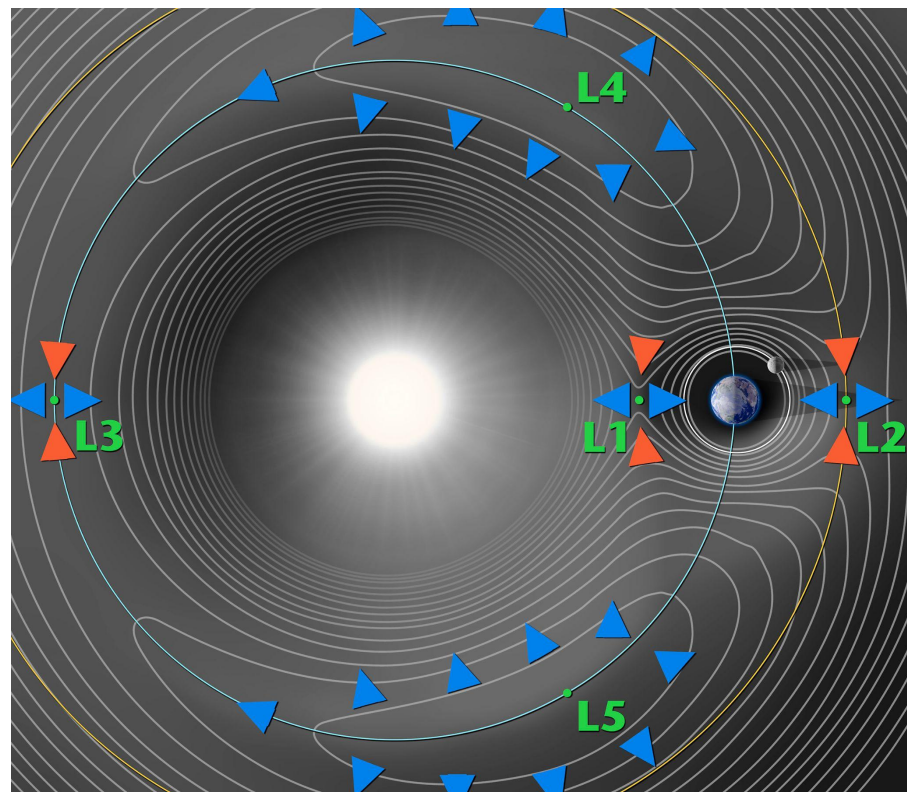
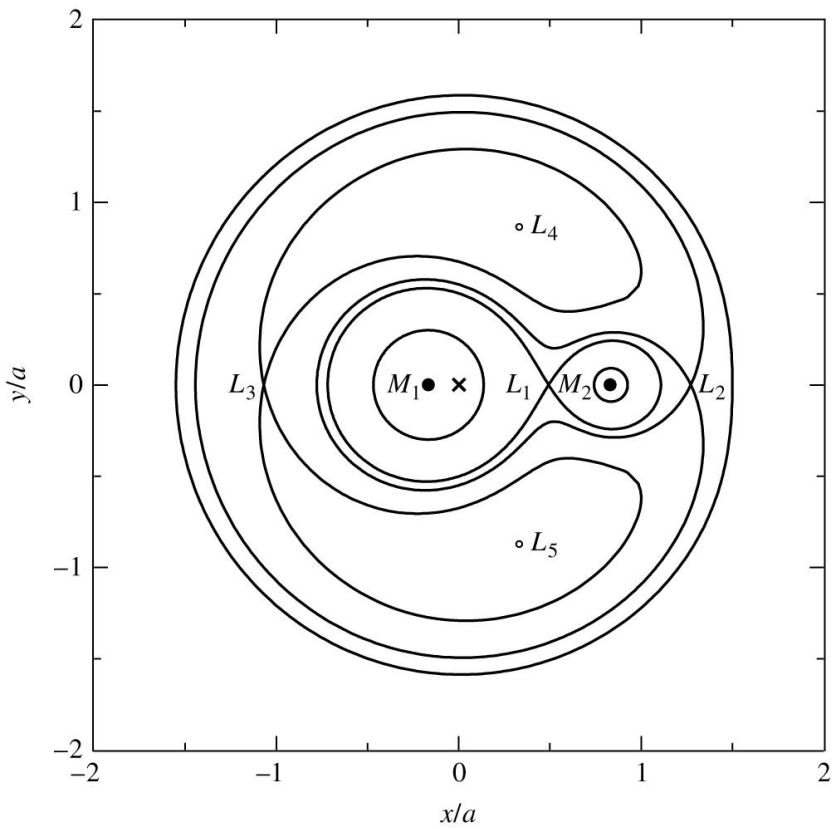


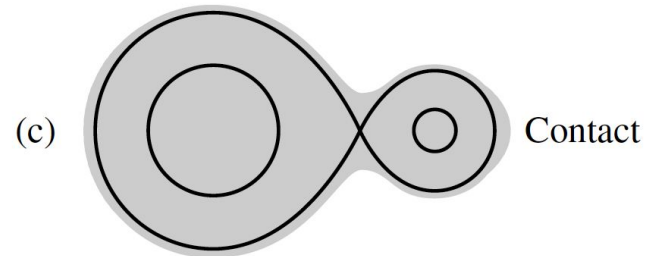
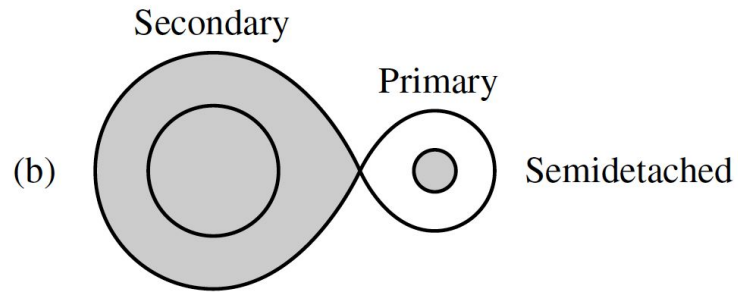
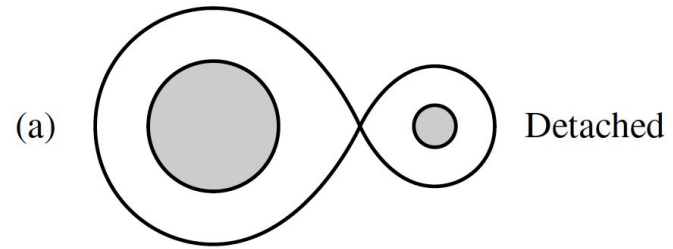
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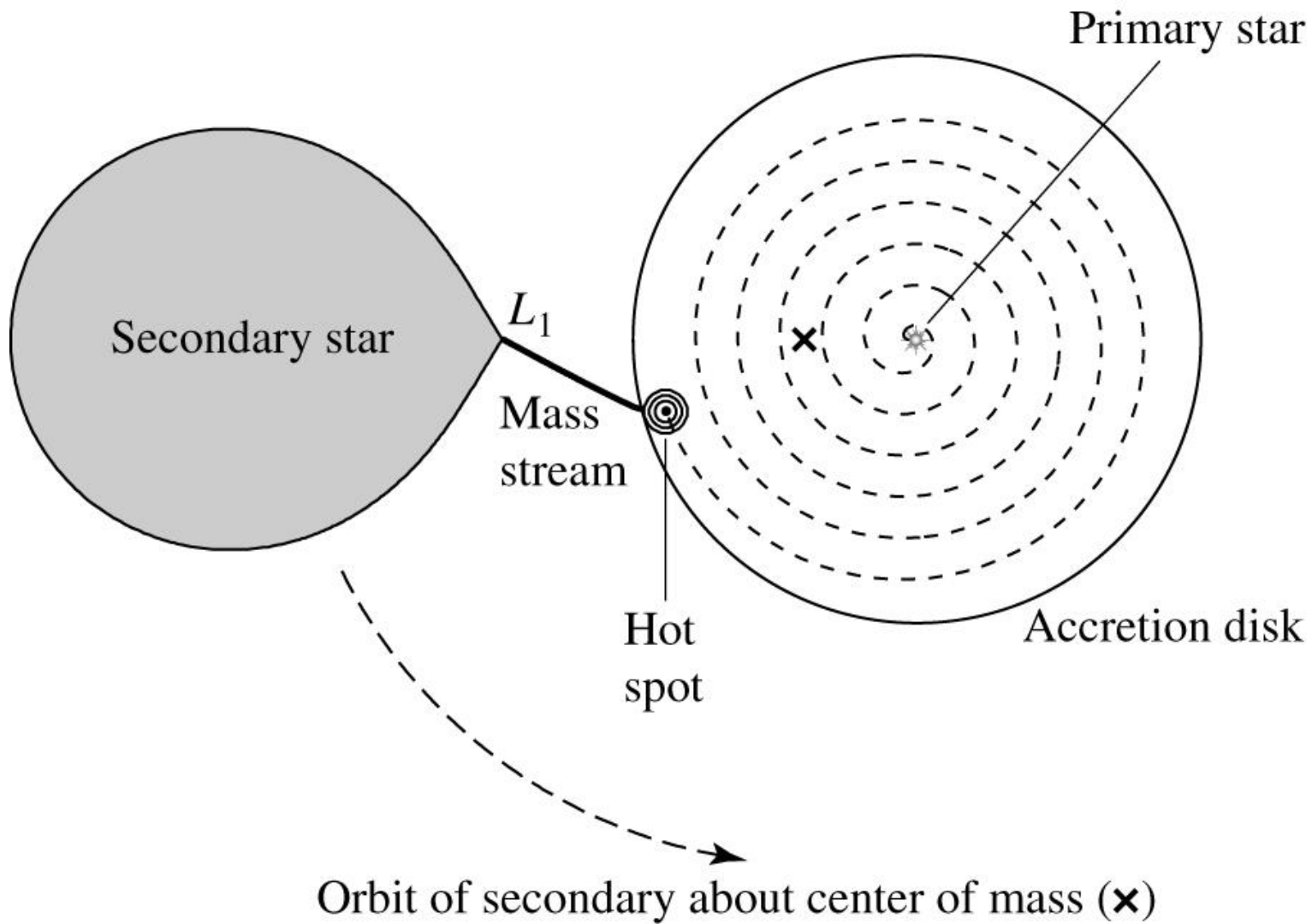


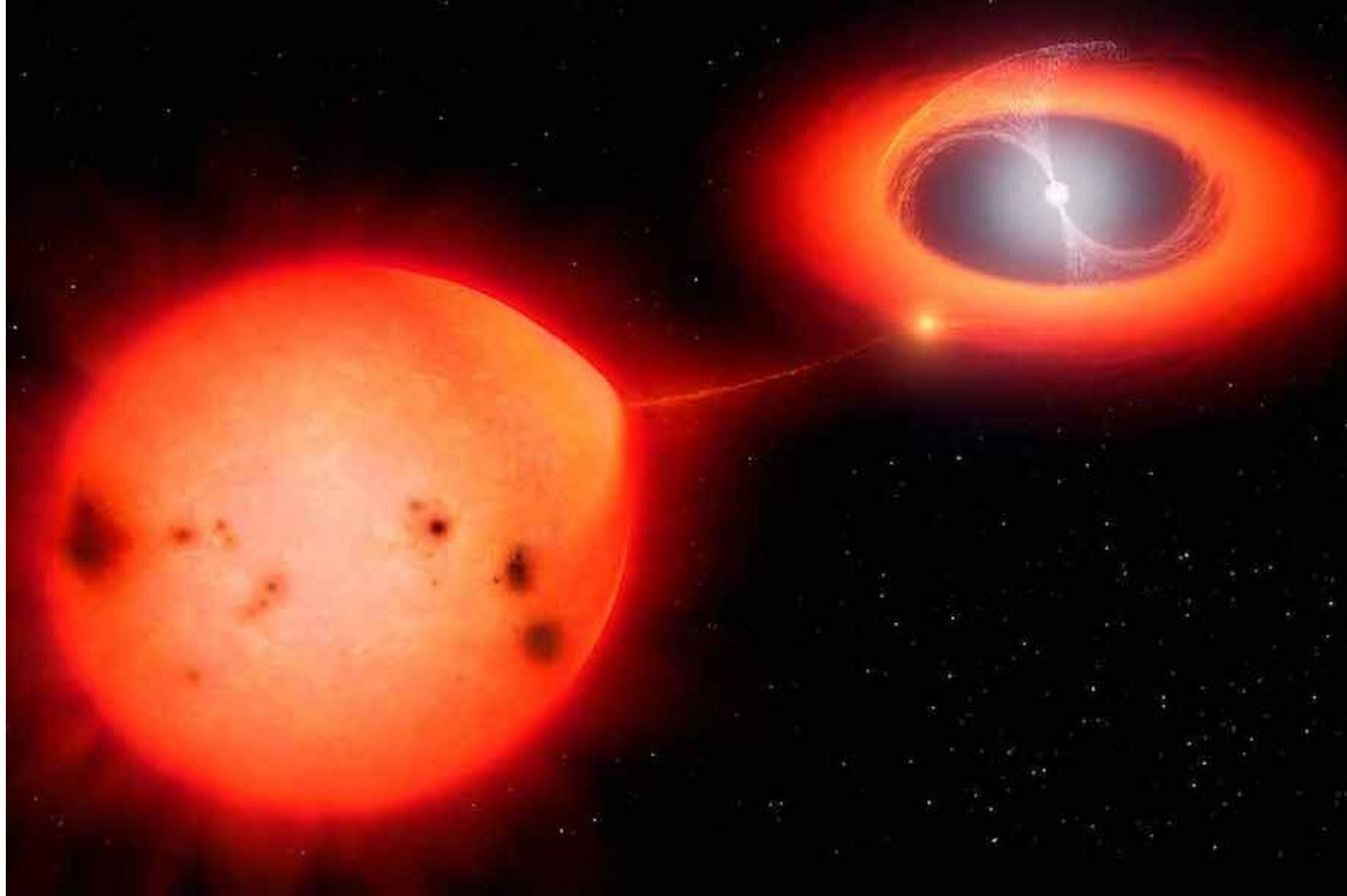


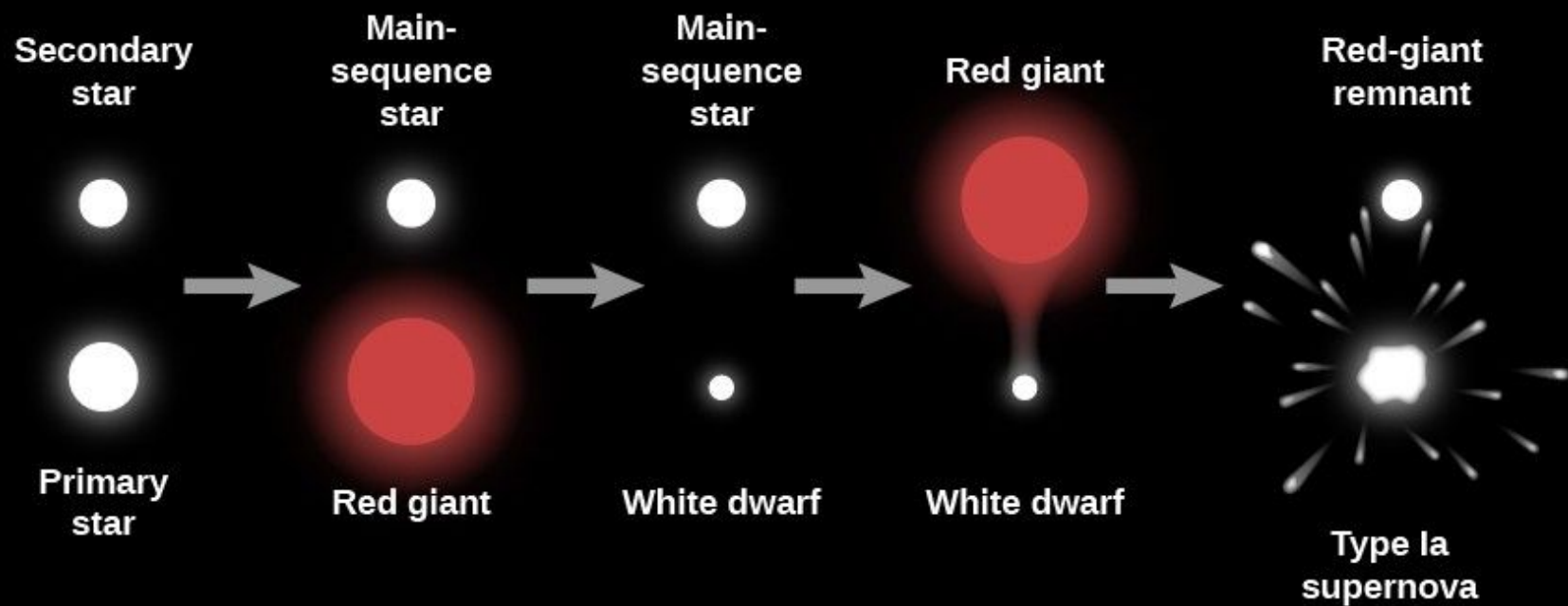












Not to scale

