A deep-space photograph of a star-forming region. The background is a dark, dense field of stars. In the center, there is a bright, glowing orange and yellow nebula. A prominent, bright yellow star is located in the center of this nebula. Surrounding the nebula and scattered throughout the field are numerous bright blue stars. The overall scene depicts a rich stellar population.

Structure and Evolution
of Stars
Lecture 18



ALCOR
4th Magnitude
(white)

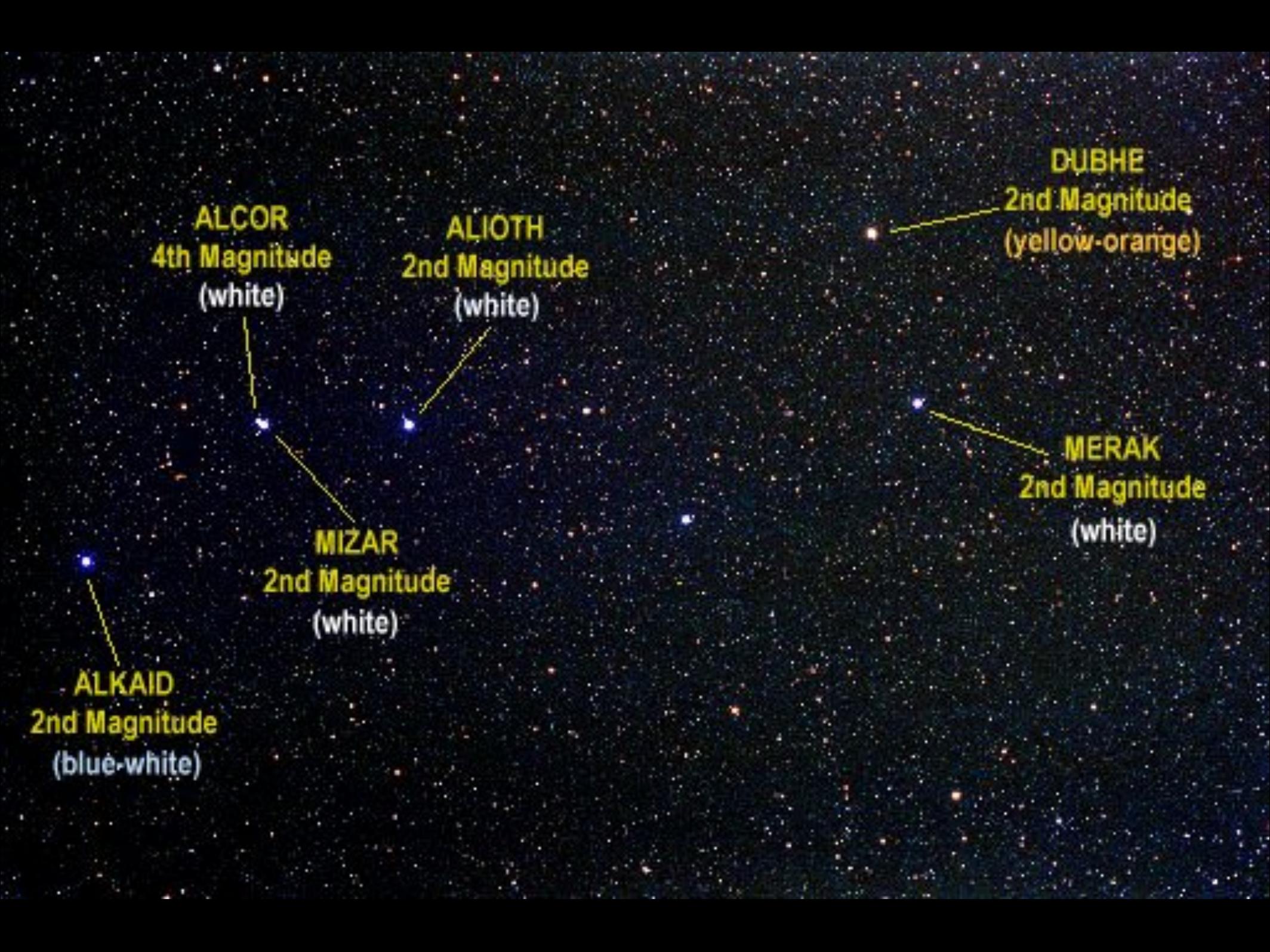
ALIOTH
2nd Magnitude
(white)

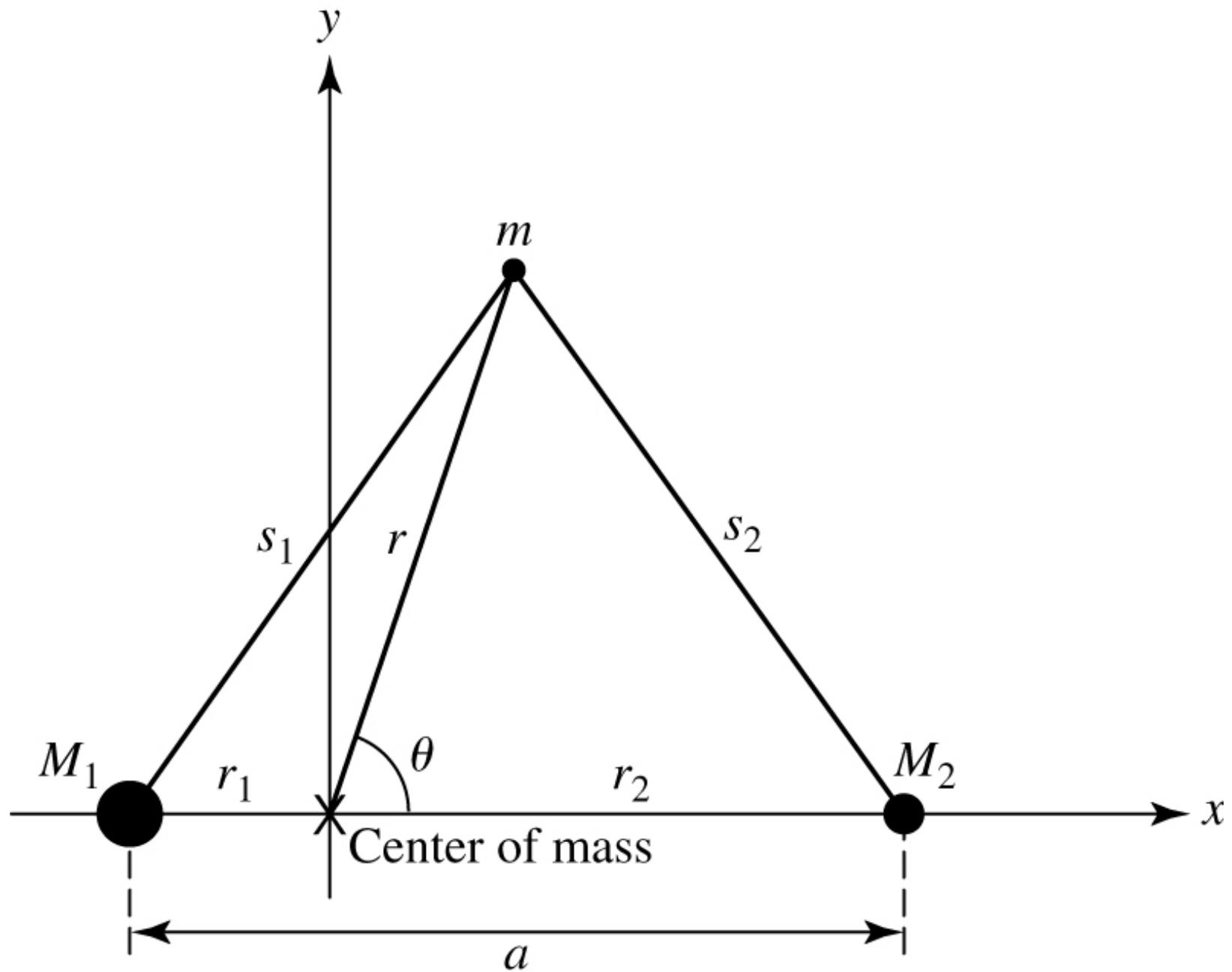
DUBHE
2nd Magnitude
(yellow-orange)

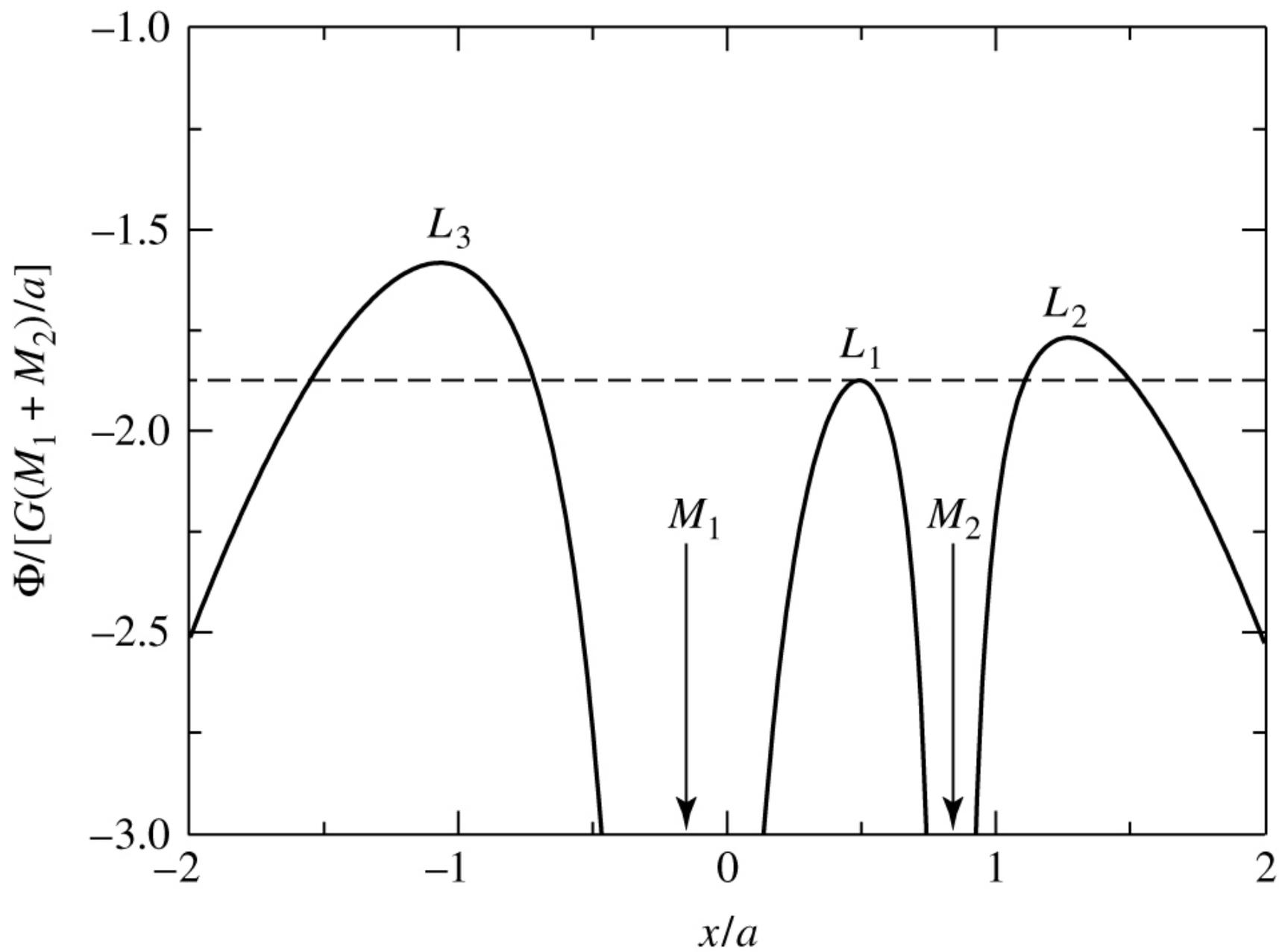
MERAK
2nd Magnitude
(white)

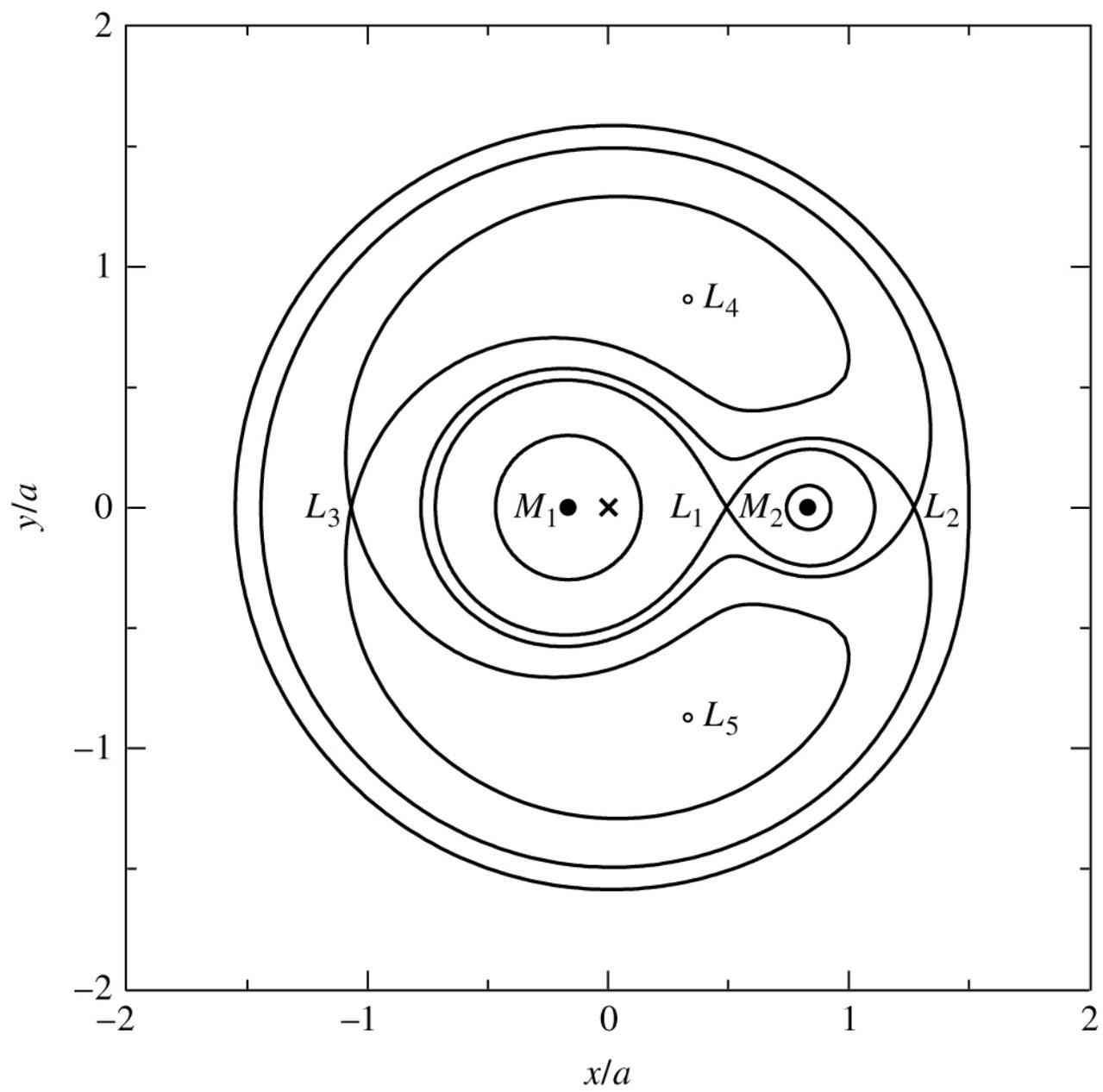
MIZAR
2nd Magnitude
(white)

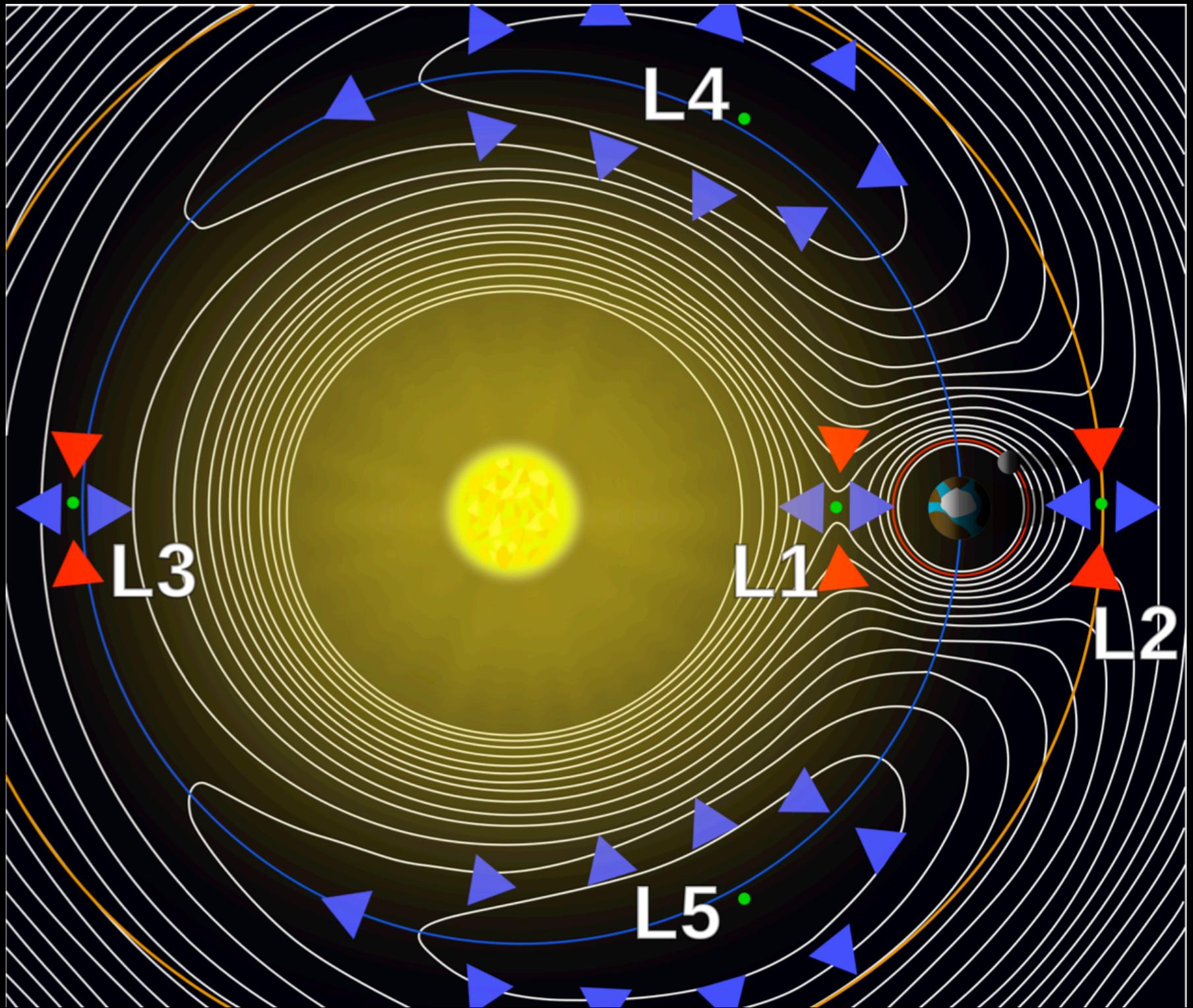
ALKAID
2nd Magnitude
(blue-white)

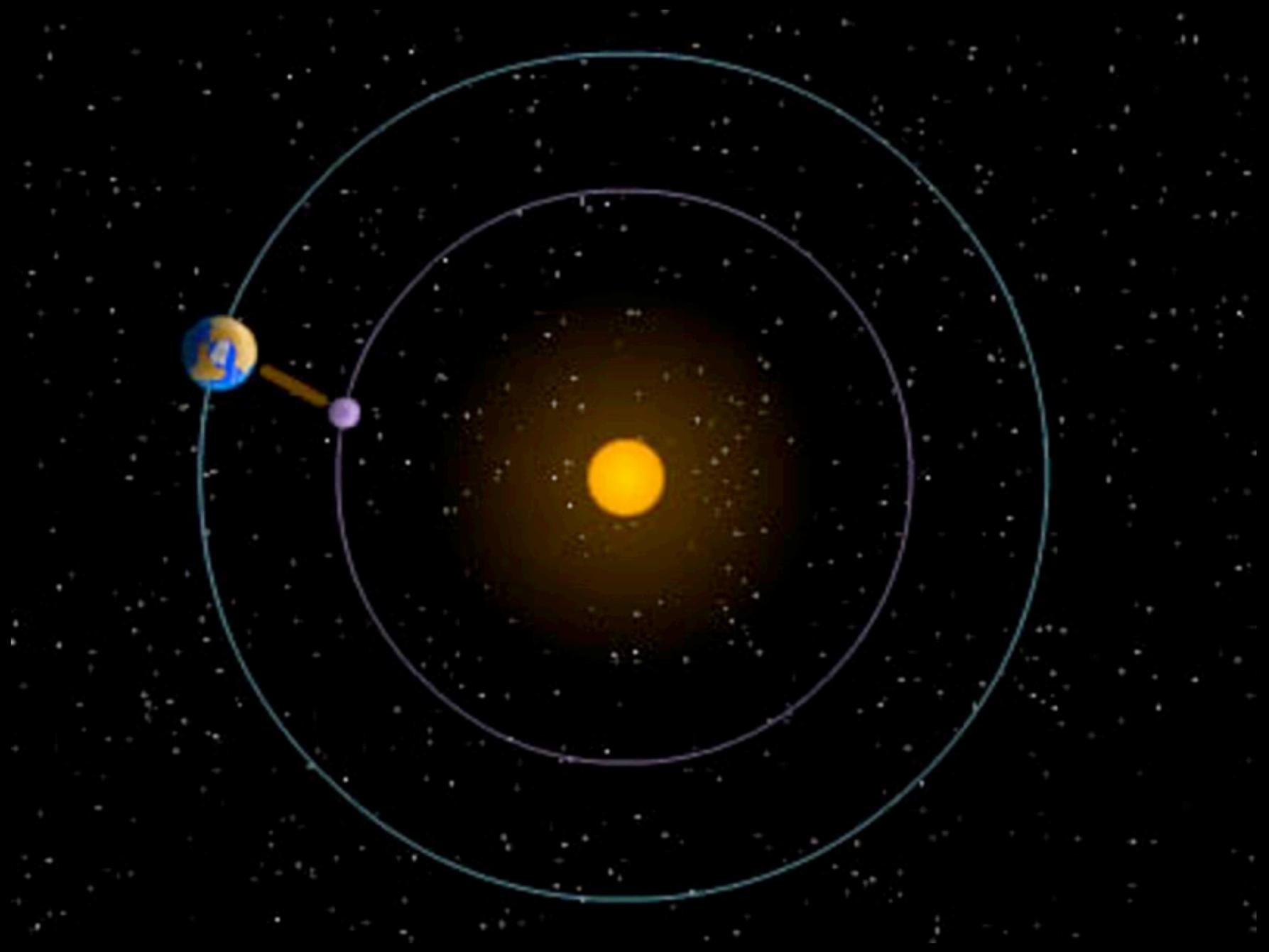


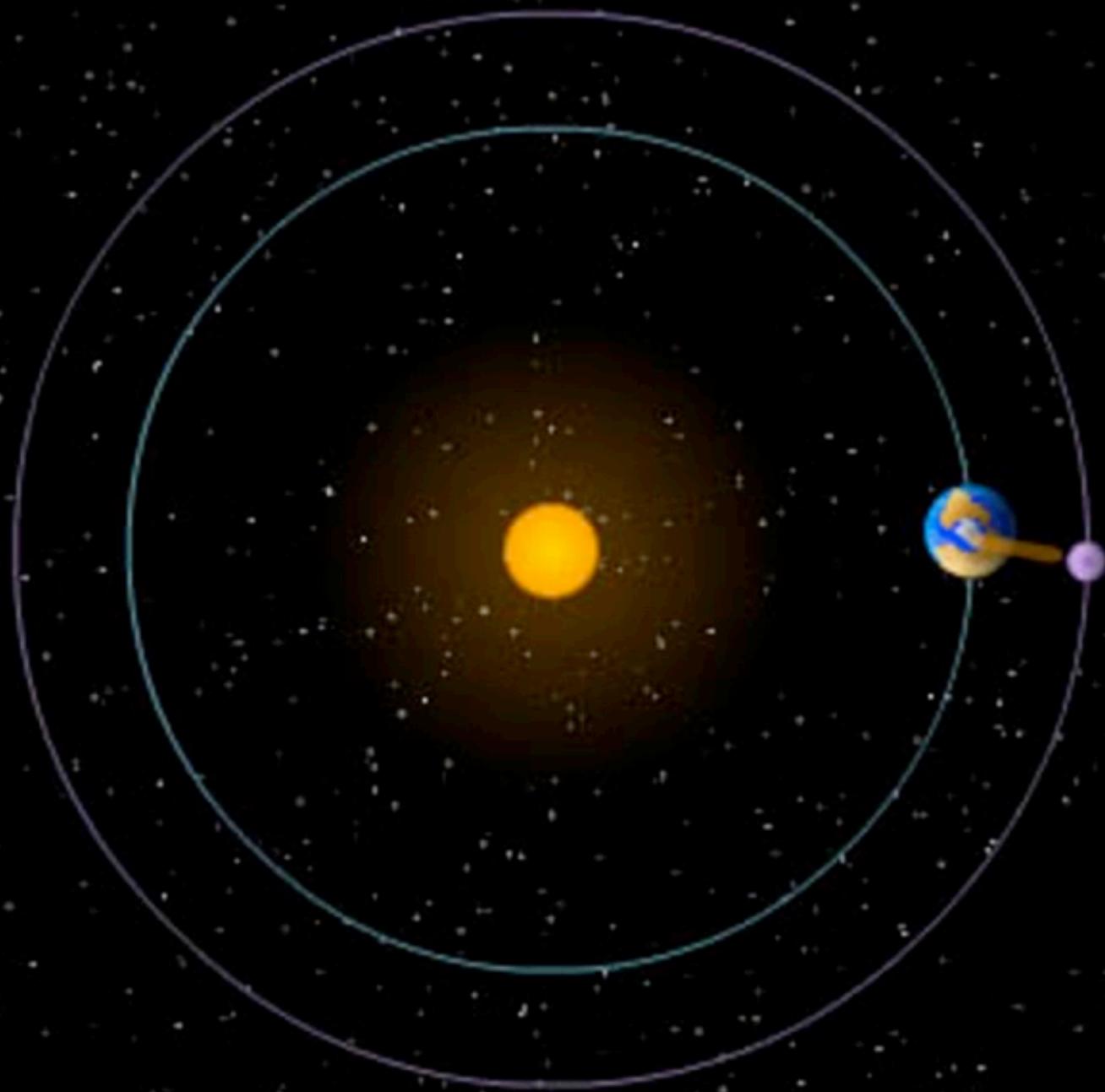


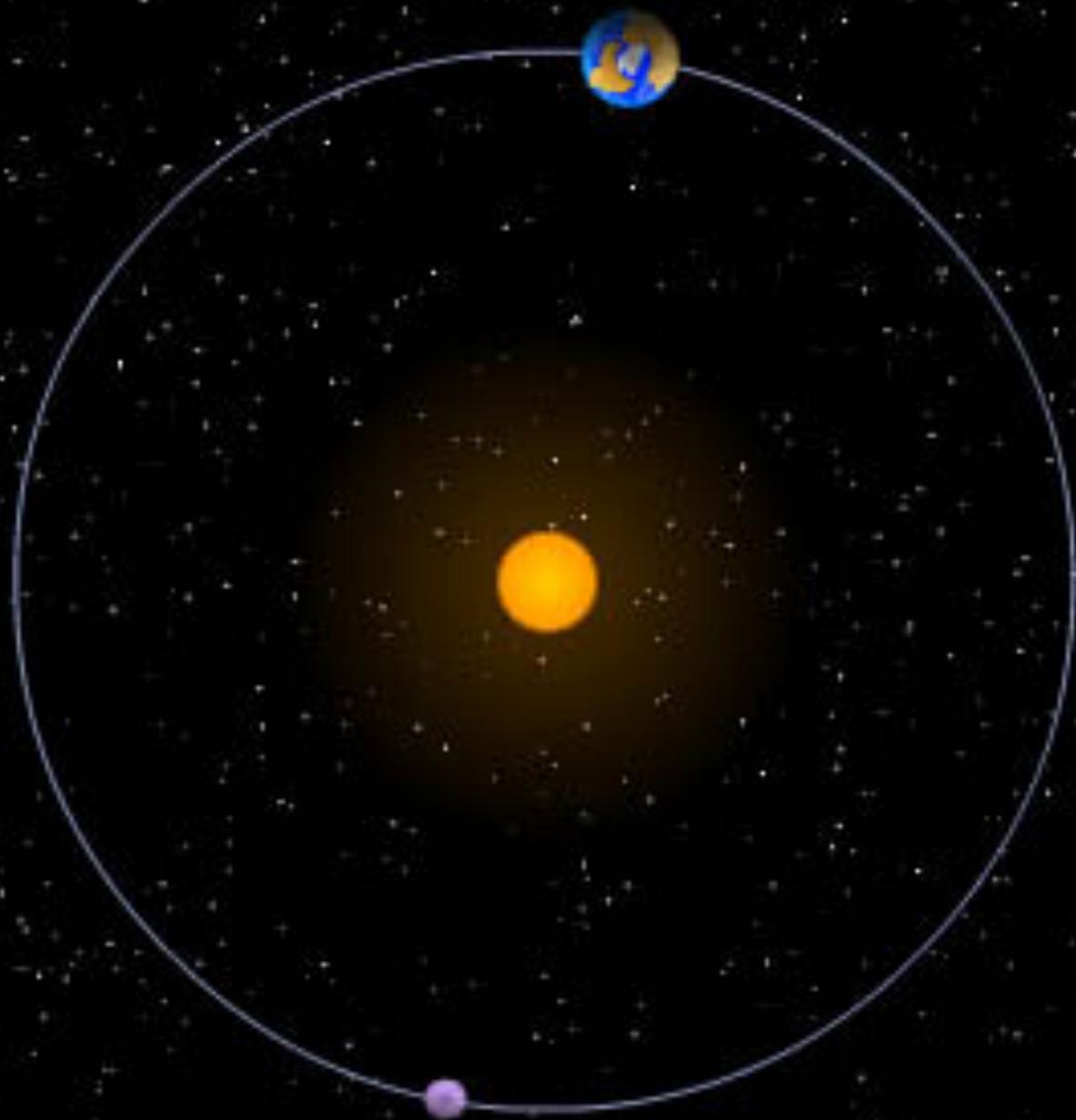


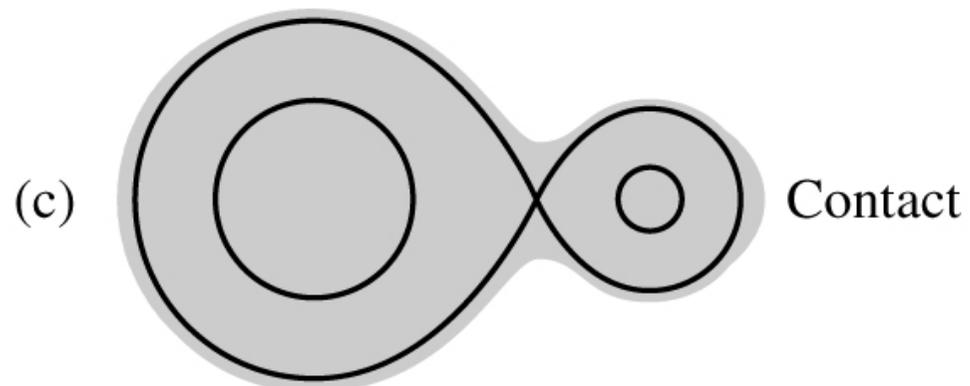
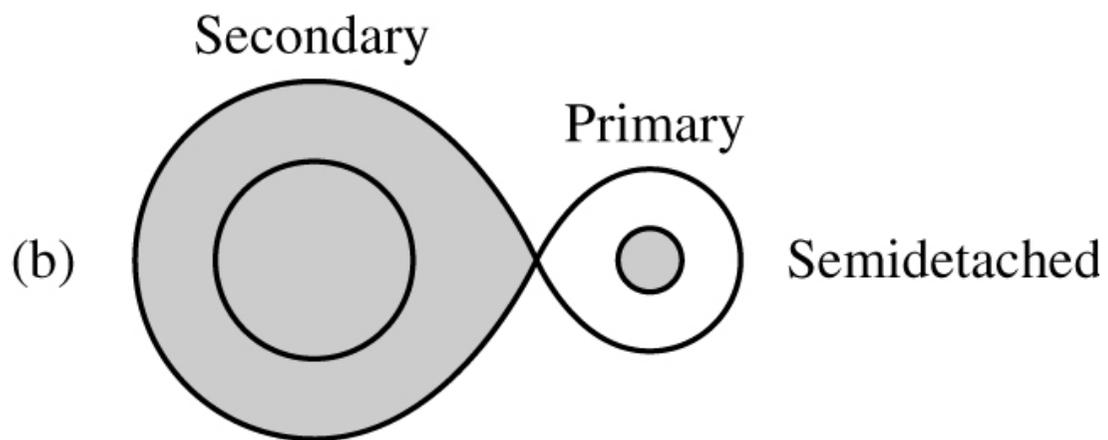
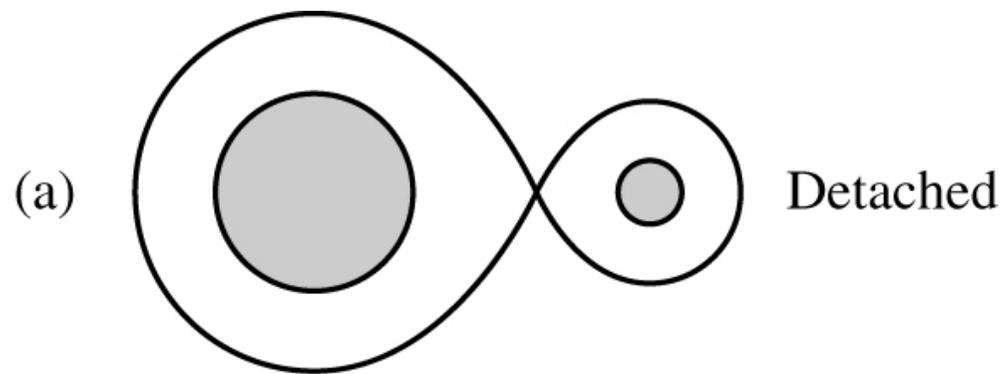




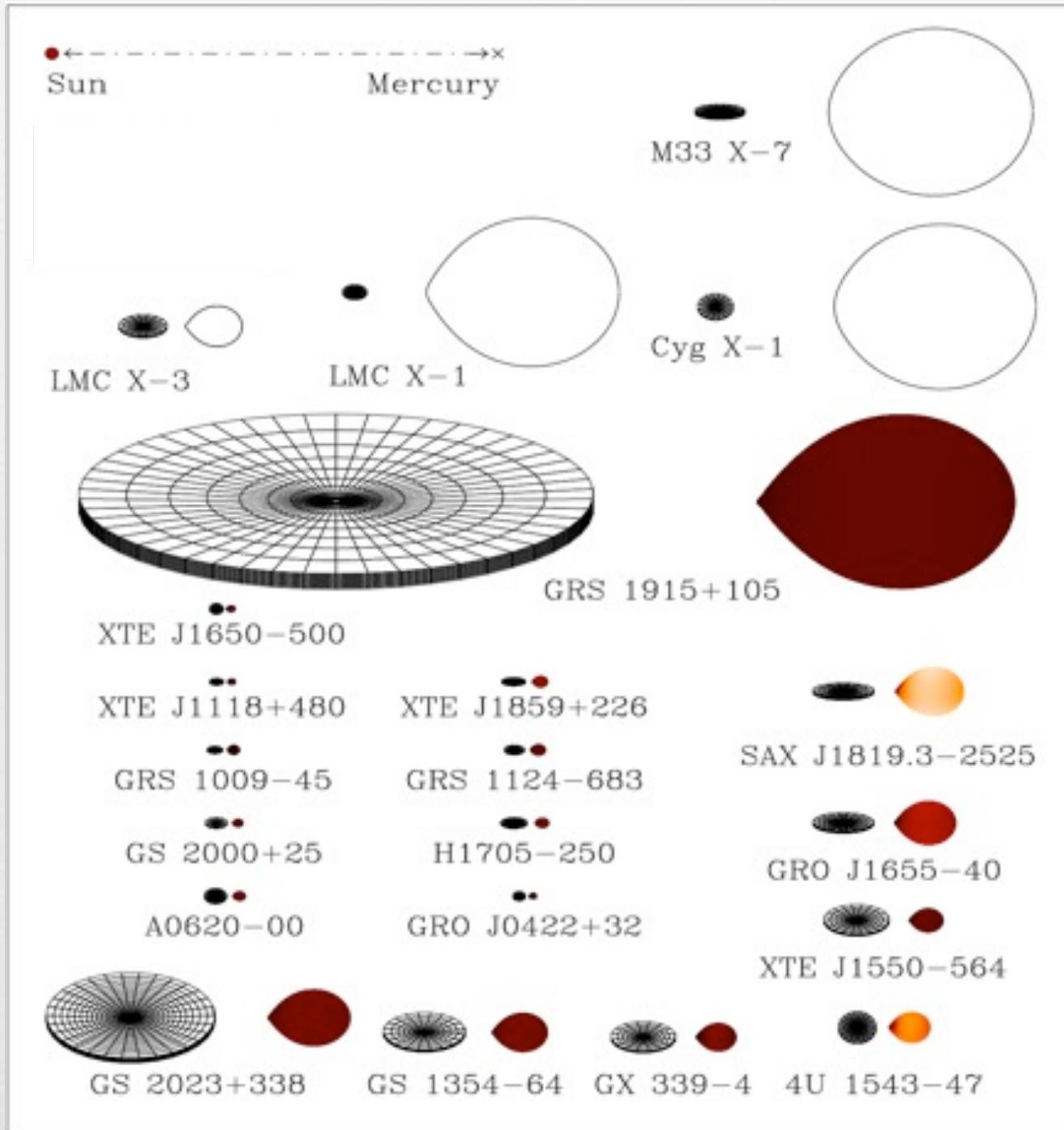




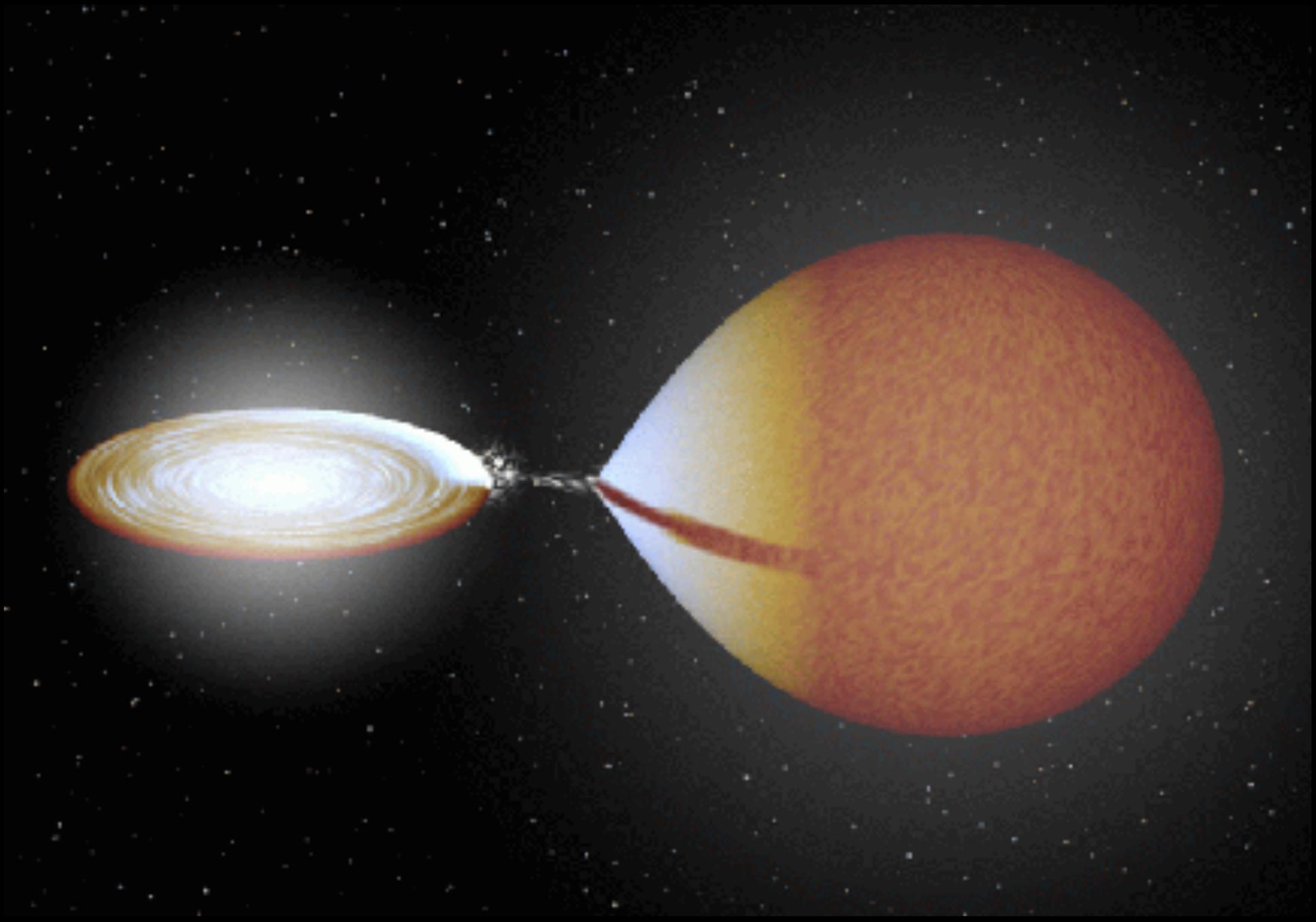


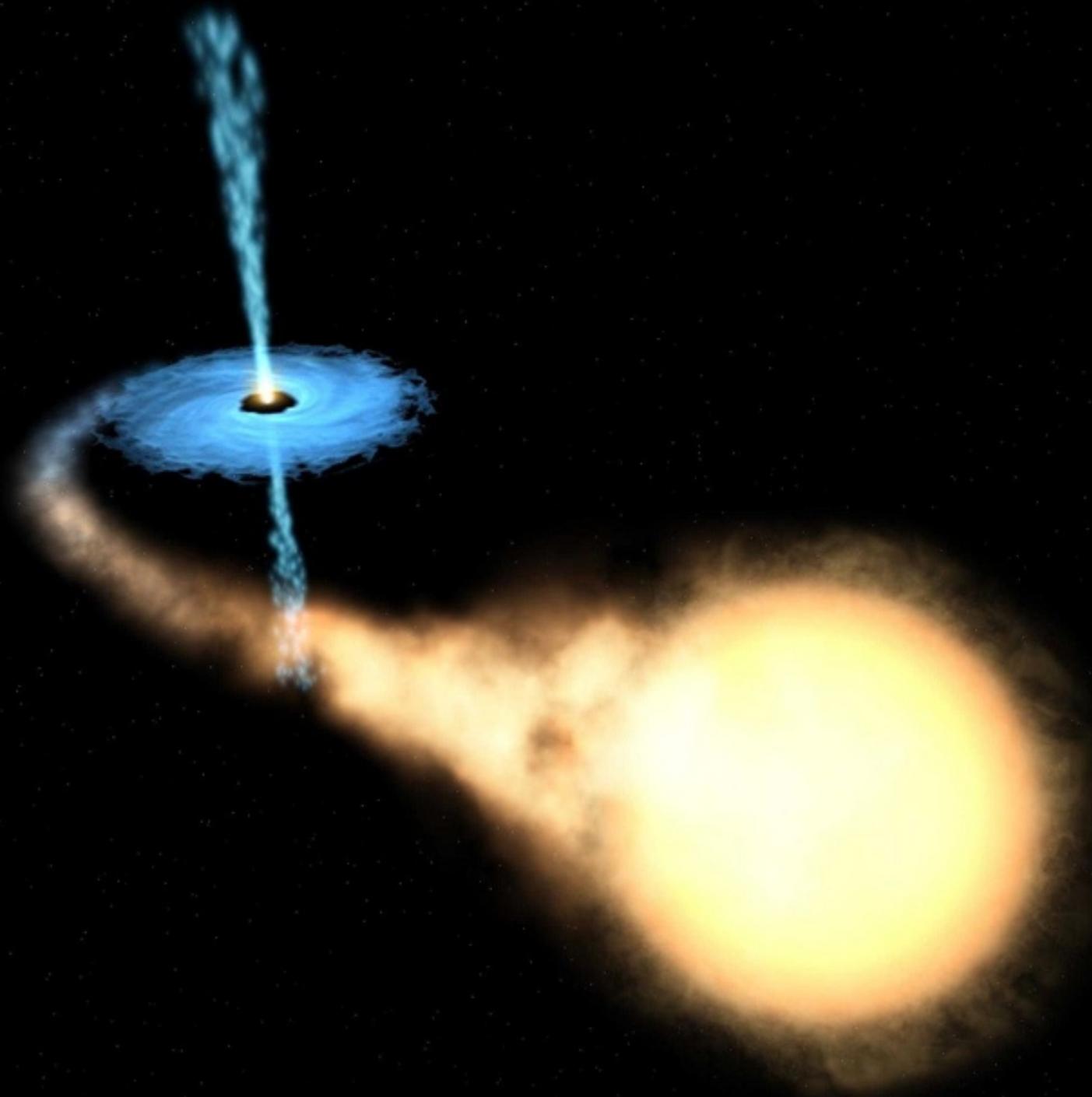


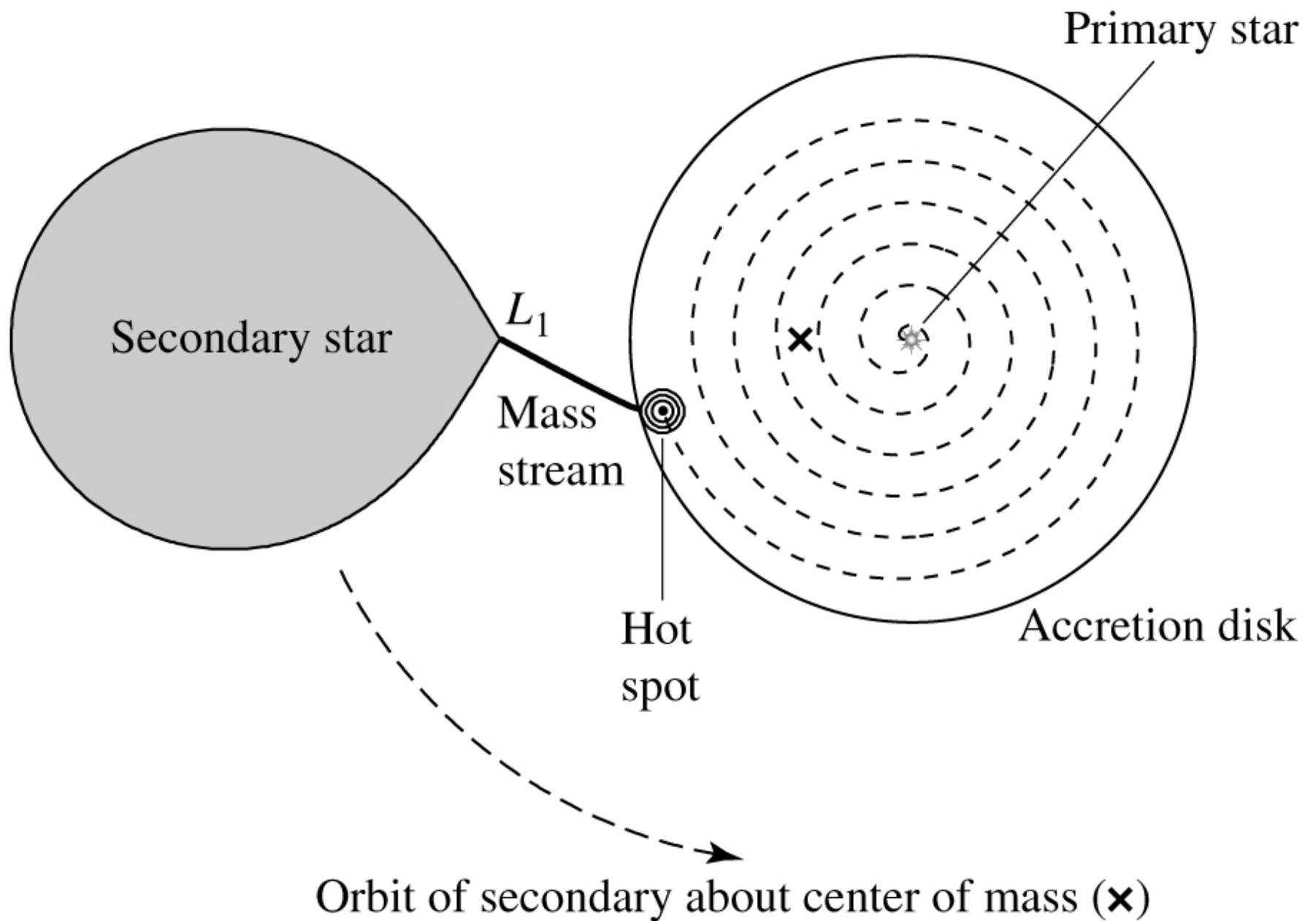
The Black Hole Binary Census



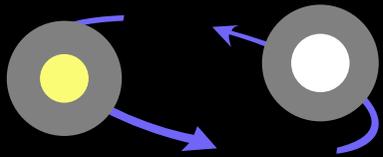
Courtesy: J. Orosz



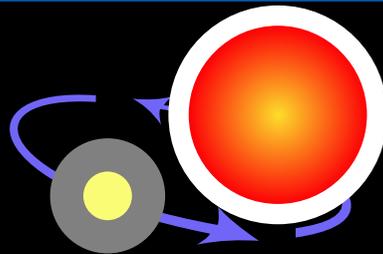




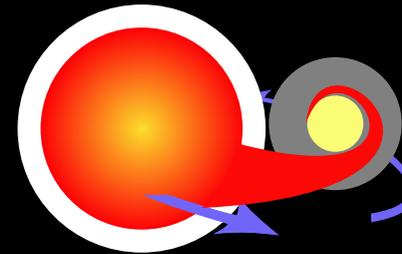
The progenitor of a Type Ia supernova



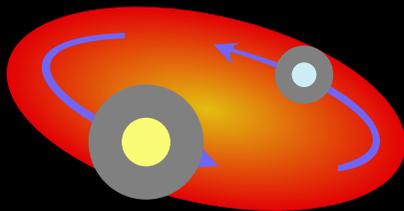
Two normal stars are in a binary pair.



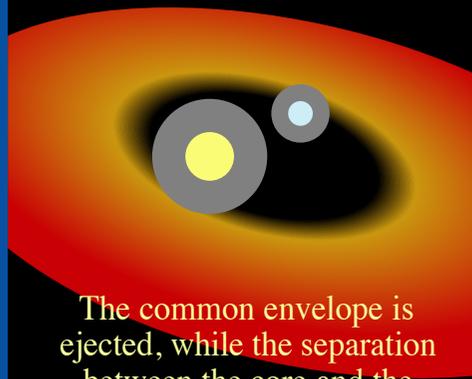
The more massive star becomes a giant...



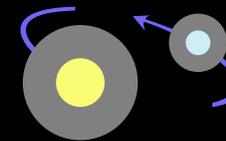
...which spills gas onto the secondary star, causing it to expand and become engulfed.



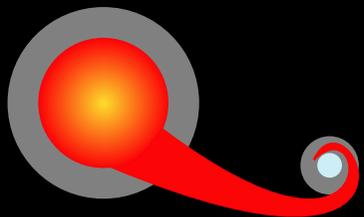
The secondary, lighter star and the core of the giant star spiral toward within a common envelope.



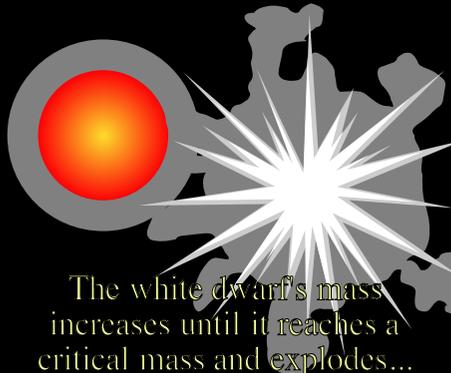
The common envelope is ejected, while the separation between the core and the secondary star decreases.



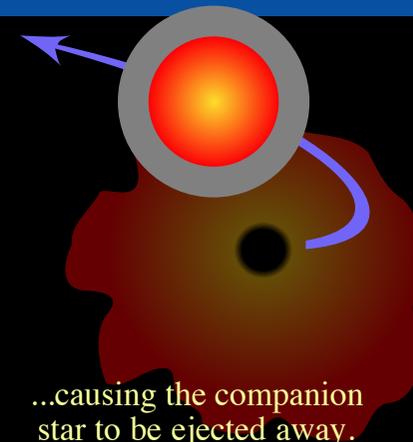
The remaining core of the giant collapses and becomes a white dwarf.



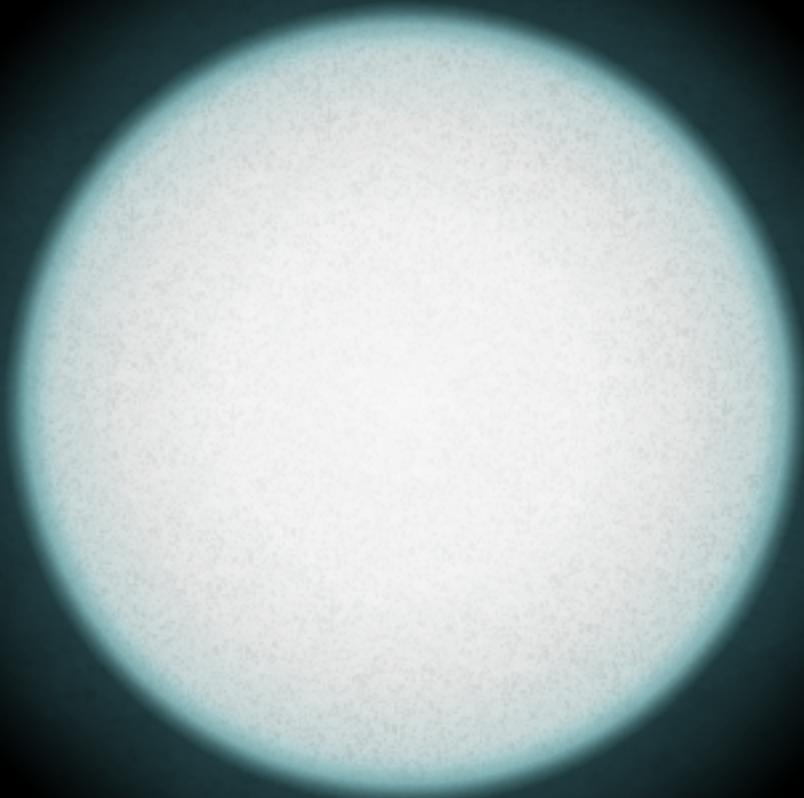
The aging companion star starts swelling, spilling gas onto the white dwarf.



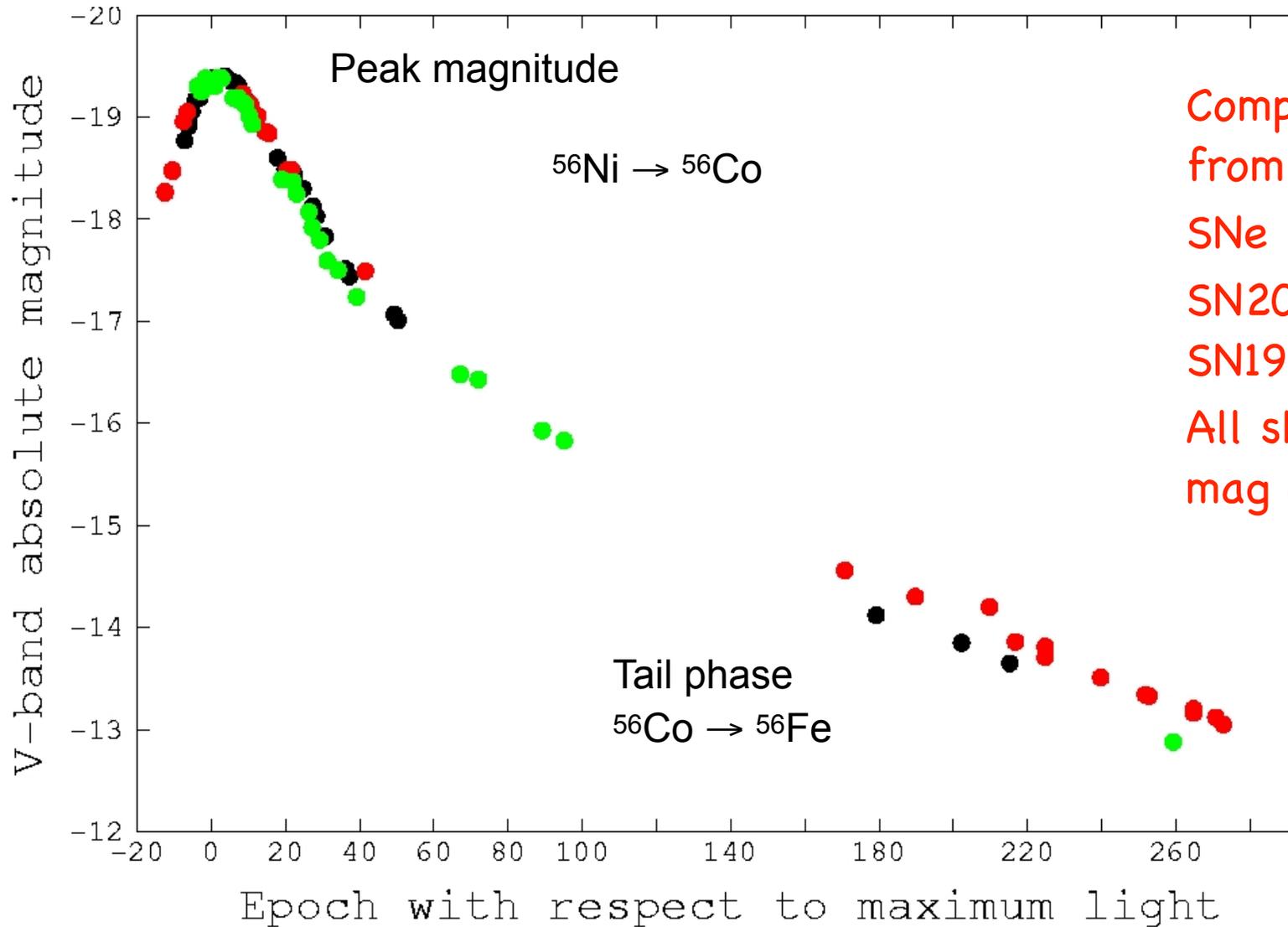
The white dwarf's mass increases until it reaches a critical mass and explodes...



...causing the companion star to be ejected away.



Typical lightcurve for Type Ia SNe



Composite lightcurve
from three typical
SNe Ia.

SN2002er, SN1990N,
SN1996X.

All shifted to peak
mag of SN2002er

