

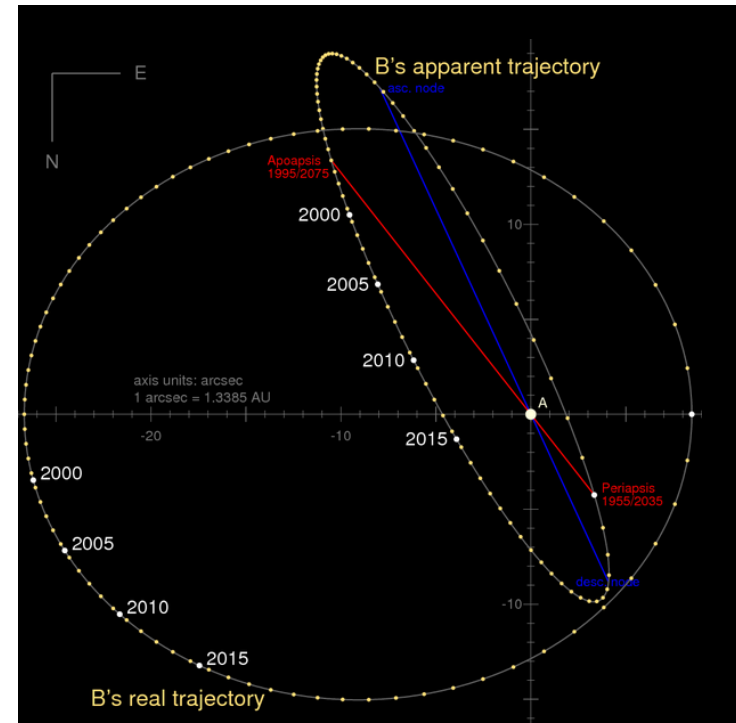
# Introductory Astronomy

Week 4: Stars

Clip 11: Binary Stars

# Partners

- About  $\frac{1}{5}$  of all stars are gravitationally **bound** to a partner
- Glossary:
  - **Visual**: can **see** both
  - **Optical Double**: not binary
  - **Non-visual**: other methods
- $\alpha$ -Centauri AB is a **triple** with **Proxima Centauri**



# $\alpha$ -Centauri is Famous

- As nearest star to Earth this has been of interest to many
- **October, 2012**: an Earth-sized **planet** detected orbiting  **$\alpha$ -Centauri B** at **0.04 AU**

# With Benefits

- Star position gives a **projection** of orbit on **tangent** plane
- Can find **radial** component by **Doppler shift**
- Get complete orbit
- Given **period** and **radius** find **mass**

$$\frac{M_1 + M_2}{M_{\odot}} = \left( \frac{R}{1 \text{ AU}} \right)^3 \left( \frac{P}{1 \text{ y}} \right)^{-2}$$

- Plotting motion of **both** partners find  $R_1, R_2$   
 $M_1 R_1 = M_2 R_2$

# Credits

- $\alpha$ -Centauri Orbit: Wikimedia/SiriusB  
[http://en.wikipedia.org/wiki/  
File:Orbit Alpha Centauri AB arcsec.png](http://en.wikipedia.org/wiki/File:Orbit_Alpha_Centauri_AB_arcsec.png)
- $\alpha$ -Centauri video: ESO/L. Calçada/Nick Risinger  
(skysurvey.org)  
<http://www.eso.org/public/videos/eso1241a/>