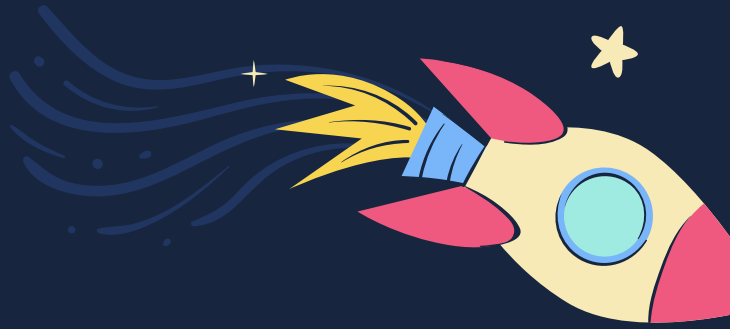
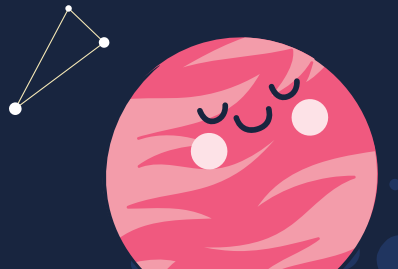
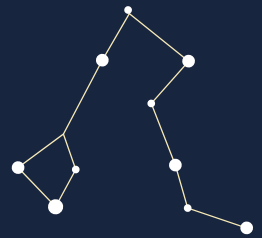
Rogue Planets

Ming Gong

Contents







Formation

Star-like

Sub-brown dwarf
Heavy, M_J

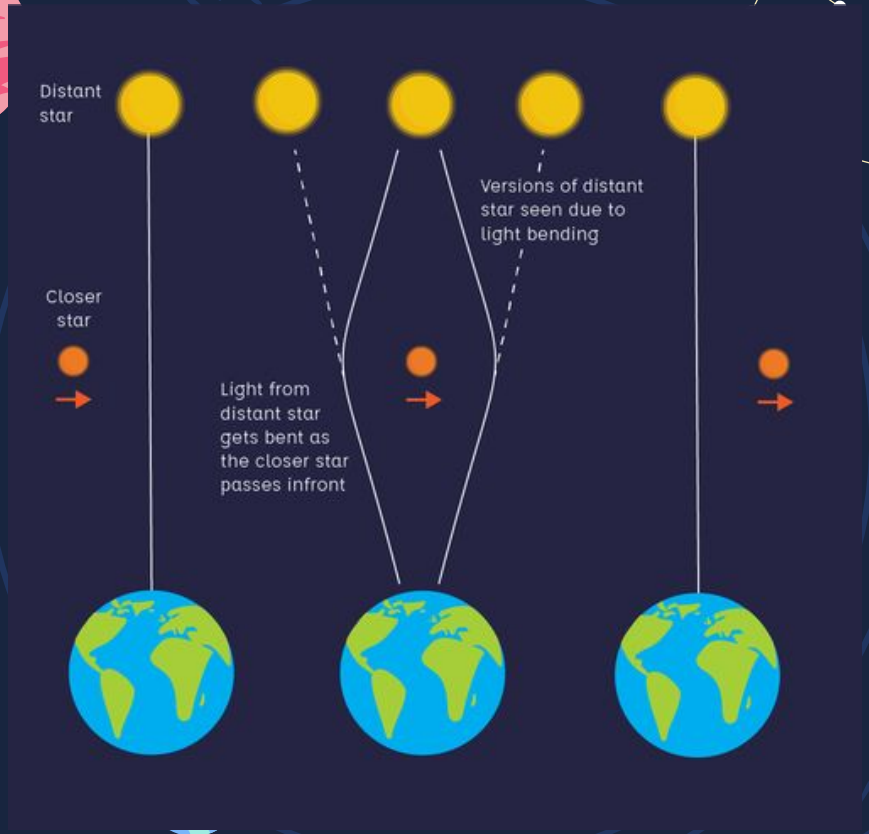
Planet-like

Ejected from stars
Light, M_E

Gravitational Lensing

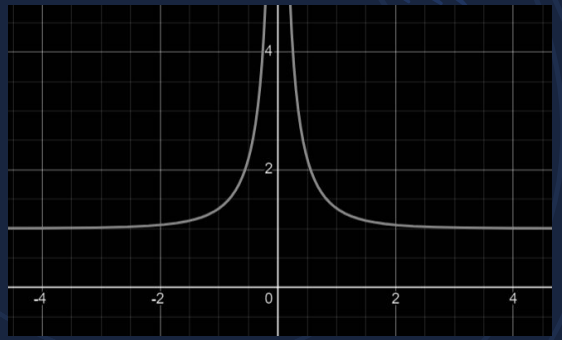
$$\theta = \sqrt{\frac{4GM}{c^2}\frac{D_S - D_L}{D_S D_L}}$$

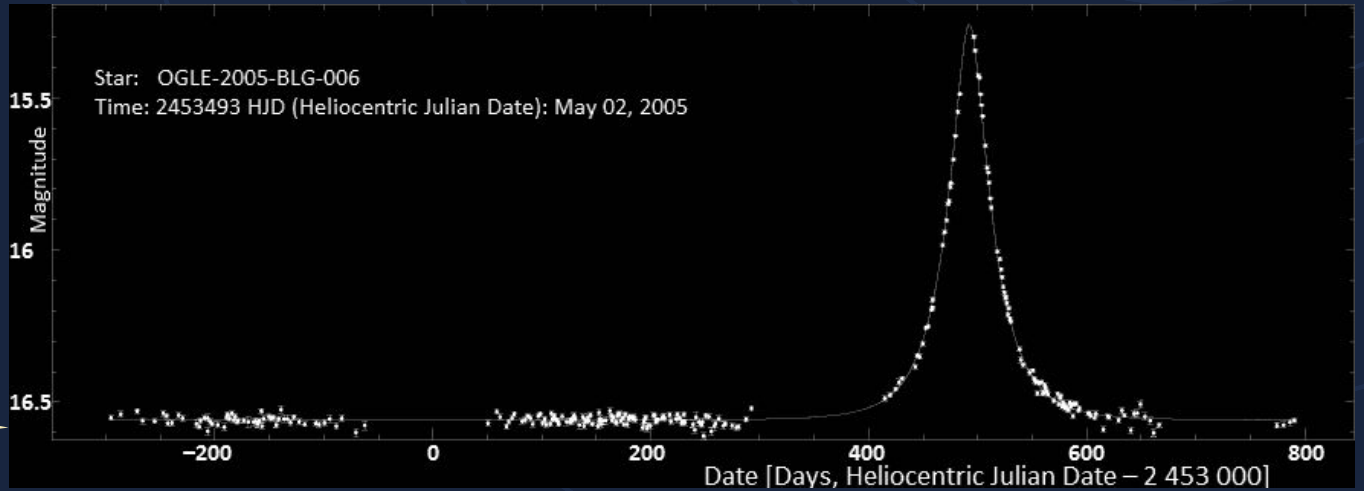
$\theta \sim \mu$arcsec



Gravitational Microlensing

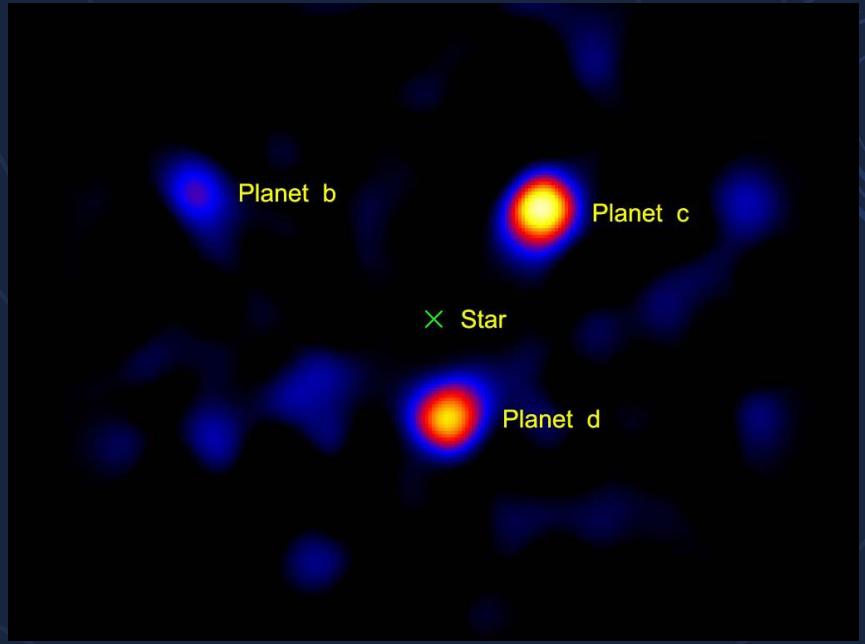
$$A = \left| \frac{u^2 + 2}{u\sqrt{u^2 + 4}} \right|$$





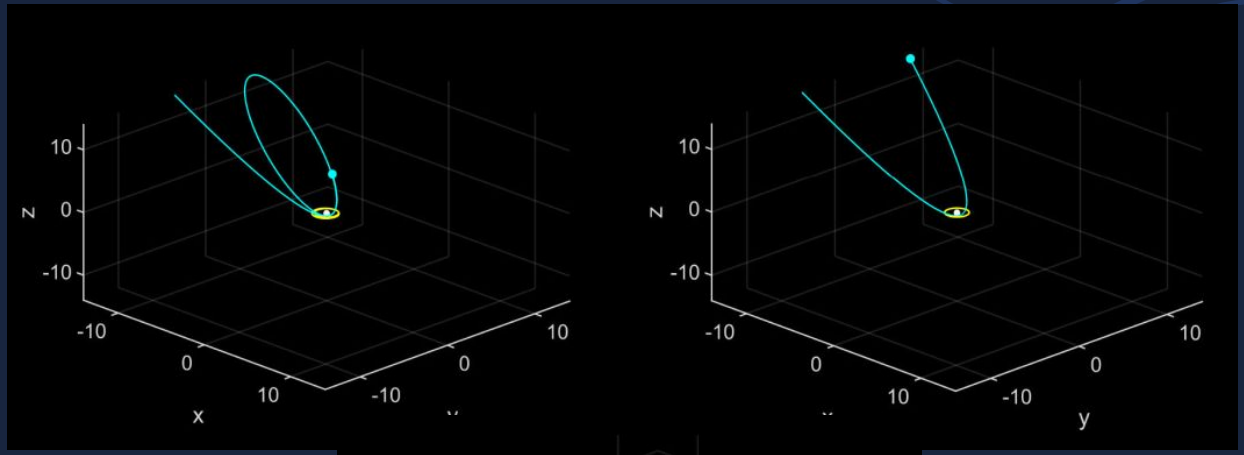
Direct Imaging

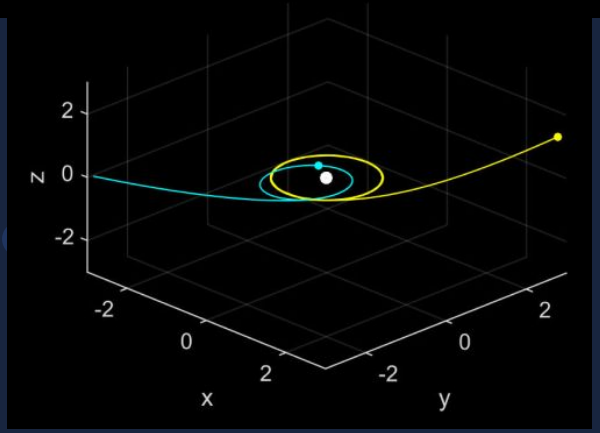
- Thermal emission
- Large, hot planets ~5 M_J
- Close to the sun
- Age and luminosity → mass



2 rogue planets for every star
~ 50 are confirmed

Interaction





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Thanks!

Feel free to ask questions