INFLUENCE OF STELLAR COMPANIONS ON FOMALHAUT'S RING

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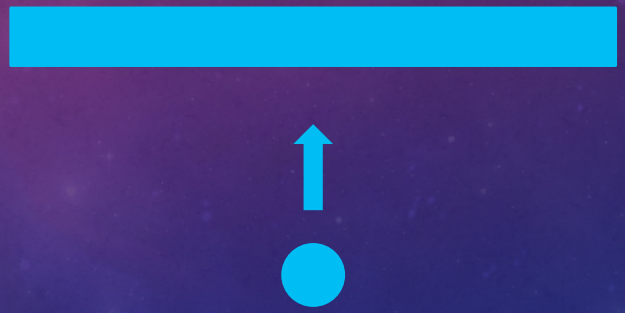
VOCABULARY

- Binary Star
  - Second Star in a System
- Tertiary Star
  - Third Star in a System
- Astronomical Unit (AU)
  - 150 million km
- Galactic Tide
- Eccentricity
  - 0 to 1

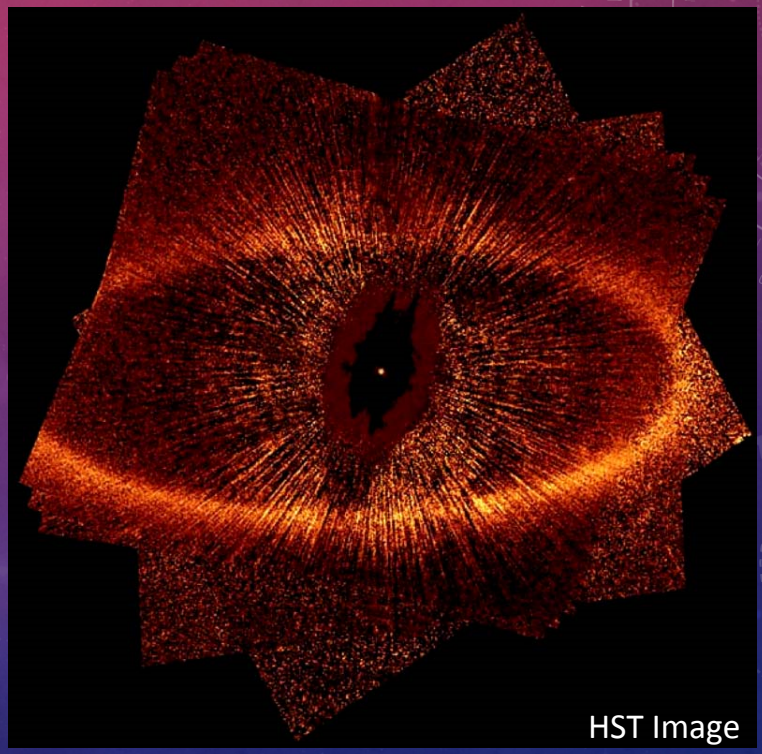


FOMALHAUT SYSTEM

- Fomalhaut A
  - 25 ly from Earth
  - 1.92 Solar Masses
  - Ring of Dust
- Fomalhaut B
  - 50,000 AU
  - 0.72 Solar Masses
- Fomalhaut C
  - 150,000 AU
  - 0.18 Solar Masses

FOMALHAUT'S RING

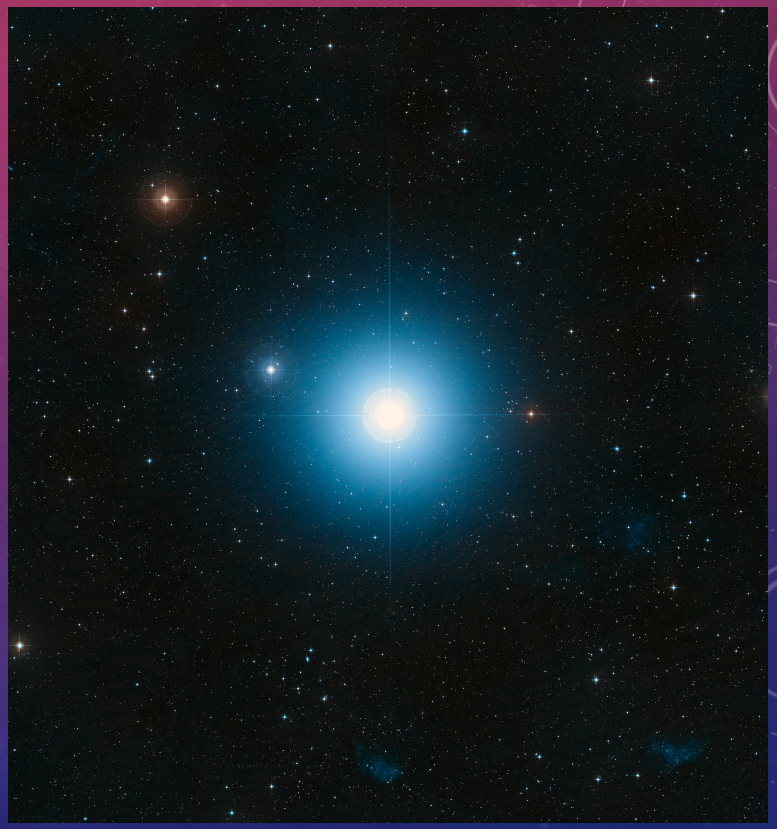
- Why are we interested in Fomalhaut's ring?
  - Eccentricity of 0.1
- Planetary Detection
  - Observe Eccentricity
    - Evidence for Planet



HST Image

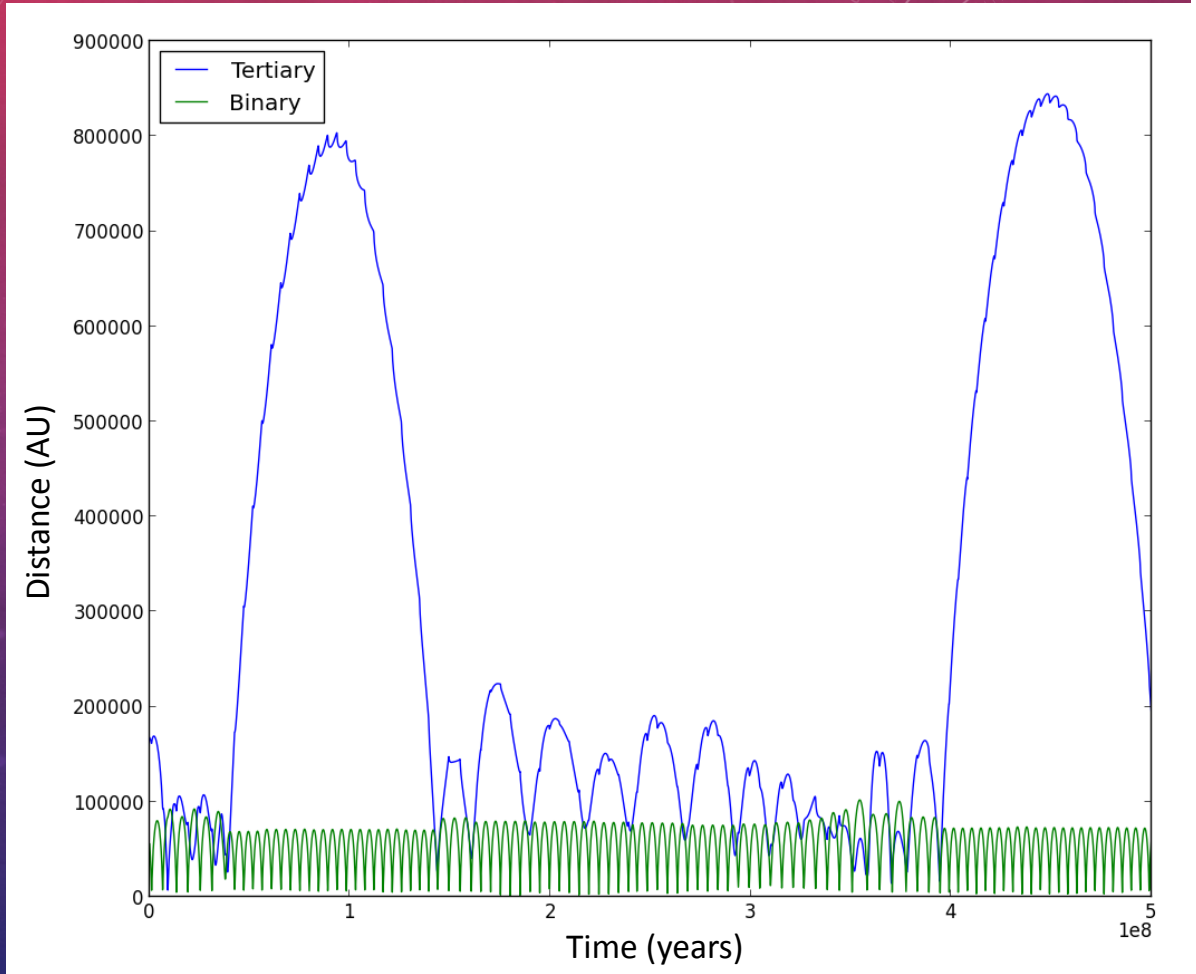
STELLAR EVOLUTION

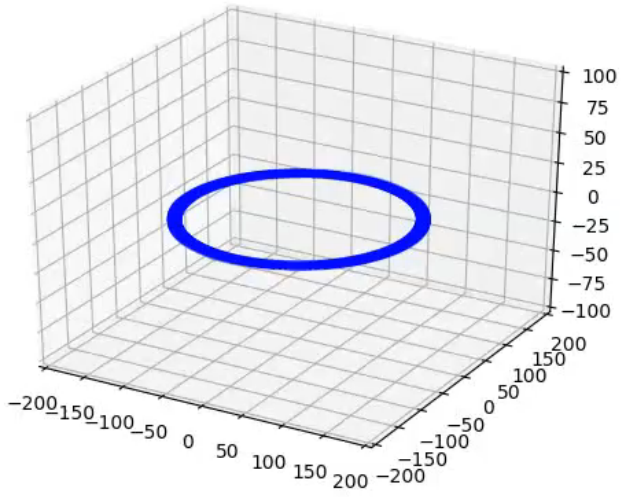
- Companion Stars
  - Long Orbital Periods
    - Tens of Millions of Years
  - Unstable Orbits
    - Galactic Tide
    - Stellar Passages



SIMULATIONS

- 2000 Simulations
  - Random Initial Conditions
  - No Disk
- Final Positions
  - Simulations within 50% of Observed
  - Rerun with Disk

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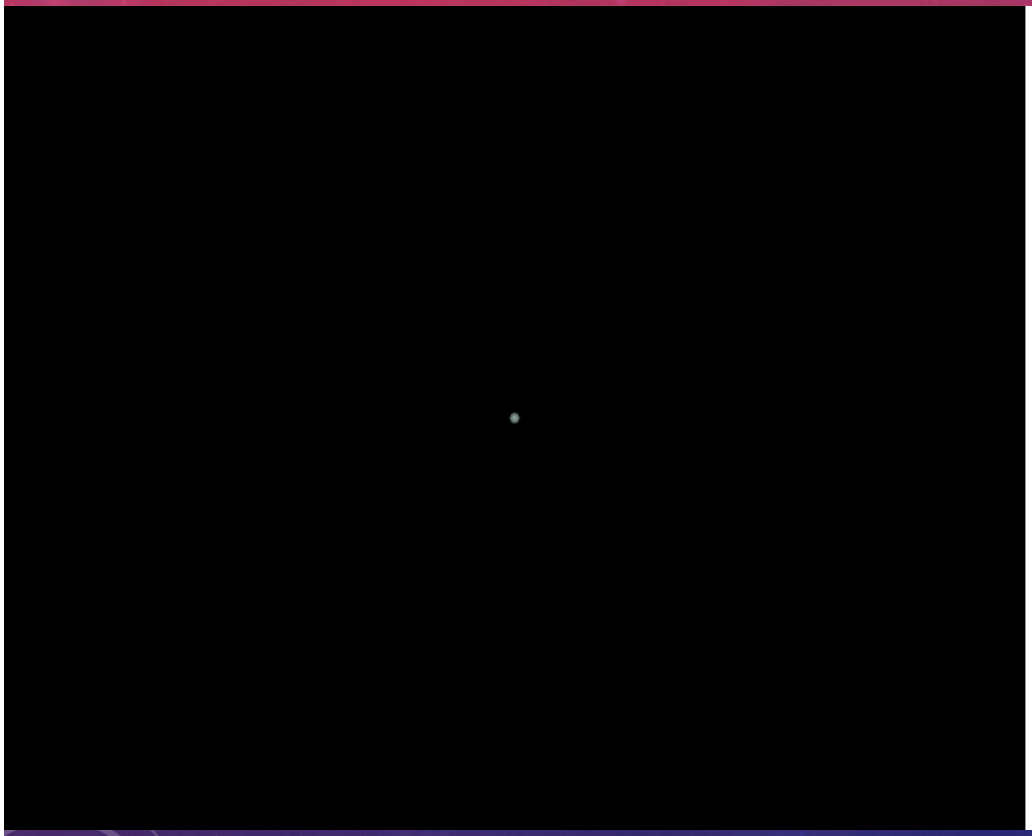

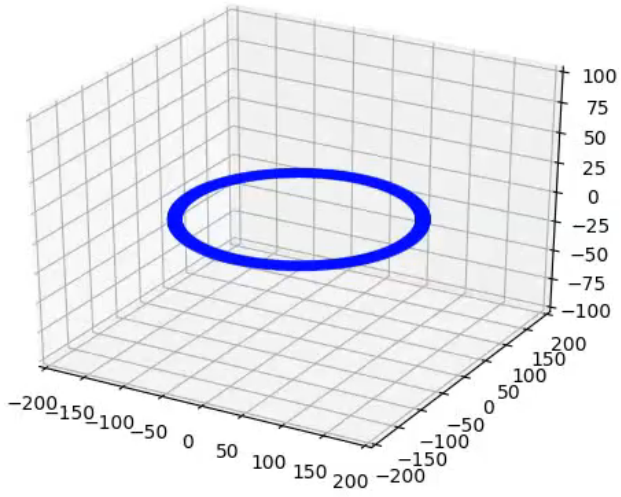
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WHAT IS A SUCCESS

- Median Eccentricity
  - Greater than 0.05
  - Less than 0.2
- Spread of Orbits
  - Low Standard Deviation
  - Well Defined Ring

RESULTS

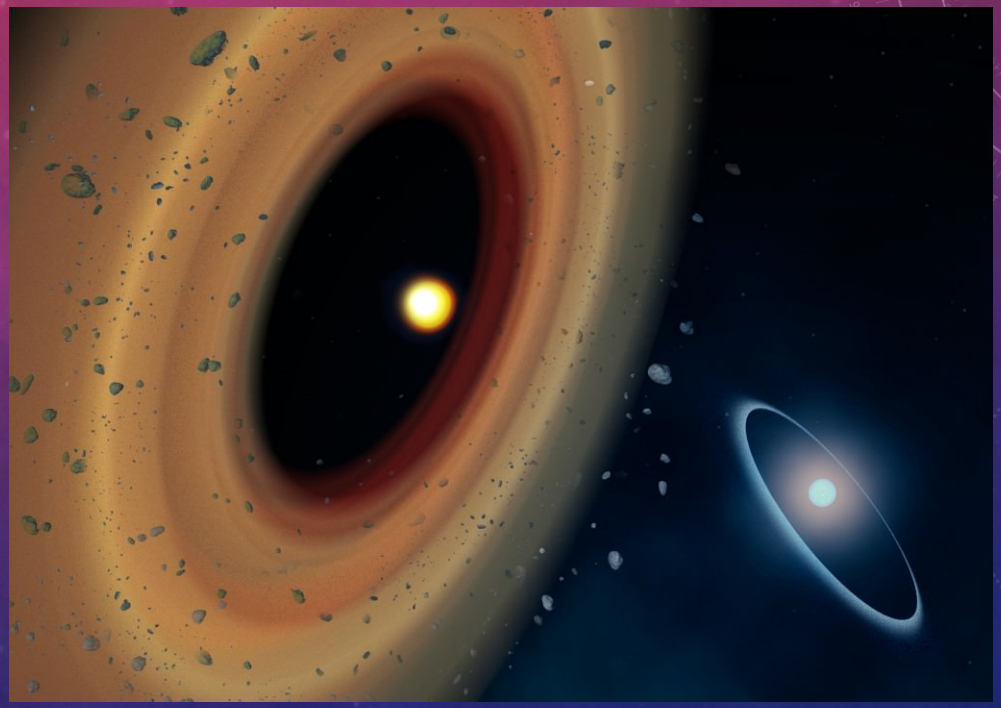
- 2000 Simulations
- 135 with Correct Final Positions
- 7 Interesting Simulations

CONCLUSION

- Many Simulations
  - About 1% Finished with Correct Final Conditions
- Eccentric Ring Recreated with Stellar Companions
- Eccentric Ring not Necessarily a ‘Smoking Gun’ for Planetary Detection
- Upcoming Observations
  - James Webb Space Telescope

FUTURE WORK

- Fomalhaut C
  - Ring of dust
    - 10 to 40 AU
- Alter Simulations
  - Same Initial Conditions
  - Add Ring around Fomalhaut C



Questions?