

DEATH STARS & VENGEFUL PLANETS



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ASTRONOMY OPEN NIGHT 2017



**MACQUARIE
University**

THE BIG QUESTIONS:

Where do we come from?

**Galaxies and stars...
...how do they form/change?**

How many planets are out there?

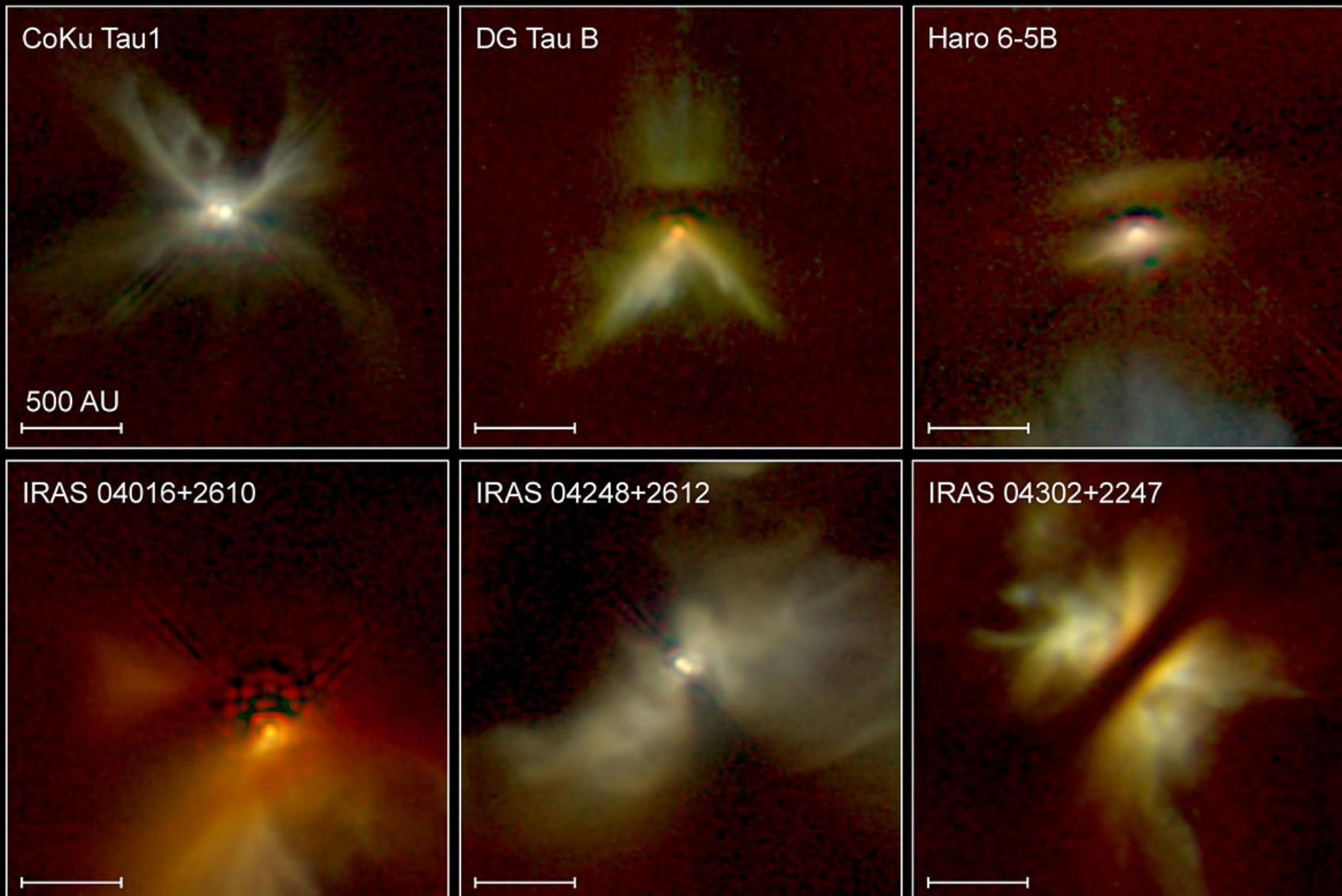
Is there other forms life?



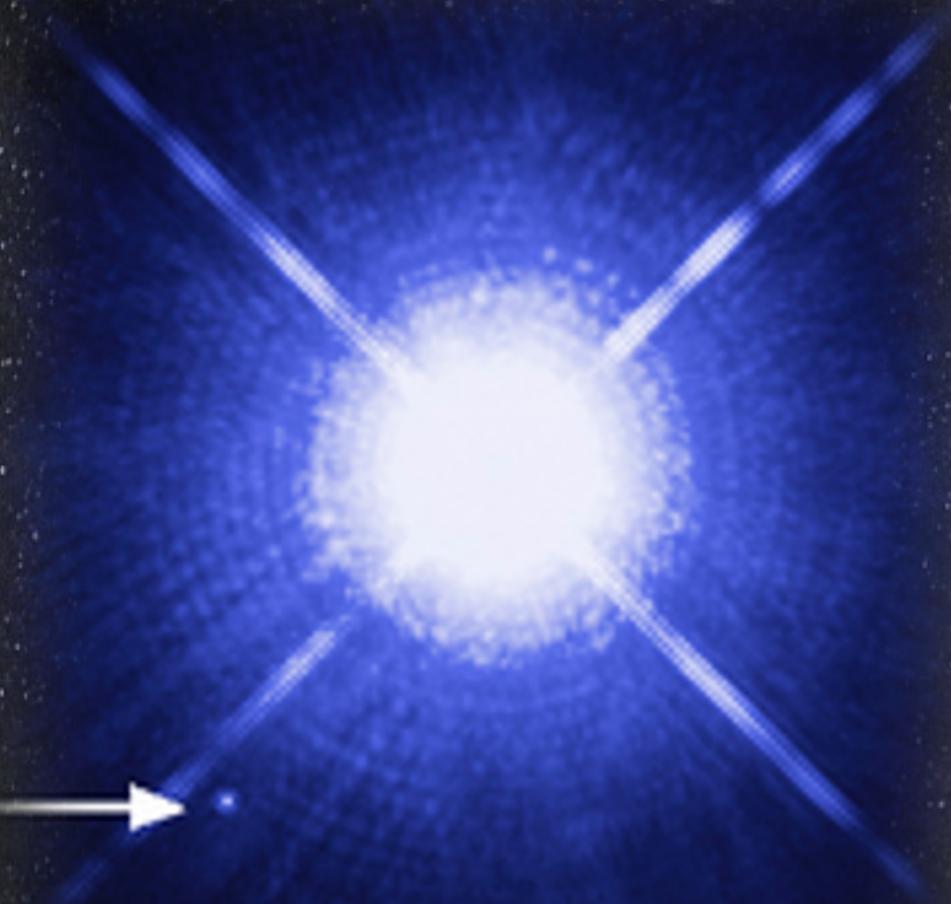
BABY PICTURES



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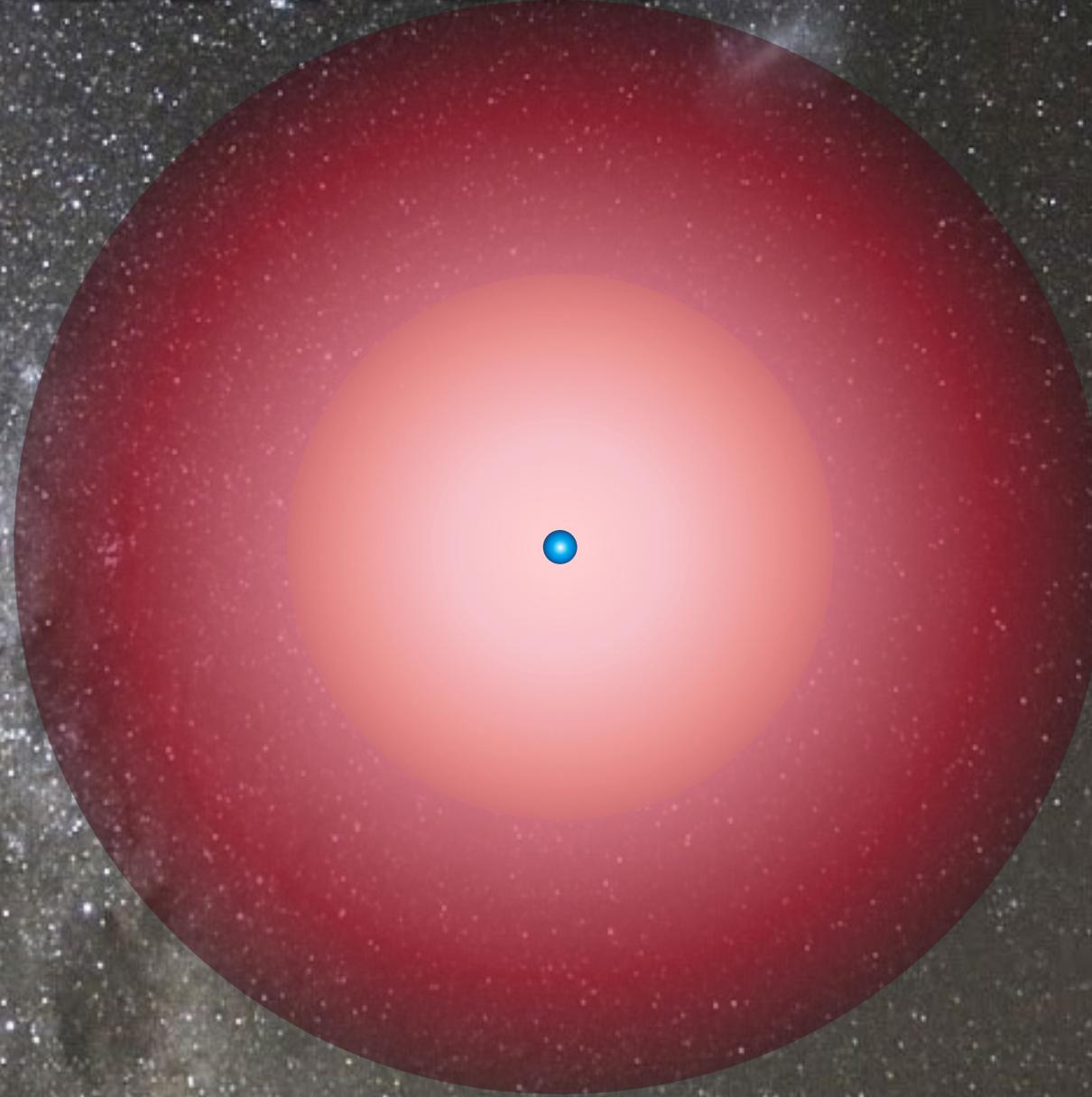


Young Stellar Disks in Infrared
Hubble Space Telescope • NICMOS



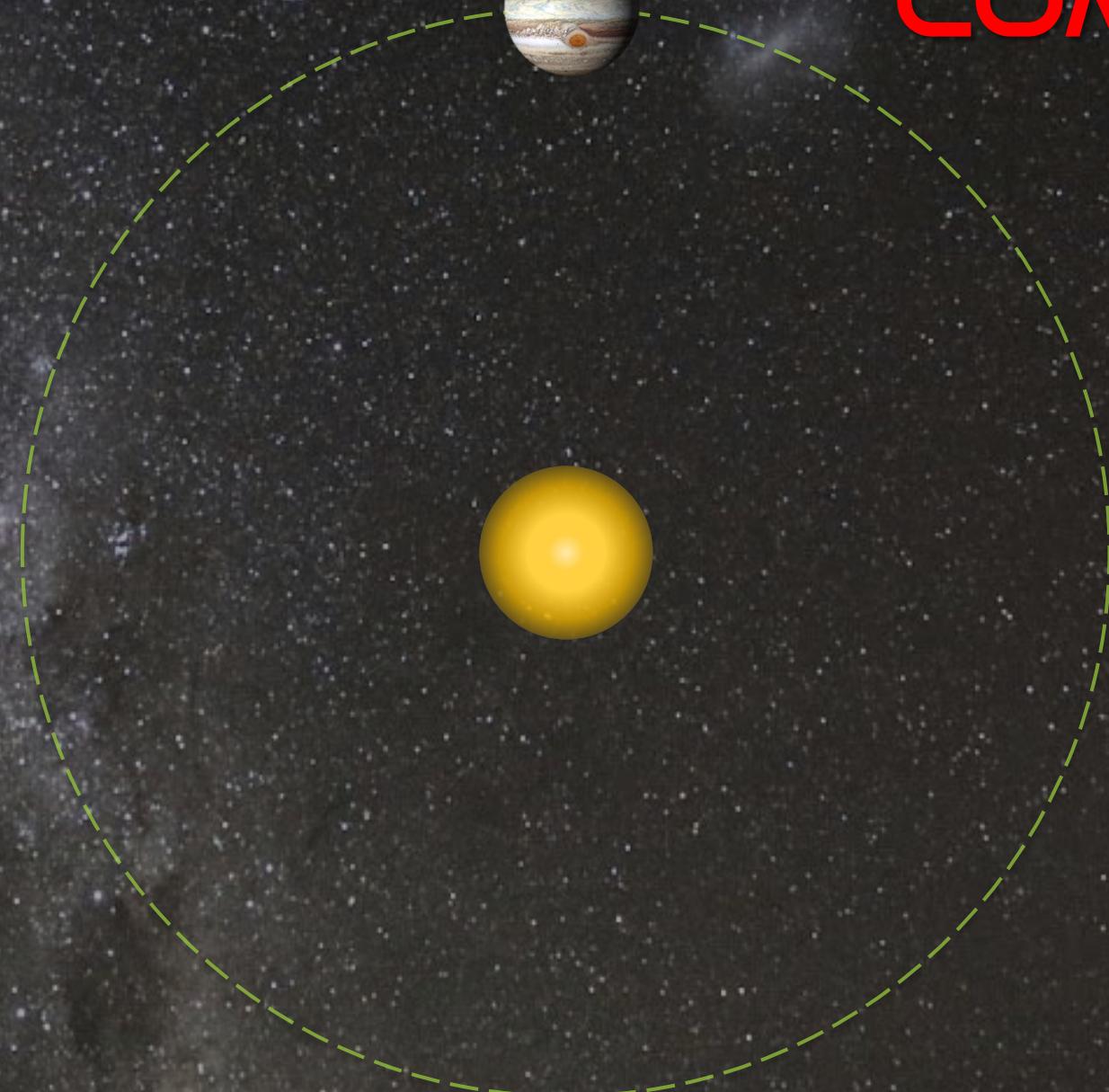
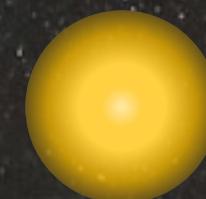
QUIETLY EXPLODE
S

STELLAR "EVOLUTION"



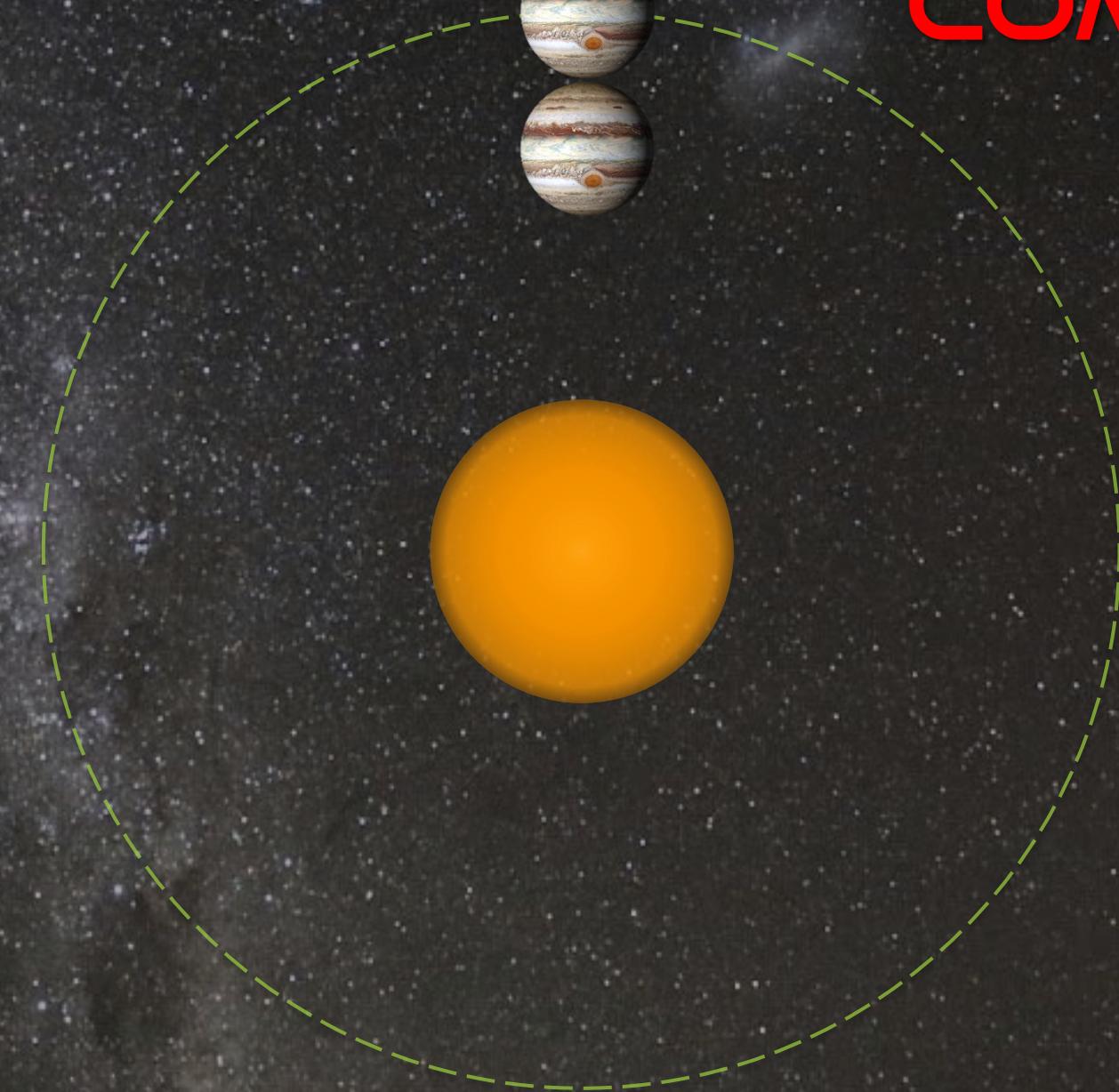
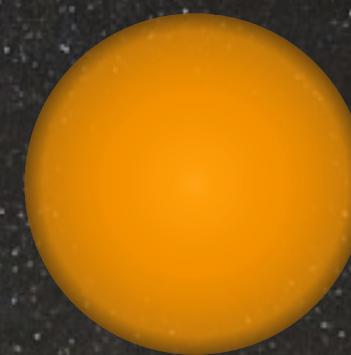
STELLAR "EVOLUTION"

...WITH A
COMPANION



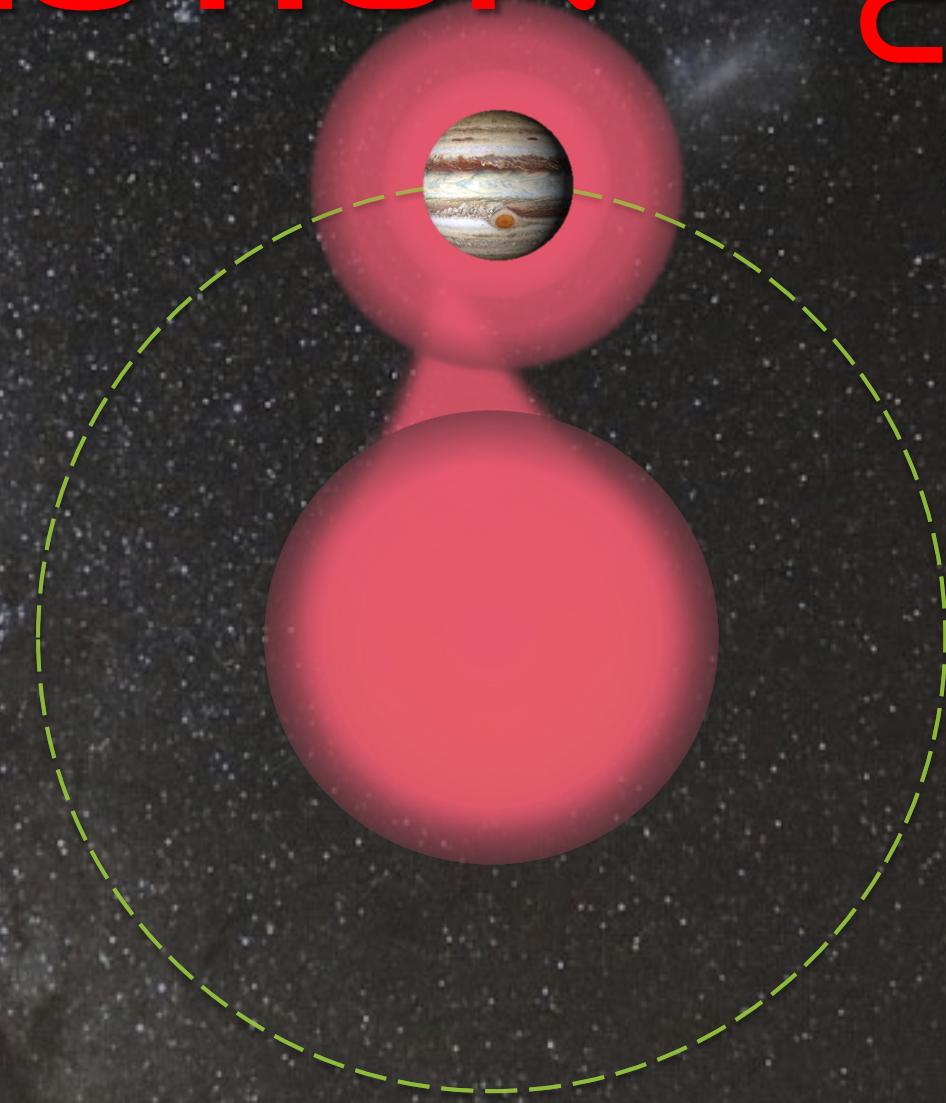
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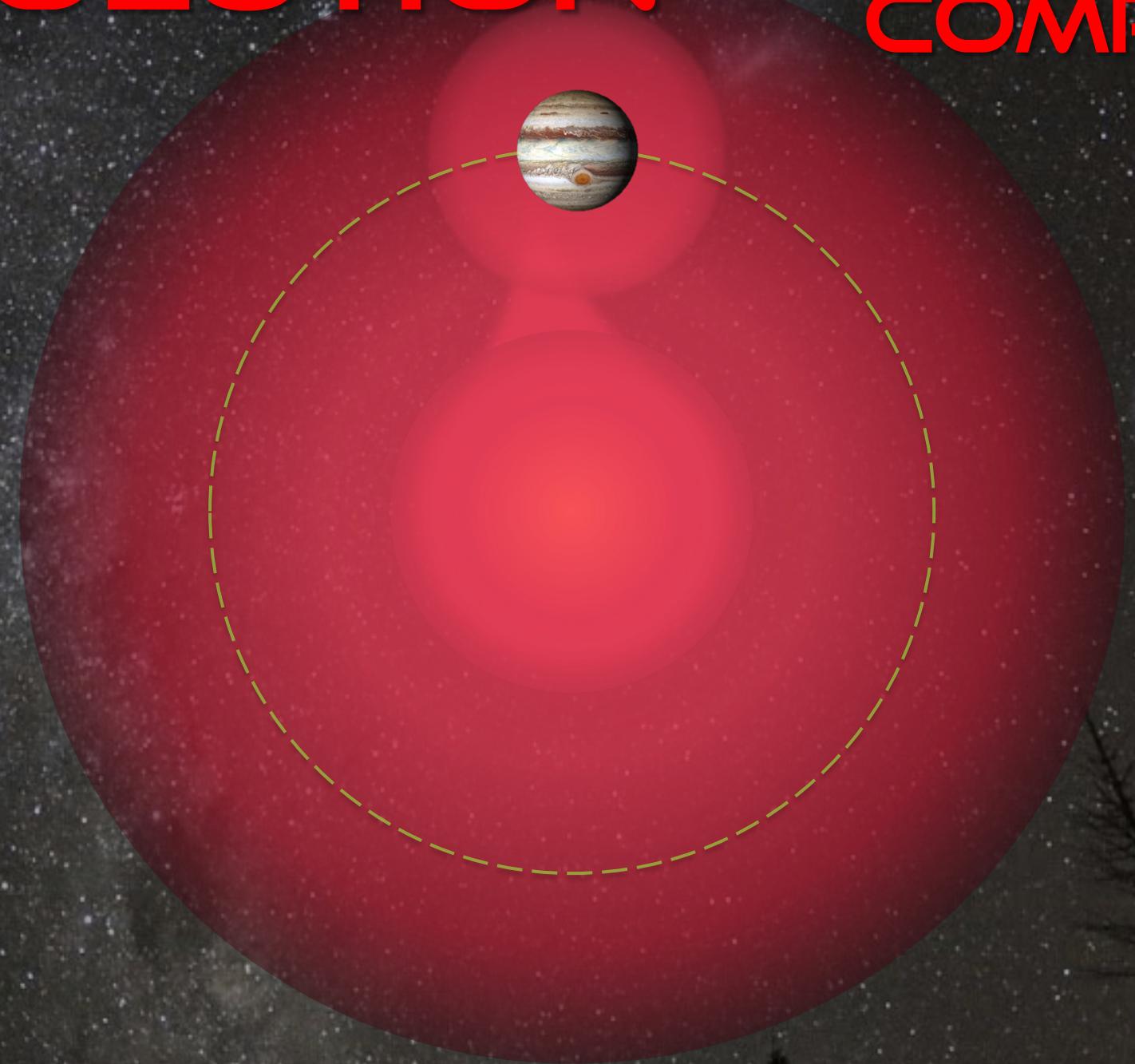
STELLAR "EVOLUTION"

...WITH A
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STELLAR "EVOLUTION"

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COMPANION



EARTH IN 5 BILLION YEARS



DO PLANETS HIT THE SUN?

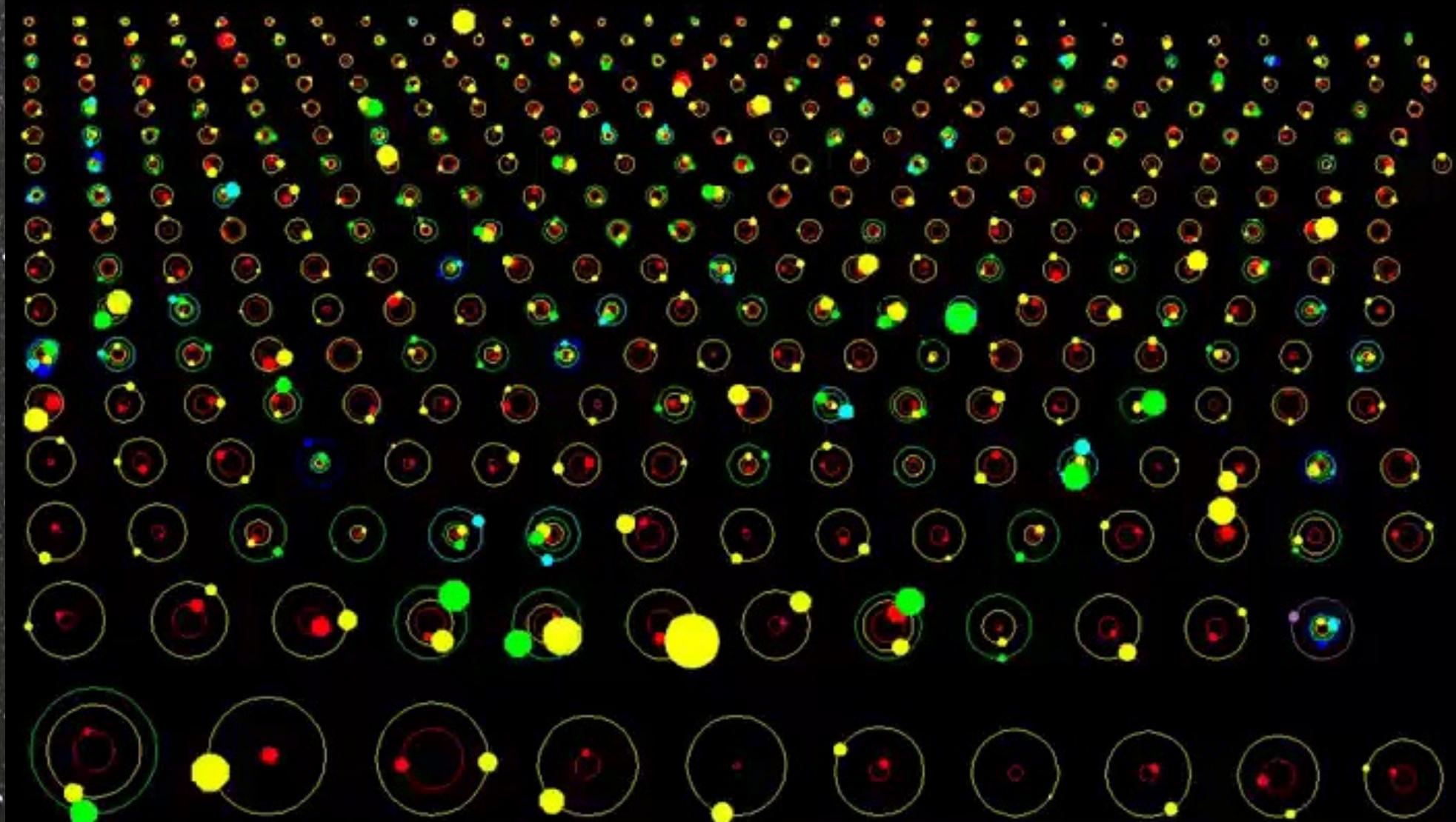
A blue-tinted image of a celestial body, likely a planet, showing its atmosphere and a bright light source, possibly the sun, visible as a small white circle at the top center.

Watch Here ->

016 / 08 / 02 18:30

OTHER STARS HAVE PLANETS TOO!

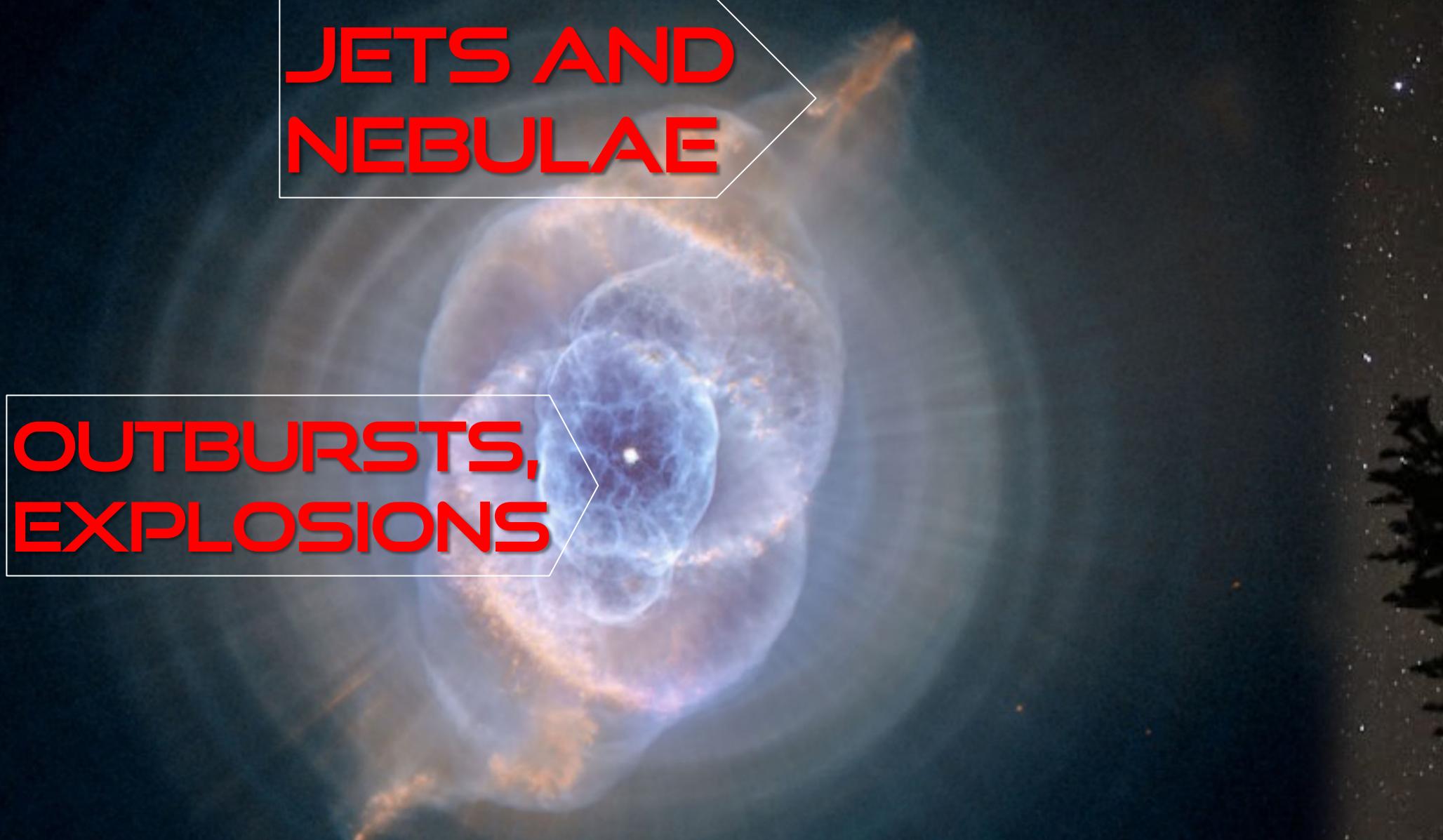
The Kepler Orrery II
 $t[\text{BJD}] = 2454965$ D. Fabrycky 2012



CONSEQUENCES OF HAVING COMPANIONS

JETS AND
NEBULAE

OUTBURSTS,
EXPLOSIONS



CAN PLANETS SURVIVE?

Yes!

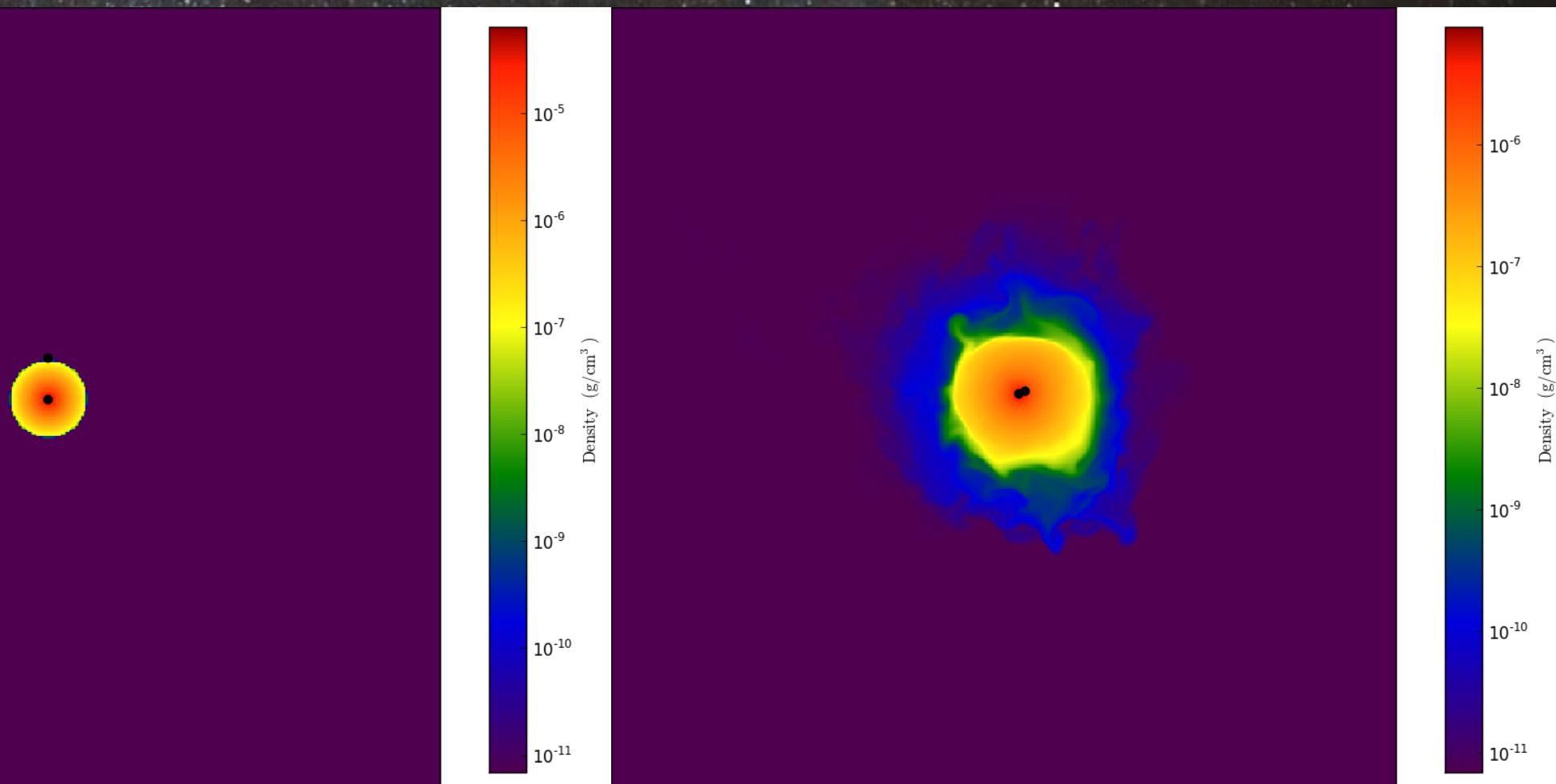
GIANT STAR + PLANET? (10X MASS OF JUPITER)



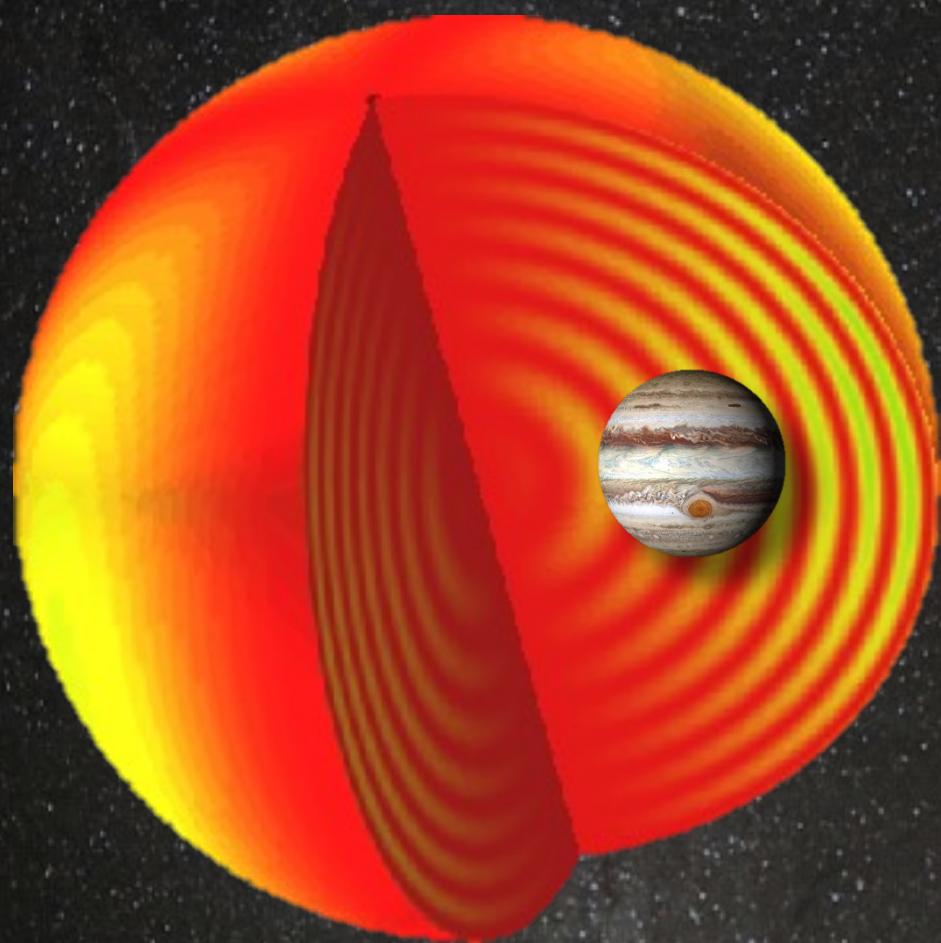
10

years

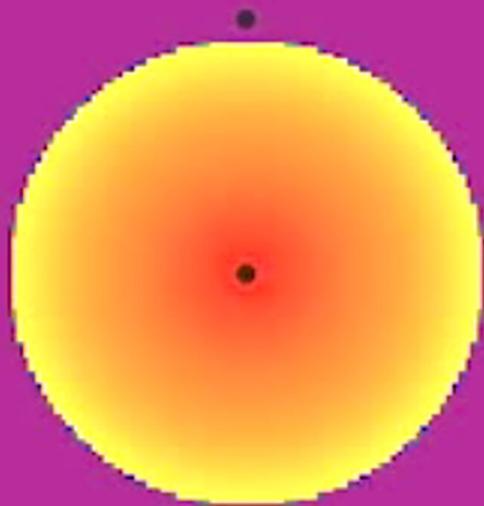
GIANT STAR + PLANET? (10X MASS OF JUPITER)



ALTERNATIVELY...

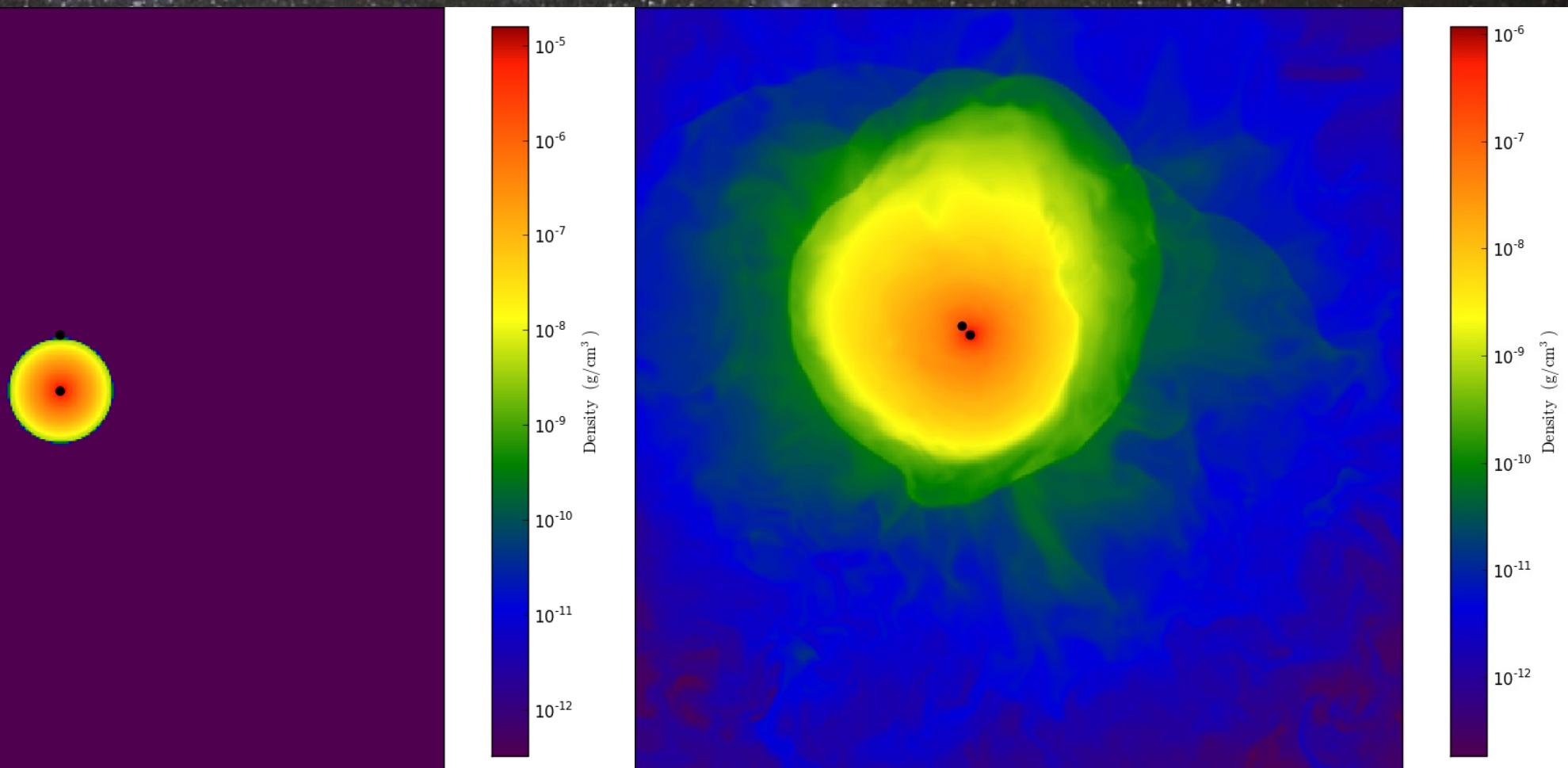


TRY A LARGER STAR?

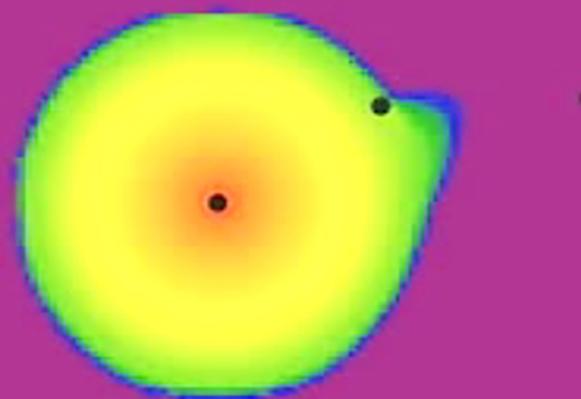


80

years



TWO PLANETS?



10

years

CONCLUSIONS...

Star-planet interaction may explain certain features of stars

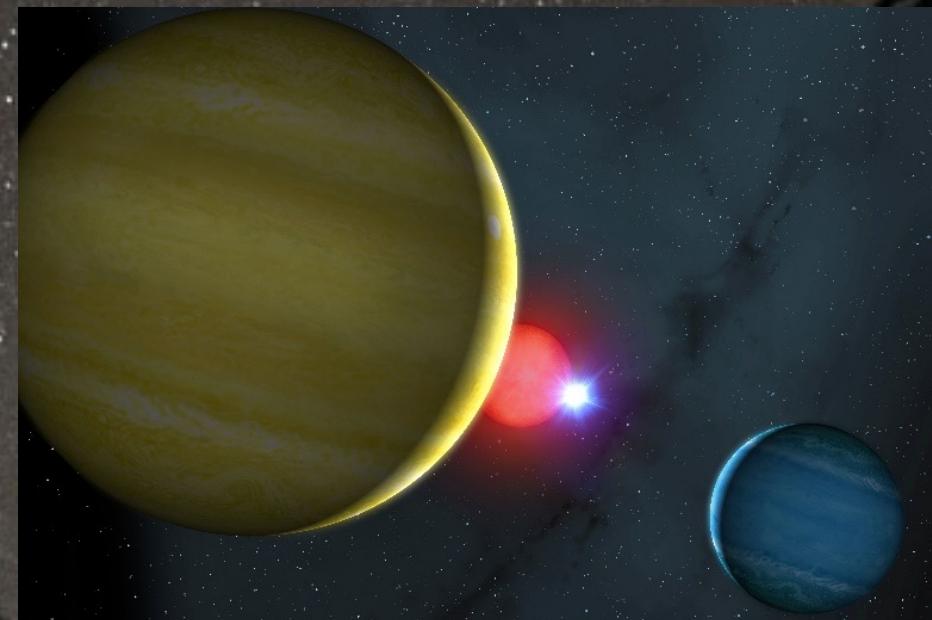
Planets can survive inside stars for reasonably long times

...but they need to somehow cause the star to eject its envelope. Else, they perish inside the star ...

We may have discovered some mechanisms to explain planet survival

CONCLUSIONS...

- Main goal: understand implication of planetary interactions for stellar evolution.
However:
- Implications for stability of planets in orbit around evolved binaries (NN Ser)
- Second generation planet formation (pulsar planets)





THANK YOU!



Astronomical Observatory



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