

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?

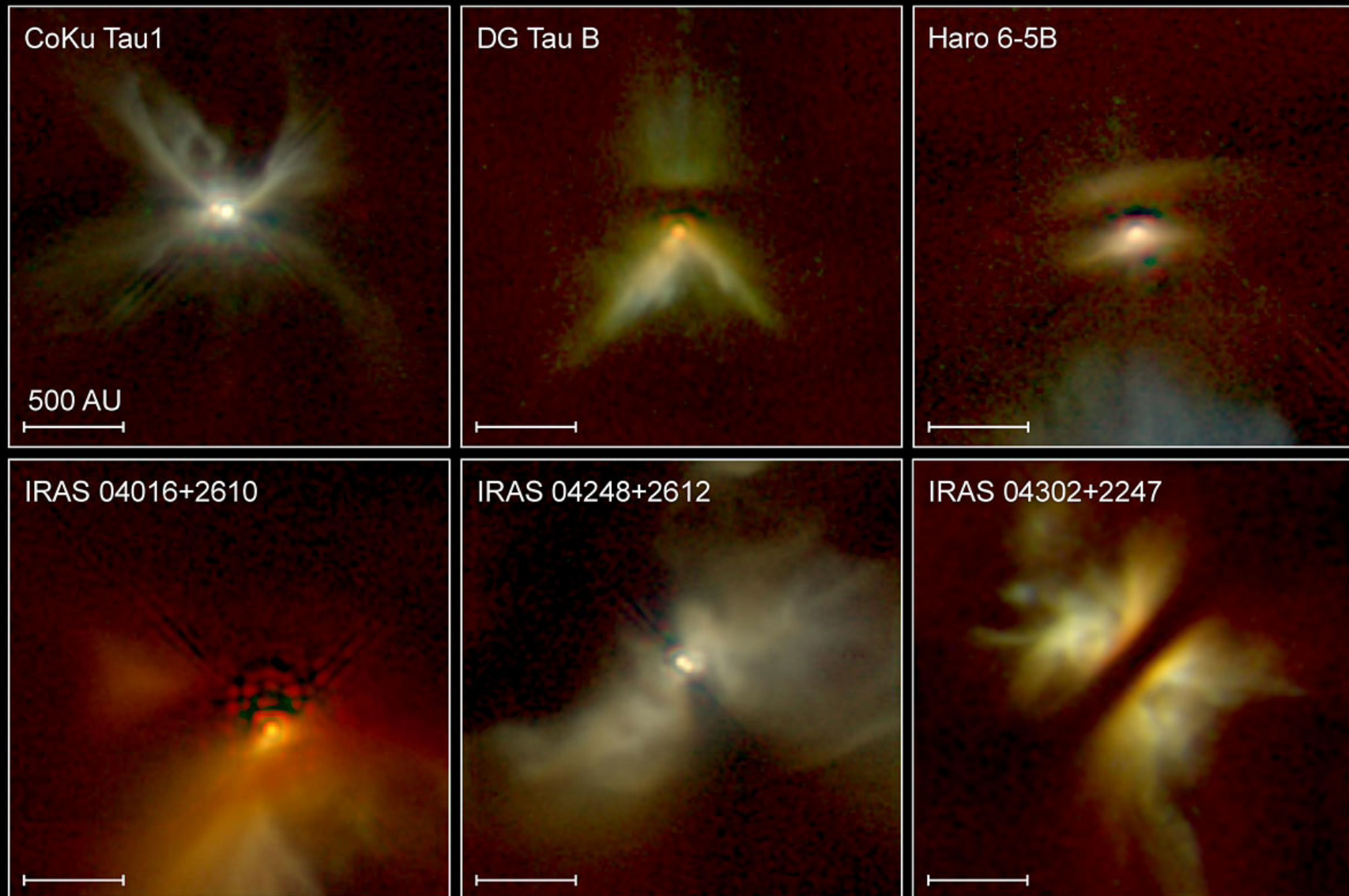
Is there other forms life?



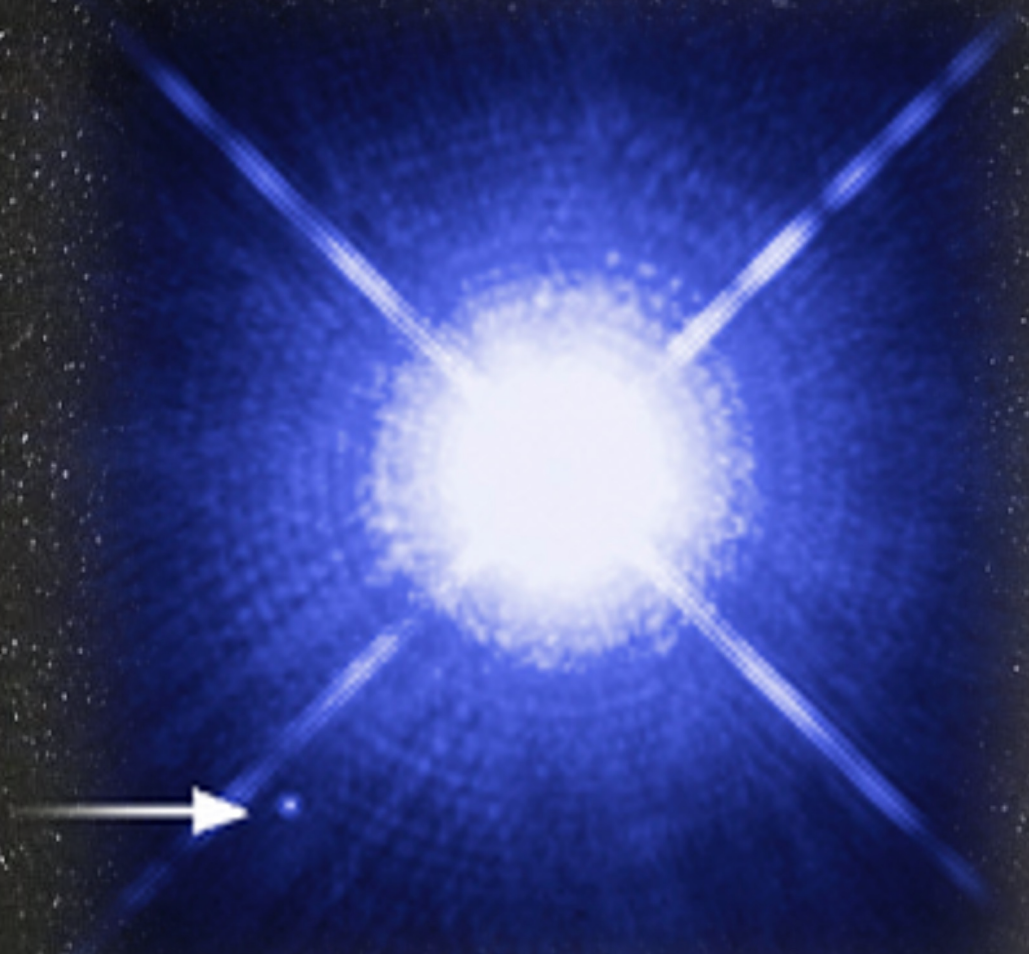
BABY PICTURES



BABY PICTURES



Young Stellar Disks in Infrared
Hubble Space Telescope • NICMOS

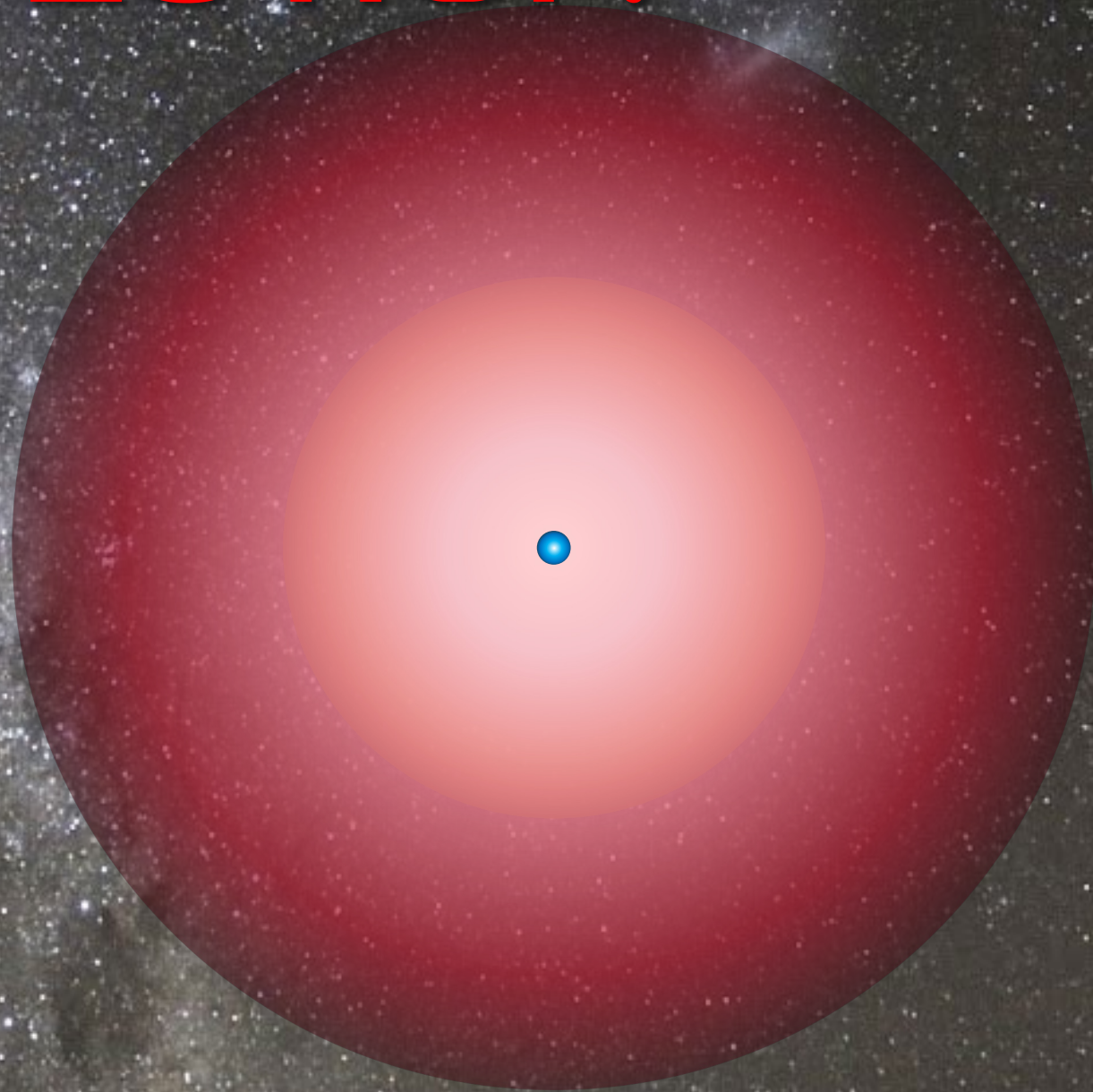


QUIETLY



**EXPLODE
S**

STELLAR "EVOLUTION"



STELLAR "EVOLUTION"

...WITH A
COMPANION



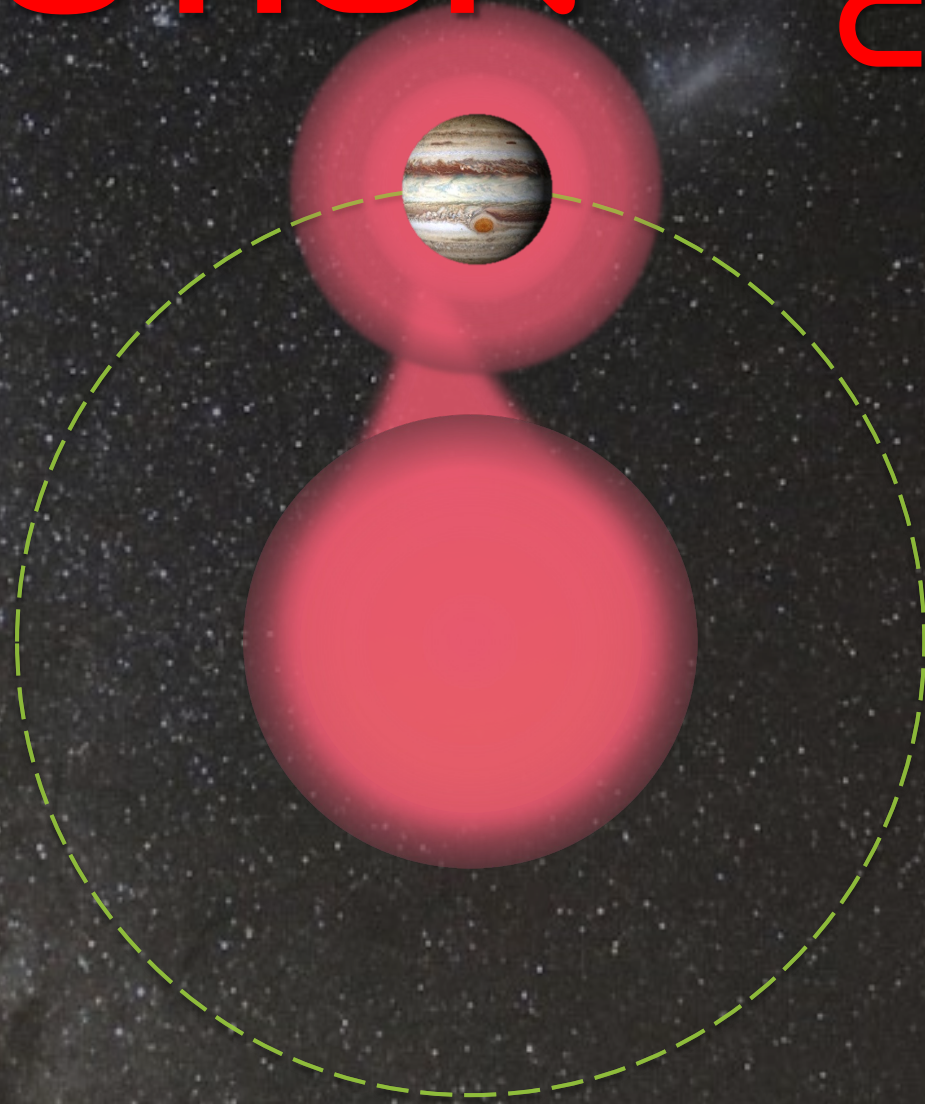
STELLAR "EVOLUTION"

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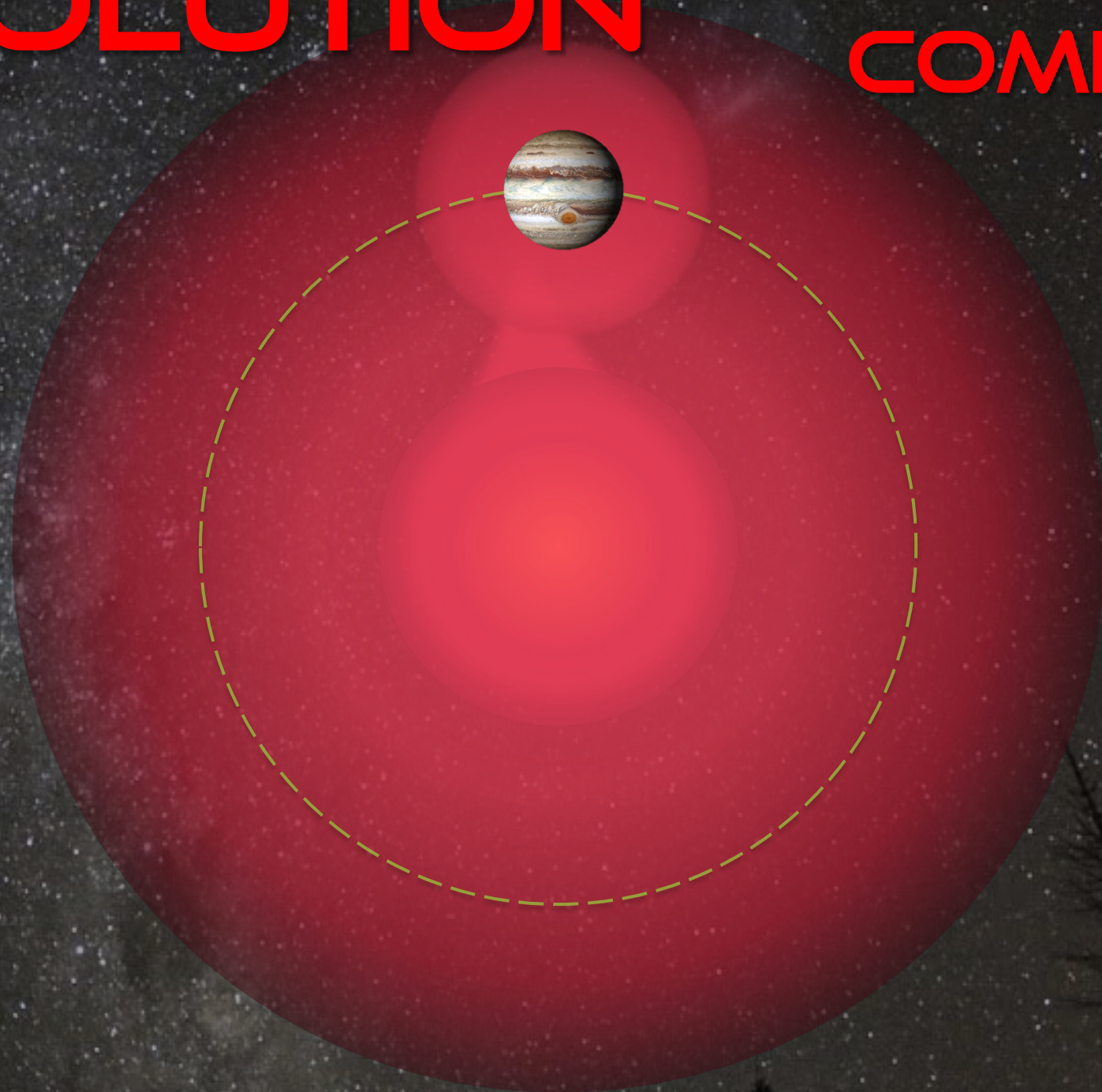
STELLAR "EVOLUTION"

...WITH A
COMPANION



STELLAR "EVOLUTION"

...WITH A
COMPANION



EARTH IN 5 BILLION YEARS



DO PLANETS HIT THE SUN?

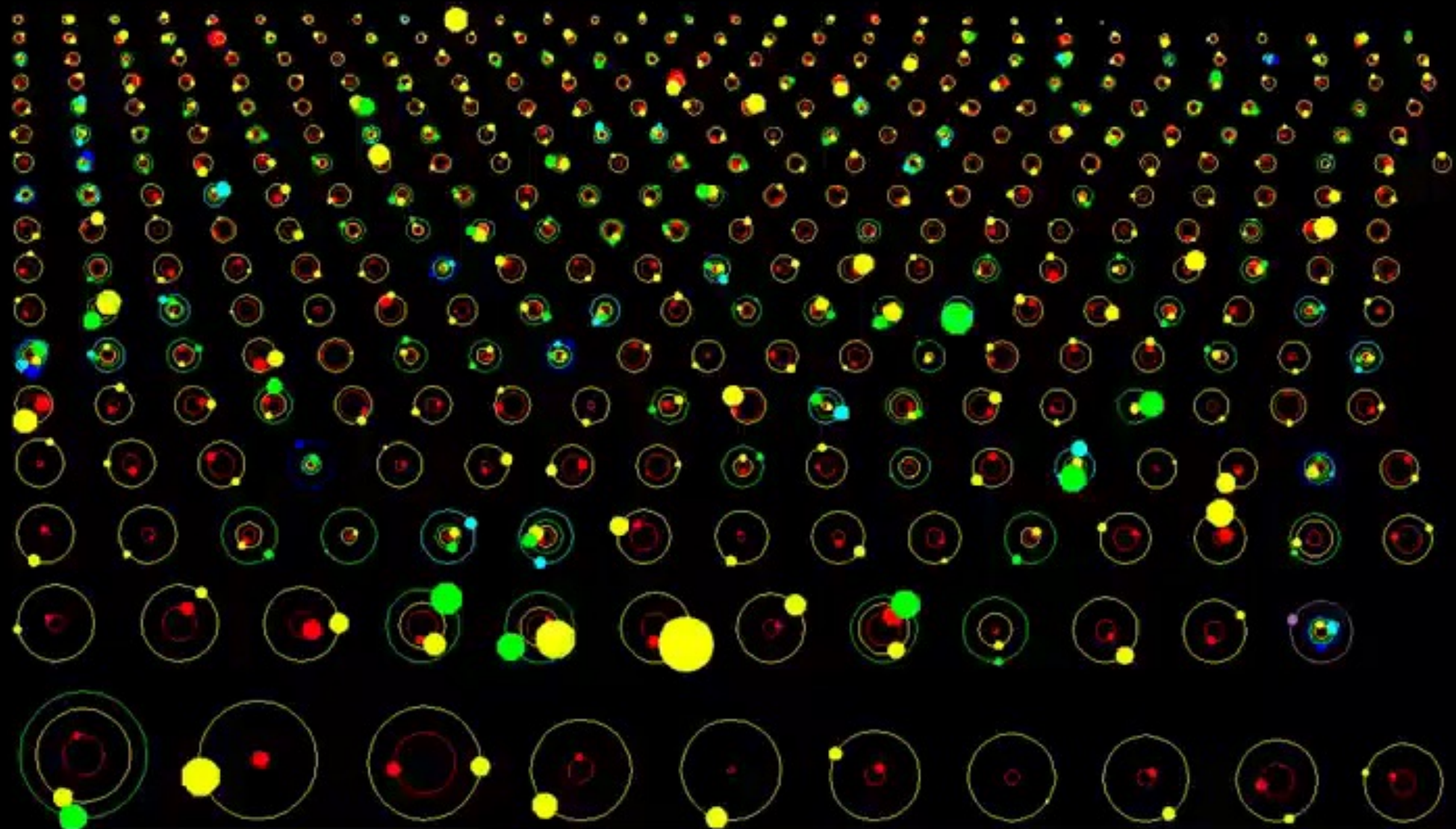


OTHER STARS HAVE PLANETS TOO!

The Kepler Orrery II

t[BJD] = 2454965

D. Fabrycky 2012



CONSEQUENCES OF HAVING COMPANIONS

JETS AND
NEBULAE

OUTBURSTS,
EXPLOSIONS



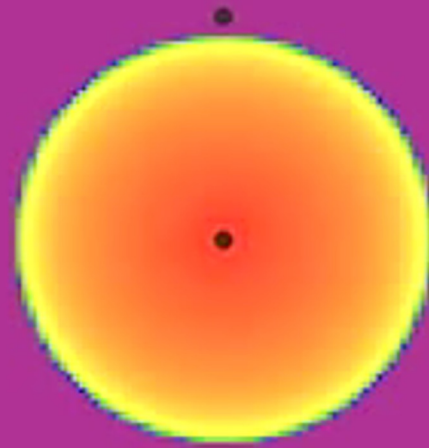


CAN PLANETS
SURVIVE?

Yes!

GIANT STAR + PLANET?

(10X MASS OF JUPITER)

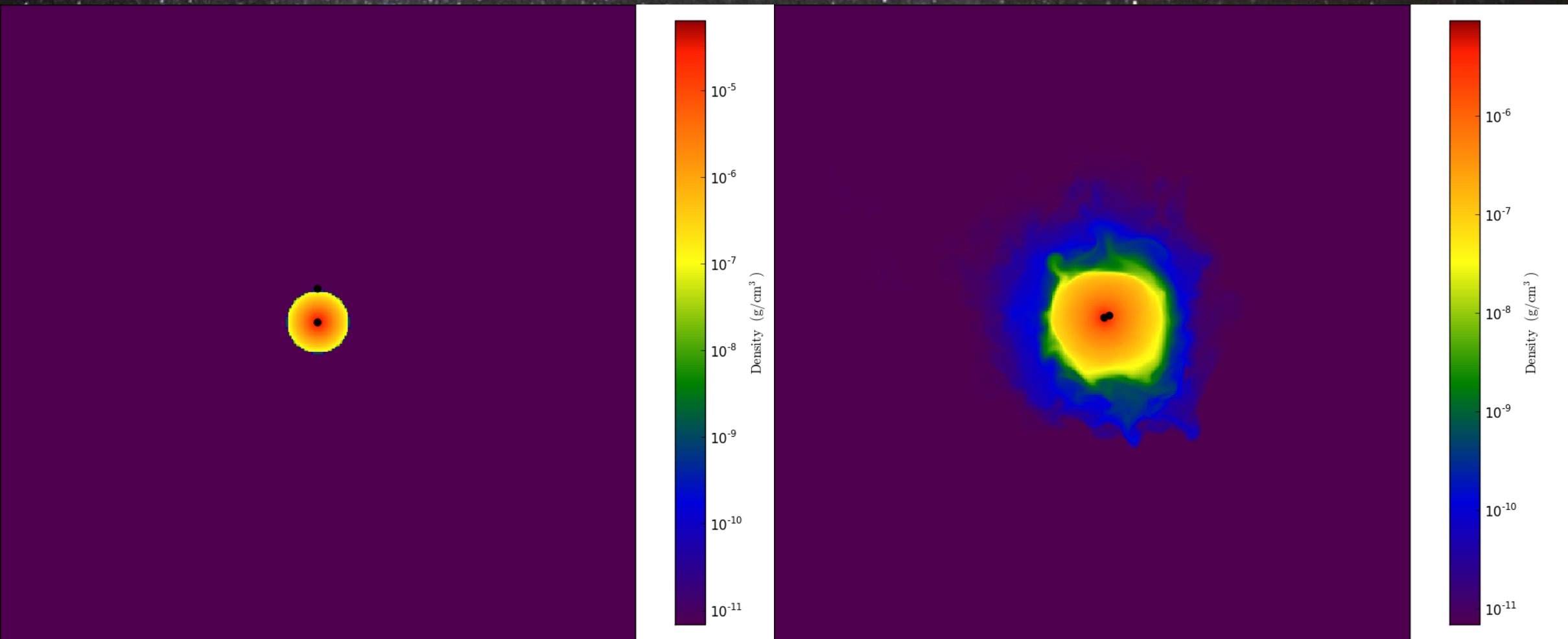


10

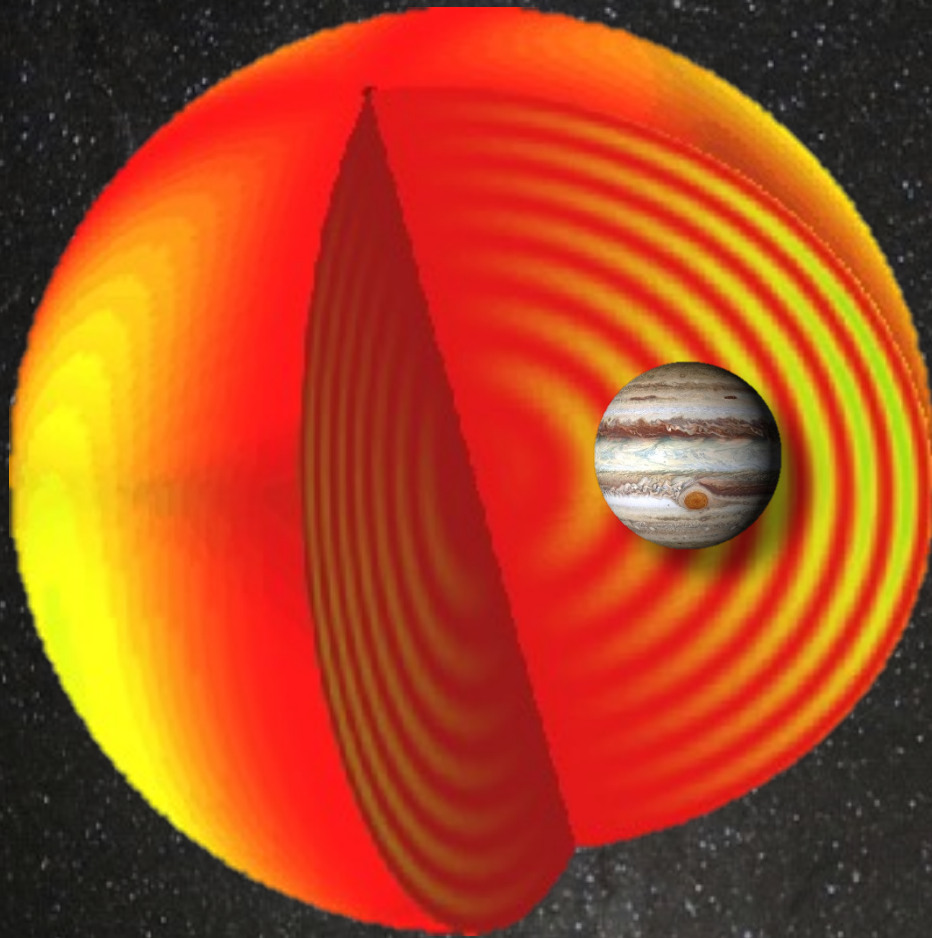
years

GIANT STAR + PLANET?

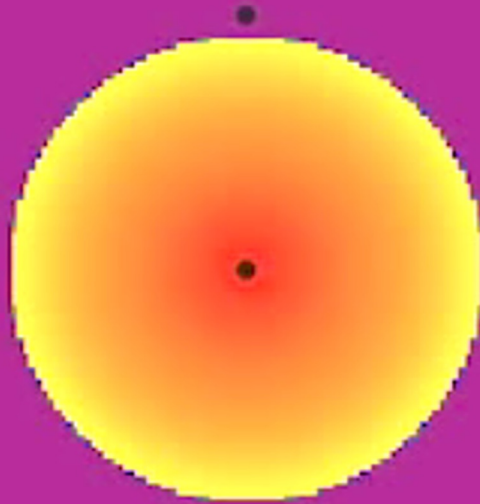
(10X MASS OF JUPITER)



ALTERNATIVELY ...

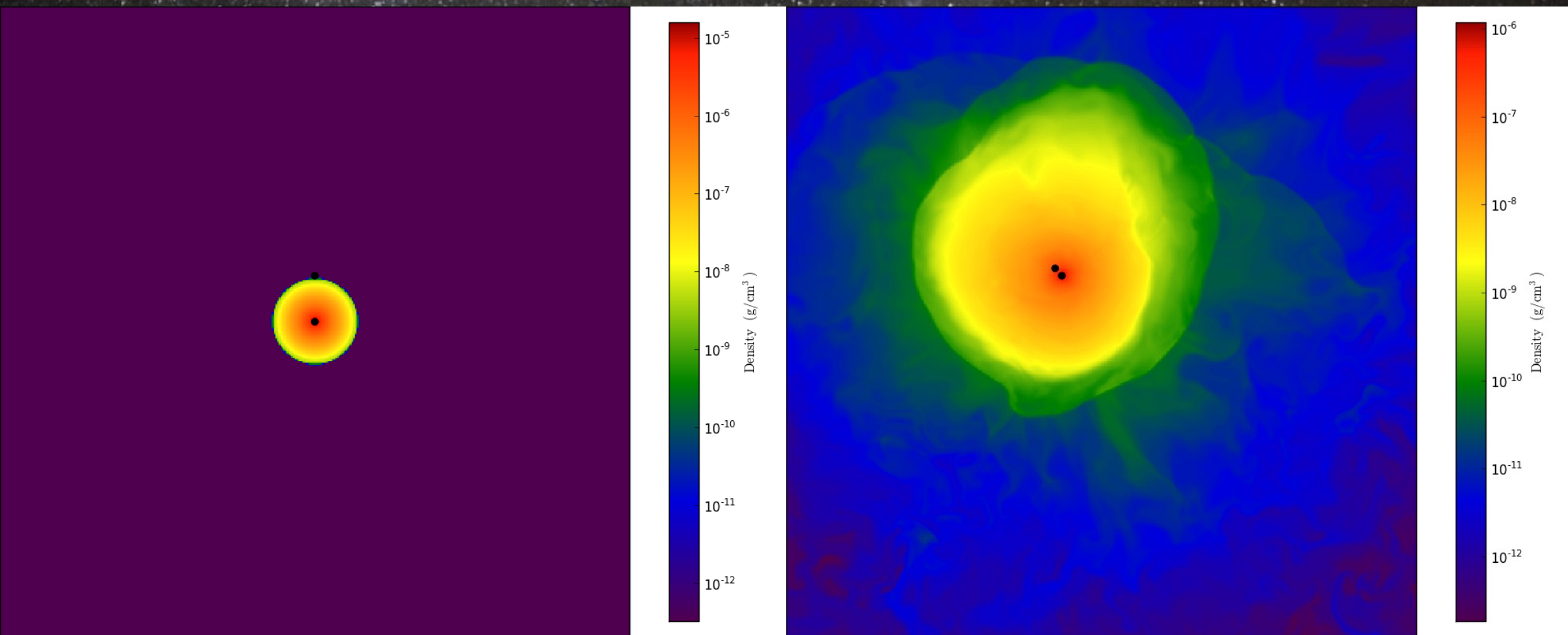


TRY A LARGER STAR?

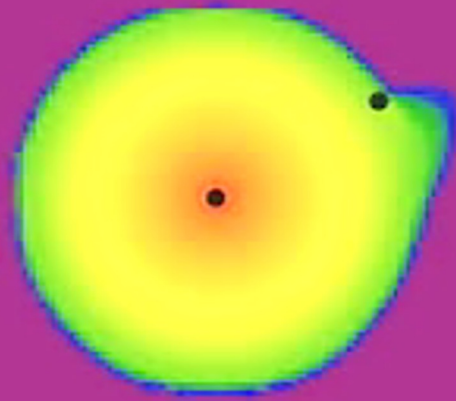


80

years



TWO PLANETS?



10

years

CONCLUSIONS...

Star-planet interaction may explain certain features of stars

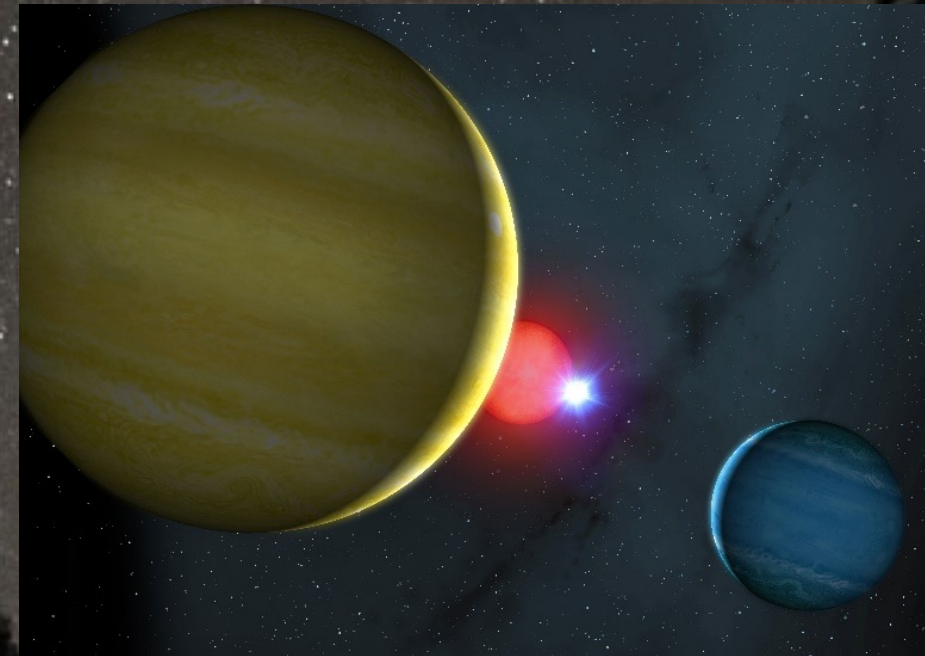
Planets can survive inside stars for reasonably long times

...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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