Blazing the Trail: Direct Imaging of Extrasolar Giant Planets in the Habitable Zone

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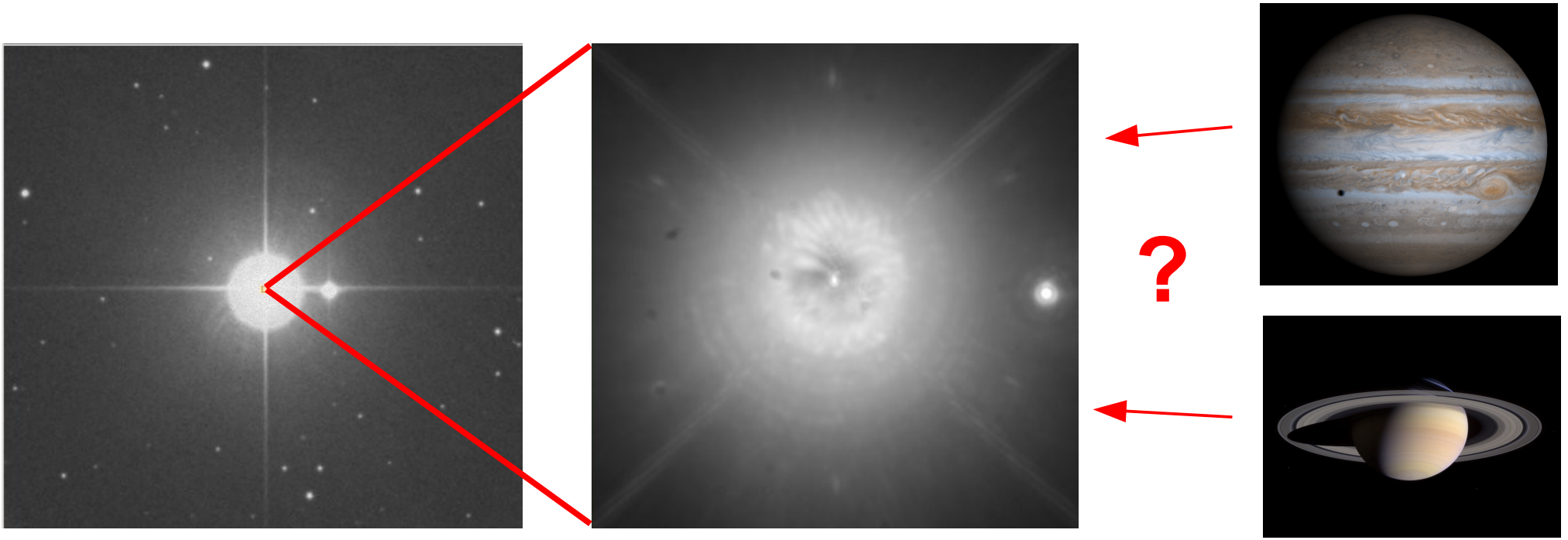
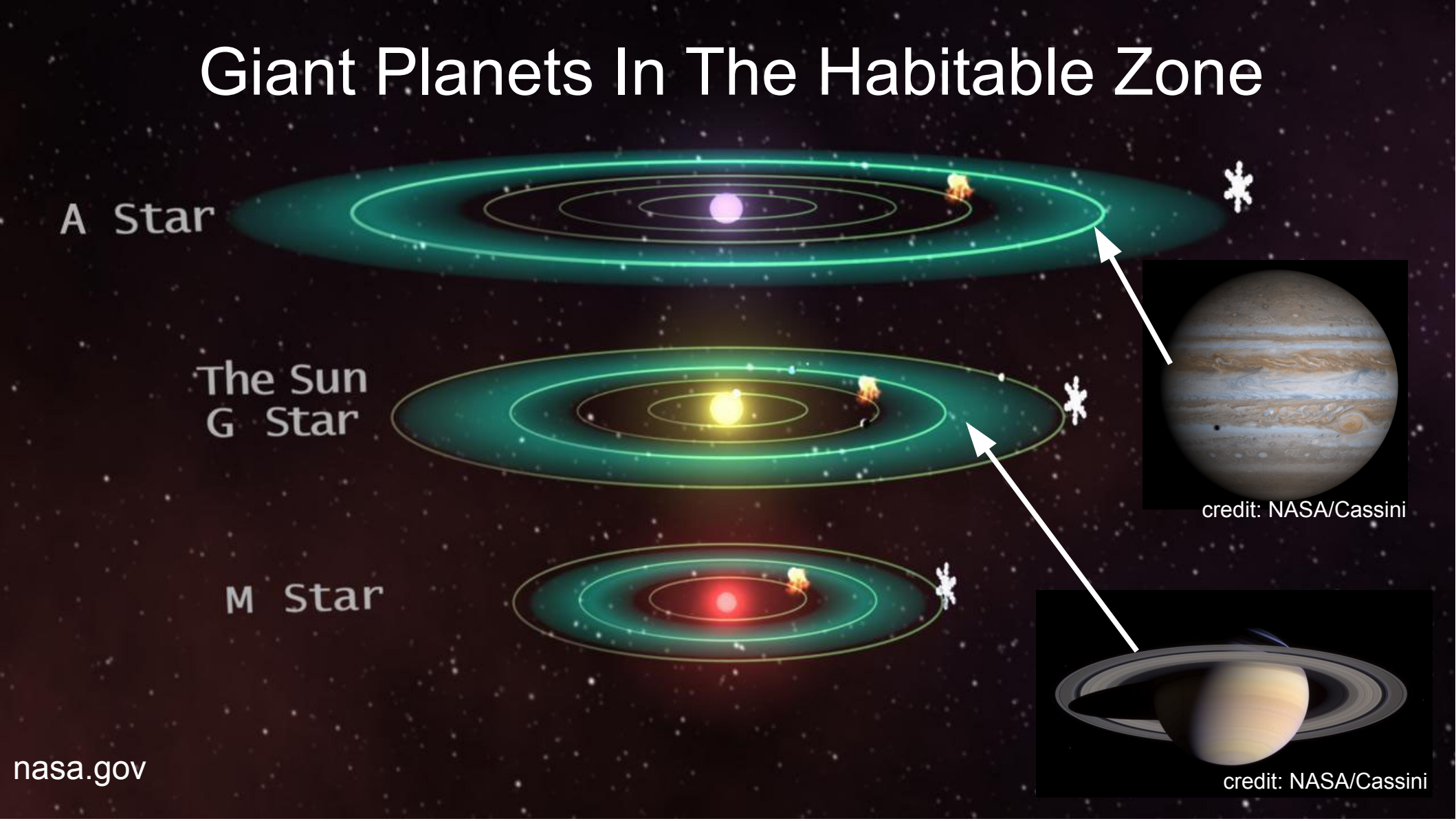


With the Magellan Adaptive Optics system we can, for the first time, take pictures of planets like Jupiter and Saturn in the habitable zones of nearby, bright stars.

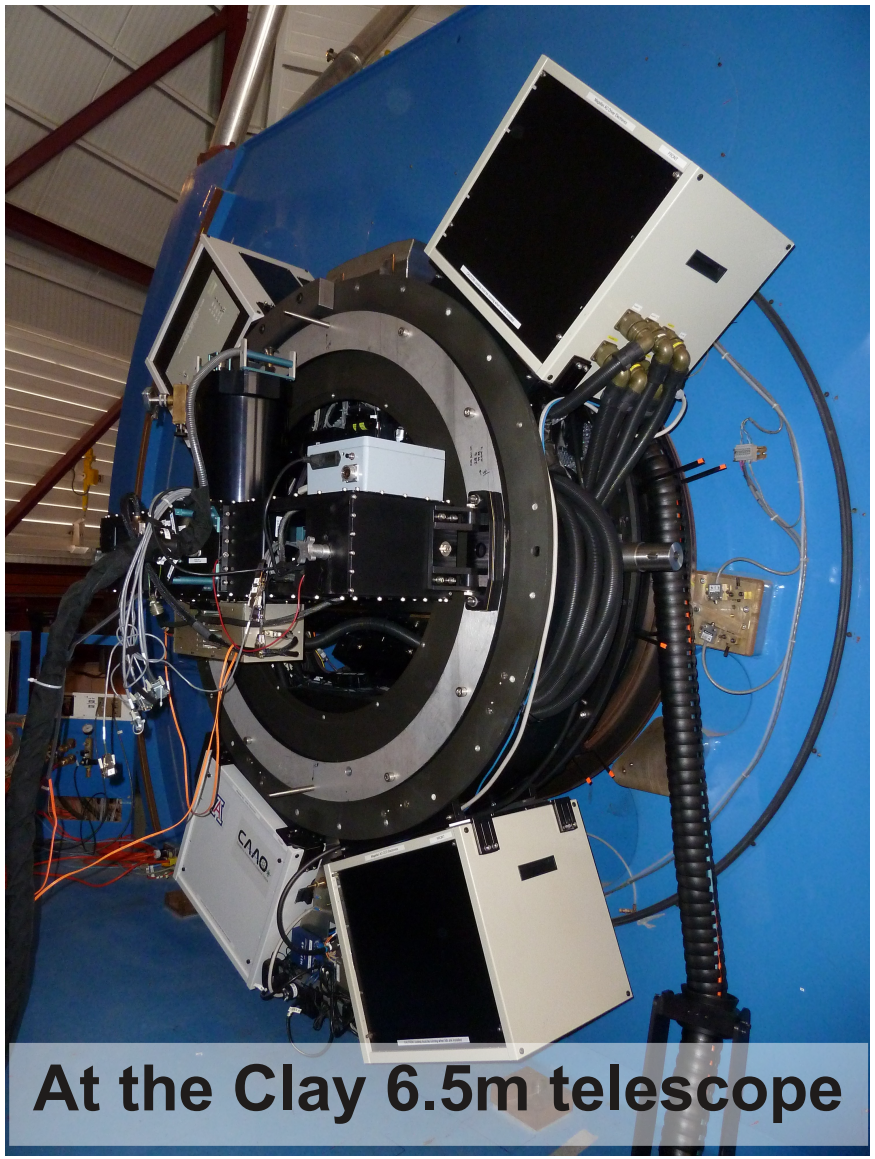
Giant Planets In The Habitable Zone



The habitable zone is the narrow band around a star where the star's warmth keeps water liquid. A giant planet in this band will be warmed by radiation from the star. Around the nearest bright stars, we can detect such a warm Jupiter-sized planet with MagAO. While hunting for the thermal light given off by these planets, I will take the highest resolution, highest contrast images ever taken of the nearest sun-like stars at visible wavelengths.

MagAO

The Magellan Adaptive Optics system (MagAO) corrects for turbulence in the atmosphere 1000 times per second. To do this we use a latest generation Adaptive Secondary Mirror and a cutting edge Pyramid Wavefront Sensor (WFS). MagAO can even perform these corrections at visible wavelengths - a significant step forward in AO technology on large telescopes. This powerful system achieves very high resolution and sensitivity, and has been demonstrated on-sky. With MagAO, and science cameras Clio and VisAO, we can search the habitable zones of nearby stars for giant planets.

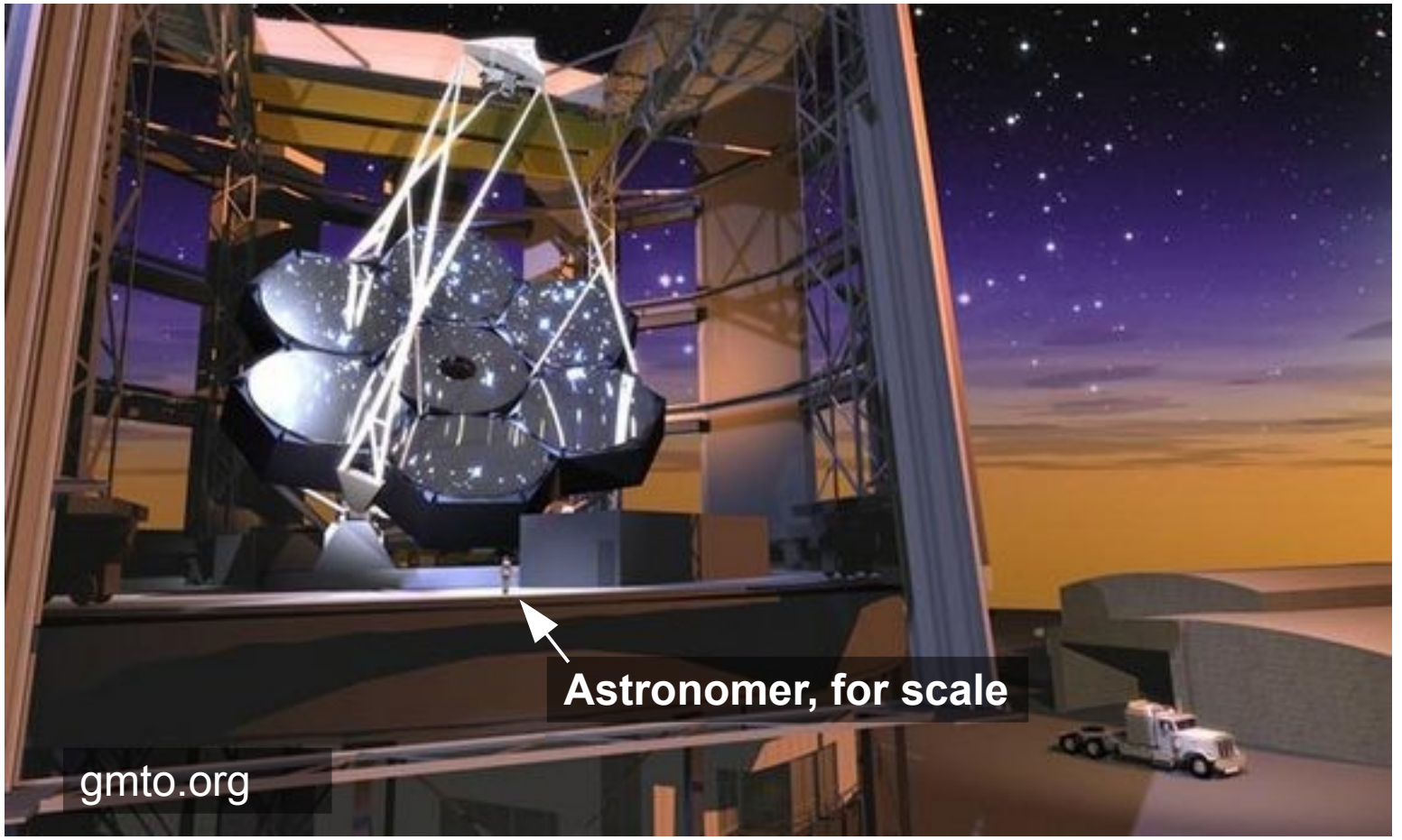


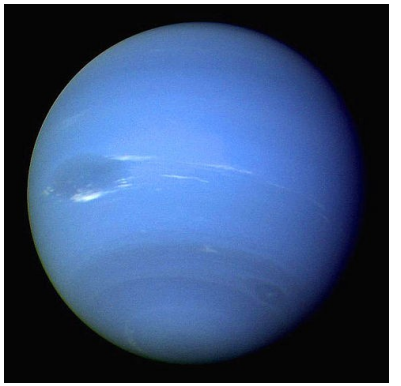
At the Clay 6.5m telescope

VisAO Camera and WFS

For more information about MagAO visit:
http://visao.as.arizona.edu

Blazing The Trail: Will ELTs Image Habitable Planets?





NASA/Voyager 2

NASA/Apollo 17

The experiments I will conduct as a NASA Sagan Fellow will help lay the groundwork for the next generation of extremely large telescopes (ELTs), such as the Giant Magellan Telescope shown above. With a factor of 4 increase in diameter compared to today's telescopes, ELTs will be sensitive to Neptunes, and maybe even Earth-sized planets. With today's technology we can only hope to reach Jupiter and Saturn sized planets, but the lessons we learn will help us reach our ultimate goal of detecting an Earth-like planet around a Sun-like star.