GIANT MAGELLAN TELESCOPE

EXOPLANETS

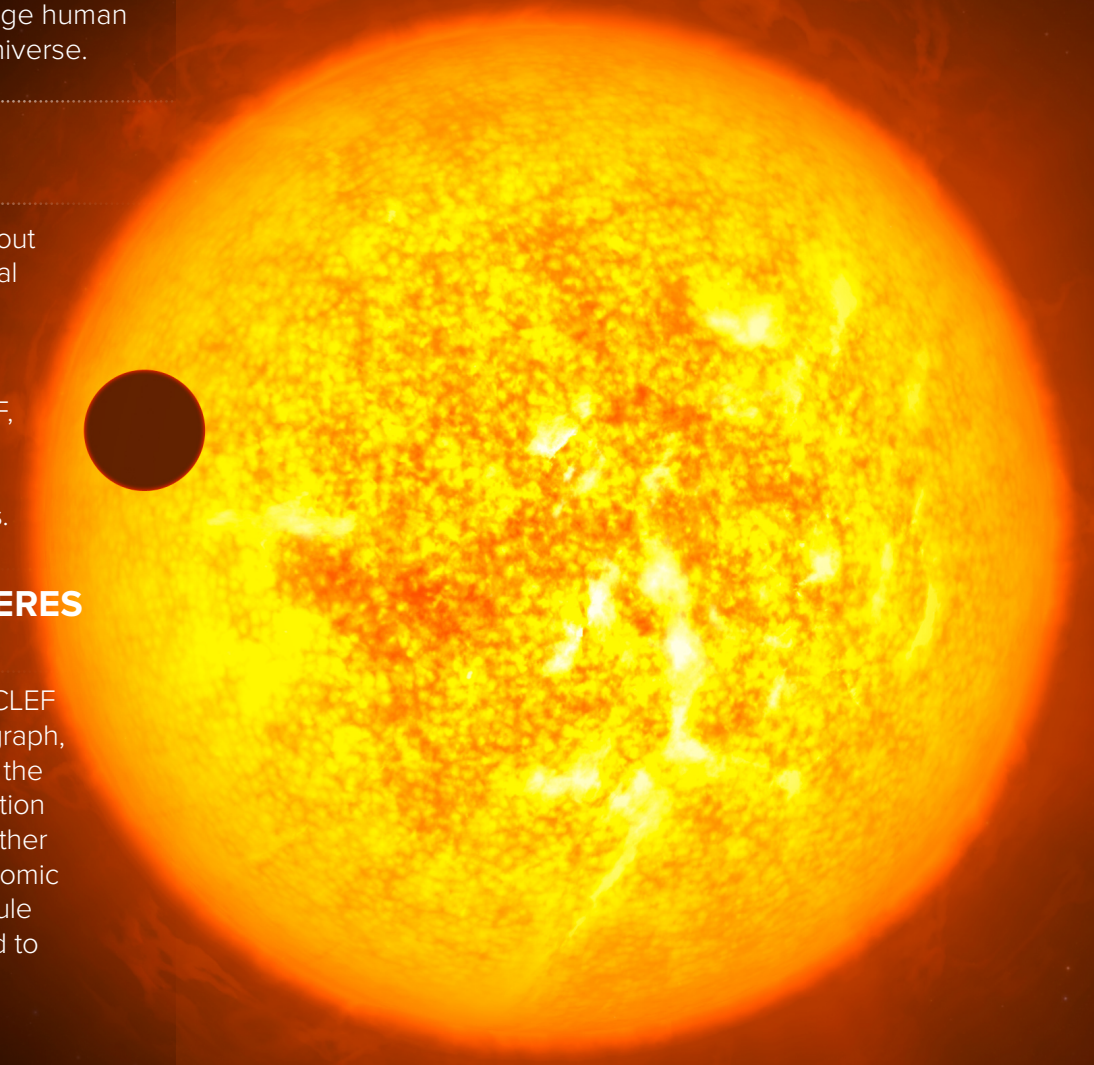
The study of exoplanets is one of the core science drivers for the Giant Magellan Telescope. The GMT could make discoveries that will forever change human kind's view of our place in the Universe.

DETECTING ROCKY PLANETS

To detect rocky planets within about 30 light years/10 pc of Earth, radial velocity measurements to a precision of 10cm/second are needed. GMT's high-precision visible-light spectrograph, G-CLEF, will carry out a census of the population of Earth-like planets orbiting the nearest Sun-like stars.

LOOKING AT ATMOSPHERES FOR SIGNS OF LIFE

If an exoplanet transits its star, G-CLEF and GMT's near-infrared spectrograph, GMTNIRS, will take a spectrum of the system to determine the composition of the atmosphere, including whether there are biomarkers such as diatomic oxygen – a highly reactive molecule that must be continually produced to be detected.



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The GMT will make follow up observations of exoplanet detections by telescopes such as JWST, TESS and ALMA.

TAKING AN IMAGE

With its adaptive optics system and a coronagraph, the GMT will be able to take images of nearby exoplanets. The images will have an angular resolution between 10-30 milliarcseconds in the near-infrared, meaning for systems around 100 pc (300 light years) away, the GMT can separate a star and planet 1-3 times as far apart as the Earth and the Sun.

DEFINITIONS

Arcsecond
an angle of 1/3600th of a degree.

Parsec (pc)
a unit of distance equal to 3.2 light years, or 6 trillion miles.

Radial velocity
the rate at which a star appears to wobble caused by an orbiting planet.

Spectrograph
an instrument that measures both the radial velocity of a star and the composition of the light from it.

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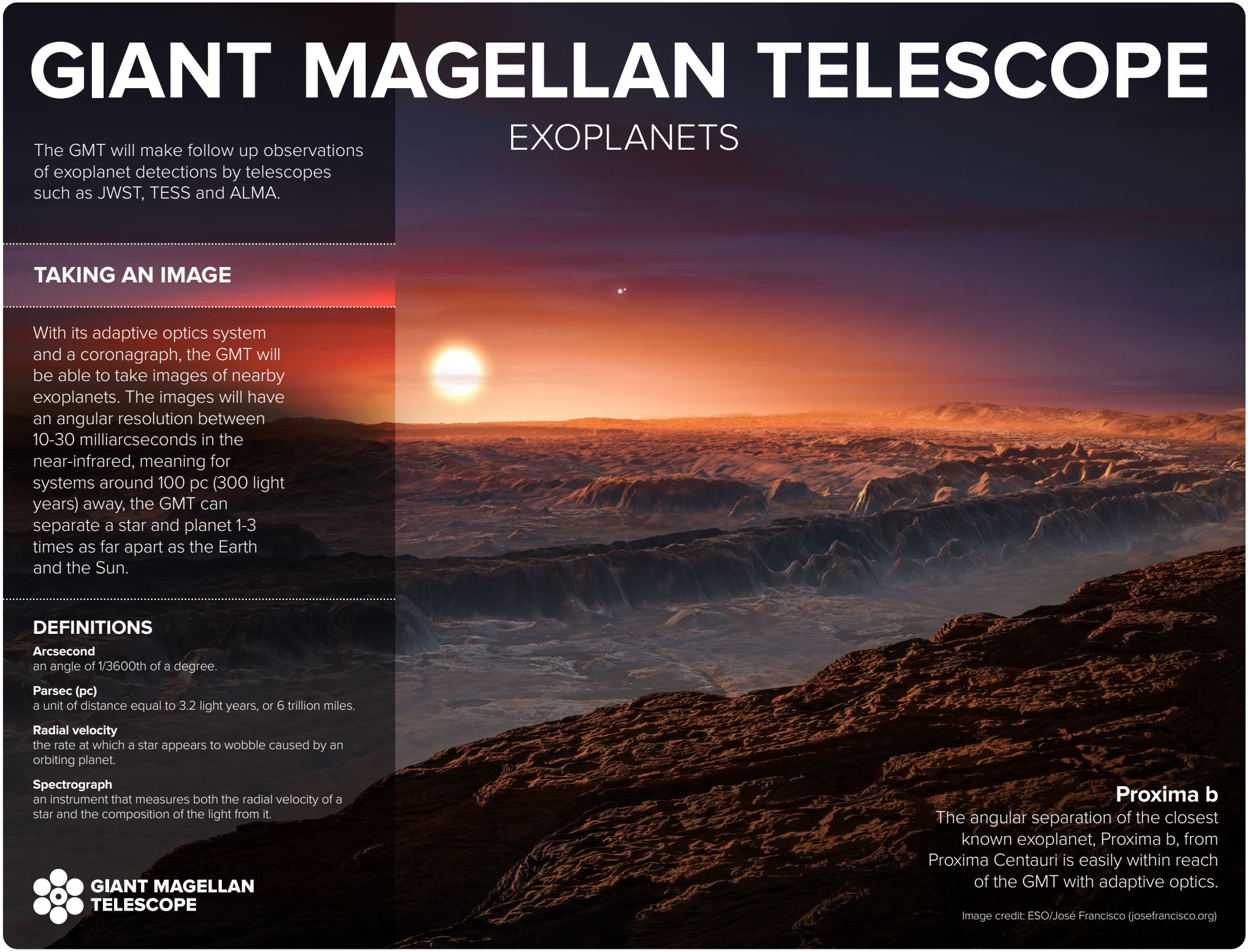

Proxima b
The angular separation of the closest known exoplanet, Proxima b, from Proxima Centauri is easily within reach of the GMT with adaptive optics.

Image credit: ESO/José Francisco (josefrancisco.org)