

# The Mars METS\* Mission

## Background

Scientists launched the Kepler Space Observatory space telescope in 2009 to search for exoplanets. When a star is observed getting slightly dimmer periodically, it indicates there's an exoplanet transiting in front of it. In this way, Kepler has found over 1,000 exoplanets. In April 2018, scientists launched the *Transiting Exoplanet Survey Satellite* (TESS) space telescope to improve on what *Kepler* learned.

## This Year's Mission Objective

In our mission scenario for this year, scientists are looking to improve on TESS by launching the **Mars Exoplanet Transient Satellite (METS)** mission.

Scientists on Mars launch an AFRL Space Vehicles-made space telescope, and send it into a highly elliptical, 14-day areocentric orbit around Mars. For 13 days, the satellite uses four Directed Energy Directorate-developed seven-lens precision-optics cameras (much like TESS uses) to look at a specific area of space for any changes in star brightness that indicate an orbiting exoplanet transiting (passing) in front of it.

On the 14<sup>th</sup> day, at *periareion* (the closest orbital point to Mars; the equivalent of *perigee* in an Earth orbit) the satellite turns and transmits the data it has collected, by Directed Energy Directorate-built laser, to the scientists on the surface of Mars. Then it swings out and begins scanning another patch of sky for 13 days straight.

Being farther out in the solar system, METS can scan dimmer, more remote stars than Kepler or TESS can. When METS finds a star with an exoplanet, this becomes a potential target for the coming James Webb satellite to focus on and study further.

Scientists and engineers responsible for supporting the Mars METS Mission will require a colony of long-term living quarters and food on Mars. Students participating in the 2020 METS Mission will plan and build models of the necessary facilities and life support resources for these researchers, share them with Mission Control staff at the AFRL NM STEM Academy, and participate in the culminating virtual Link-Up Day event.

*\*METS=STEM spelled backwards, Math first.*