

Astrophysics Seminar

Monday, February 27, 2017



Unlocking the Secrets of Nearby Exoplanets with the Transiting Exoplanet Survey Satellite

George Ricker

Department of Astrophysics & Space Research, MIT

The Transiting Exoplanet Survey Satellite (TESS) will discover thousands of exoplanets in orbit around the brightest stars in the sky. In its two-year prime survey mission, TESS will monitor more than 200,000 bright stars in the solar neighborhood for temporary drops in brightness caused by planetary transits. This first-ever spaceborne all-sky transit survey will identify planets ranging from Earth-sized to gas giants, around a wide range of stellar types and orbital distances.

TESS stars will typically be 30-100 times brighter than those surveyed by the Kepler satellite; thus, TESS planets will be far easier to characterize with follow-up observations. For the first time it will be possible to study the masses, sizes, densities, orbits, and atmospheres of a large cohort of small planets, including a sample of rocky worlds in the habitable zones of their host stars.

An additional data product from the TESS mission will be full frame images (FFI) with a cadence of 30 minutes. These FFI will provide precise photometric information for every object within the 2300 square degree instantaneous

field of view of the TESS cameras. These objects will include more than 1 million stars and bright galaxies observed during sessions of several weeks. In total, more than 30 million objects brighter than magnitude $I=16$ will be precisely photometered during the two-year prime mission. In principle, the lunar-resonant TESS orbit could provide opportunities for an extended mission lasting more than a decade, with data rates in excess of 100 Mbits/s.

An extended survey by TESS of regions surrounding the North and South Ecliptic Poles will provide prime exoplanet targets for characterization with the James Webb Space Telescope (JWST), as well as other large ground-based and space-based telescopes of the future.

A NASA Guest Investigator program is planned for TESS. The TESS legacy will be a catalog of the nearest and brightest main-sequence stars hosting transiting exoplanets, which should endure as the most favorable targets for detailed future investigations.

TESS is currently on target for launch in March 2018 as a NASA Astrophysics Explorer mission.



3:30pm in CAS 502. Refreshments served at 3:15pm in CAS 500.

**BOSTON
UNIVERSITY**

Institute for Astrophysical Research
725 Commonwealth Avenue
617-353-5990
<http://www.bu.edu/iar/seminars>

Next Week
No Seminar
Spring Break