Transiting Planets from Kepler, K2 &TESS

Jack Lissauer

NASA Ames Research Center

Jack.J.Lissauer@nasa.gov

+1 650-604-2293 (office)

Abstract

NASA's Kepler spacecraft, launched in 2009, has been a resounding success.More than 4000 planet candidates have been identified using data from Kepler primary mission, which ended in 2013, and >2000 of these candidates have been verified as bona fide exoplanets.After the loss of two reaction wheels ended the primary mission, the Kepler spacecraft was repurposed in 2014 to observe many fields on the sky for short periods.This new mission, dubbed K2, has led to the discovery of >600 planet candidates, ~200 of which have been verified to date; most of these exoplanets are closer to us than the majority of exoplanets discovered by the primary Kepler mission.TESS, launching in 2018, will survey most of the sky for exoplanets, with emphasis on those orbiting nearby and/or bright host stars, making these planets especially well-suited for follow-up observations with other observatories to characterize atmospheric compositions and other properties.

More than one-third of the planet candidates found by NASA's are associated with target stars that have more than one planet candidate, and such "multis" account for the majority of candidates that have been verified as true planets.The large number of multis tells us that flat multiplanet systems like our Solar System are common. Virtually all of the candidate planetary systems are stable, as tested by numerical integrations that assume a physically motivated mass-radius relationship. Statistical studies performed on these candidate systems reveal a great deal about the architecture of planetary systems, including the typical spacing of orbits and flatness. The characteristics of several of the most interesting confirmed Kepler & K2 multi-planet systems will also be discussed.