The Kepler Mission

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(PhysOrg.com) -- Since the first planet around another star (an "extrasolar planet") was discovered by SAO astronomers and others in 1989, over 450 extrasolar planets have been found. Their study now comprises a whole new field of astronomy, one which has revolutionized our understanding of planets and planetary systems, and enabled scientists to begin to place the earth into a broader context.

There are two primary techniques that have been used to discover and/or study most extrasolar planets: measuring stellar wobble as a planet orbits its star (the velocity method), and measuring stellar dimming for planets whose orbits fortuitously cross the face of their star as seen from earth (the transit method).

The Kepler satellite, with a 1.4-meter diameter telescope, was launched by NASA into orbit last year on March 6. It is designed to discover and study extrasolar planets transiting their stars, and especially to search for earth-like planets. Kepler stares at about 150,000 stars in one part of the sky, looking for the patterns of brightness variations (as small as .001%) that signal the presence of a transiting planet.

This past winter and spring a dramatic first series of fourteen papers appeared in scientific journals describing the initial mission results, with CfA scientists John Geary, Dave Latham, Dimitar Sasselov, Andrea Dupree, Soren Meibom, David Charbonneau, Matt Holman, Lars Buchhave, and Guillermo Torres contributing. One unexpected discovery was the detection of two planets whose whopping temperatures, at over 12,000 kelvin, are significantly higher than the

surface temperatures of the stars they orbit.

Another paper compares the low-level variability of our sun with that of other stars of a similar mass and age, and finds that nearly half of them are more active than the sun. These initial results promise a wealth of new information as the mission progresses, and will lead to a new understanding of planets in general and the place of earth among them.

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