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KEPLER: Status, Results, and Plans

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Analysis of current Kepler observations show the presence of over 2300 candidate planets, over 2200 eclipsing binary stars, and variable stars of amazing variety. The sizes of planetary candidates range from that of Mars to over twice the size of Jupiter. Fiftynine candidates are found in the habitable zone of the host stars. Candidates as small as Mars in short period orbits are being detected. Three circumbinary planets have been confirmed and many more await analyis. More than 300 multi-planet candidates have been found. Statistical analysis shows that 99% of the candidates must be valid planetary systems rather than false positive events. In addition to radial velocity measurements, gravitational interaction between planets in near-resonant orbits is being used to determine planet masses and thus the density of the planets. A search for planetary moons is underway. Ongoing follow-up spectroscopic observations and their analyses are providing improvements compared to the values in the Kepler Input Catalog for the stellar temperatures, sizes and metallicities for many of the stars that have become Kepler Objects of Interest (KOI). In particular, the re-analysis of KOI 961 has shown that the planets orbiting it are much smaller than expected; two are slightly smaller than Earth and one is the size of Mars. Intrinsic distributions of the candidates out to periods of 150 days are derived that allow estimates of the frequency distributions of planet size with semi-major axis and orbital period and to associate the results with stellar characteristics.