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Title: Progress Toward Reliable Planet Occurrence Rates with Kepler
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Abstract: The Kepler Mission is exploring the diversity of planets and planetary systems. Its legacy will be a catalog of discoveries sufficient for computing planet occurrence rates as a function of size, orbital period, star type, and insolation flux. The mission has gone a long way toward achieving that goal. This year, the number of planet discoveries has increased by 50% (from 2,300 to 3,500), and the number of small planet candidates in the Habitable Zone has nearly doubled. Statistical studies using partial data sets have been conducted. These early results suggest that planets abound in the Galaxy with each late-type main sequence star having at least one. They also indicate that nature makes small planets efficiently. In the inner regions of planetary systems ($P < 100$ days), planets smaller than Neptune are a full order of magnitude more common than planets larger than Neptune. Measures of eta-Earth -- the occurrence rate of terrestrial-sized planets in the Habitable Zone -- have also been conducted yielding published values that range from 1% to 100%. I will describe the ingredients necessary for determining the occurrence rates of planets and report on the progress Kepler has made toward a reliable determination of eta-Earth. This singular number is arguably Kepler's most important contribution to the future of NASA's exoplanet exploration and the search for life beyond Earth.