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PARKER SOLAR PROBE: ON THE CUSP OF TOUCHING THE SUN

Abstract

NASA's Parker Solar Probe is now entering the pivotal phase of its prime mission, marking an exciting milestone for this remarkable endeavor. Since its launch on 12 August 2018, Parker has successfully completed 18 out of its scheduled 24 orbits around the Sun, venturing as close as 11.4 solar radii from the Sun's center. On 6 November 2024, it will fly by the planet for the seventh and last time, setting it up for the ultimate orbit with a perihelion of 9.86 solar radii on 24 December 2024. The mission's primary science goal is to determine the structure and dynamics of the Sun's coronal magnetic field, understand how the solar corona and wind are heated and accelerated, and determine what processes accelerate energetic particles. Throughout its journey, the mission has made remarkable advancements in its science objectives and crucial discoveries regarding previously unknown solar wind phenomena. As the mission progresses, the intensifying solar activity leading up to its cycle maximum has brought forth new and intriguing properties within the near-solar environment. These distinctive characteristics mark a significant departure from the relatively tranquil period observed during the mission's initial three years. I will present an overview of the mission's current status, its remarkable scientific achievements, and the exciting prospects awaiting us as we conclude this seven-year primary science phase.