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214.18 – Kuiper: A Discovery-class Observatory for Giant Planets, Satellites, and Small Bodies

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The recent Planetary Decadal identified important science goals for the study of the outer solar system. However, after the end of the Cassini and Juno missions in 2017, outer solar system science might face over a decade without new U.S. missions. The Survey thus noted the critical role that space-based telescopic observations, especially those enabling significant time-domain and target coverage, can play in advancing key planetary science questions. We propose a dedicated planetary space telescope, implementable in the Discovery program, to conduct three diverse investigations. Named after pioneering planetary astronomer Gerard P. Kuiper, the mission will address 9 of the 10 Decadal's Key Questions by studying 1) the giant planets, 2) their major satellites, and 3) the panoply of small bodies that populate the outer solar system. These three diverse investigations will enable significant advances in outer solar system science, through time-domain observations and substantial time on the targets. Advances in understanding the connections between weather and climate in giant planet atmospheres, as well as the interactions between giant planet atmospheres, satellites, and their external environments (e.g., auroral, solar wind, plumes, impacts), require consistent, well-calibrated, nearly-continuous observations spanning timescales from hours to years. Progress in understanding the ways that small outer solar system bodies can be used to understand the details of early giant planet migration requires compositional knowledge of statistically significant members of key dynamical populations. Observations with the required temporal coverage and fidelity needed to address these and many other important outer solar system Decadal science goals simply cannot be obtained from ground-based telescopes, or existing or planned space telescopes. Kuiper's combination of spatial resolution, spectral resolution, UV to near-IR coverage, and substantial time-domain sampling will offer an efficient, affordable, and highly relevant facility guaranteed to yield diverse, new insights and to inform planning of in situ missions for future decades.