THREE CLASSES OF KUIPER BELT OBJECTS: THEORY AND OBSERVATIONS

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FINAL REPORT

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PI: Matthew J. Holman

As part of the Origins of Solar Systems program our team conducted a dynamically-motivated search for three classes of Kuiper belt objects (distant comets near and beyond the orbit of Neptune). Our strategy has been to exploit variations in the sky density of Kuiper belt that result from the gravitational influence of Neptune. By searching two regions of the sky, one nearly 90 degrees from Neptune and one nearly opposite Neptune, and comparing the number of objects discovered in each region we are able to constrain the relative populations of resonant and non-resonant objects, a fundamental quantity in Kuiper belt formation models. In addition, by searching at a variety of angles above the plane of the solar system we have constrained the inclination distribution of Kuiper belt objects.

We have conducted four searches for this program. One was in February 1999 and August 2000 at the Canada-France-Hawaii telescope (3.6-meter), and another was in May 1999 and Oct 2000 at the Kitt Peak National Observatory (4-meter). In addition, a search for Uranian satellites was conducted.

Publications:

Gladman B, Kavelaars JJ, Holman M, Petit J-M, Scholl H, Nicholson P, Burns J. 2000. NOTE: The Discovery of Uranus XIX, XX, and XXI. Icarus, 147, 320-324.

Gladman B, Kavelaars J, Petit J-M, Morbidelli A, Holman M, Loredo T (2001) The Structure of the Kuiper Belt: Size Distribution and Radial Extent. Astron. J., accepted.