**A Detailed Comparison of Simulations of Neptune's Migration to Observations of the Kuiper Belt**

J.M. Hahn (Saint Mary's Univ.), R. Malhotra (Univ. of Arizona)

Nbody simulations are used to examine Neptune's outwards migration and its subsequent dynamical erosion of the Kuiper Belt. Monte Carlo methods are then used to assign sizes and magnitudes so that the simulated and observed Kuiper Belts can be compared in a manner that accounts for telescopic biases. From this comparison we infer that the Belt is inhabited by $N \sim 2 \times 10^5$ KBOs orbiting interior to 50 AU with radii $> 50$ km having a total mass of $M \sim 0.08d(p/0.04)^{-1.5}$ earth masses, assuming these bodies have a density $d$ in cgs units and an albedo $p$. Another interesting result is that the observed KBO populations at the 2:1 and the 3:2 resonances are both underabundant by a factor of $\sim 20$ relative to model predictions; this depletion of the resonances is possibly due to unmodeled effects, such as perturbations by large planetesimals. Estimates of the abundances of the Belt's various subpopulations (Main Belt, resonant KBOs, Trojans, Centaurs, etc.) will be reported, as well as upper limits on distant KBOs orbiting beyond 50 AU with $e \sim 0.1$.

We also confirm the findings of Chiang et. al. (2003), who showed that Neptune's migration into a stirred-up Kuiper Belt having eccentricities of $e \sim 0.1$ facilitates particle trapping at Neptune's 5:2. In addition, we find that trapping is possible at many other weak resonances, like the 11:6, 13:7, 13:6, 9:4, 7:3, 12:5, 8:3, 3:1, 7:2, and 4:1. The more distant of these resonances, the 9:4, 7:3, 5:2, and 3:1, can also promote KBOs beyond 50 AU into eccentric orbits that reside in the zone known as the Scattered Disk. However 90% of such particles in our simulation never had a close encounter with Neptune; rather they were placed there by Neptune's migrating resonances. This suggests that the so–called Scattered Disk might not be so scattered.

Abstract submitted for AAS [] meeting DPS04

Date submitted: 2004-08-31 06:48:02 Electronic form version 3.0 (21 June 2000)