Astrophysics Seminar

THE GRAND TACK: JUPITER'S MIGRATION TO 1.5 AU, AND HOW IT SHAPED THE INNER SOLAR SYSTEM

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Tuesday, September 25 ❖ 12:30 P.M. ❖ 184 NSH

A persistent difficulty in terrestrial planet formation models is creating Mars analogs with the appropriate mass: Mars is typically an order of magnitude too large in simulations. A recent study found that a small Mars can be created if the planetesimal disk from which the planets form has an outermost edge at 1.0 AU. However, that work and no previous work, can explain such a truncation of the planetesimal disk and preserve the asteroid belt. We show that gas-driven migration of Jupiter inward to 1.5 AU, before its subsequent outward migration, can truncate the disk and repopulate the asteroid belt. This dramatic migration history of Jupiter suggests that the dynamical behavior of our giant planets was more similar to that inferred for extra-solar planets than previously thought, as both have been characterized by substantial radial migration.

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