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Multi-Planet Dynamics as a Tracer of Planet Formation

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Gravitational interactions between neighboring planets reshape the dynamical structure of some and perhaps most planetary systems. By redistributing orbits, they obscure the locations where planets formed in individual systems. However, when treated as an ensemble, systems that experienced planet-planet interactions provide clues to the parameters that cause planet formation to differ around different stars. I will discuss differences between giant planet orbits in high- and low-metallicity systems, suggest a framework for explaining these differences in the context of planet formation, and comment on the conditions that lead to large-scale dynamical upheavals, with particular reference to the currently-stable system HR 8799. Our own solar system, though currently dynamically unexcited, may have experienced an upheaval in the past. I will end by demonstrating that the population of Kuiper belt objects in the distant 5:2 resonance with Neptune challenges standard models of the dynamical history of the outer solar system.