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Consequences of giant impacts

Giant impacts are important processes to determine the final states of planets. Growing planets experience a number of large impacts until they reach the final masses both in the classical core accretion and in the pebble accretion scenarios. During the planetary accretion stage, an impact generates a magma ocean in the target's mantle. The impactor's iron equilibrates with the magma ocean and becomes enriched in siderophile elements and is eventually delivered to the target's core, whereas the target's mantle becomes enriched in lithophile elements. Thus, giant impacts determine the chemical budget of the planet, but we still have limited knowledge on the process.

This talk will provide an overview of the current status of our understanding on giant impacts from various perspectives, including experimental, theoretical studies, and astronomical observations. I will also introduce our recent studies on the Earth-Moon system and consequences of large impacts on the planets based on numerical simulations. Part of our calculations are conducted using smoothed particle hydrodynamics (SPH) method that describes a fluid as collection of spherical particles. My talk aims to bridge our knowledge on the theoretical, experimental and observational studies to help identifying our future directions.