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Spin of Terrestrial Planets by Giant Impacts

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We investigate the spin parameters (period and obliquity) of terrestrial planets formed by giant impacts of protoplanets using N-body simulations. As the initial conditions we adopt the oligarchic growth model of protoplanets. We derive the statistical properties of the spin parameters from the results of 50 runs per each initial condition.

We find that for the standard model of a protoplanetary disk, the typical spin period of planets is 2-3 hours, which is as long as the rotational instability period. This is due to the assumption of the perfect accretion in our model. If we include the collisional disruption and/or satellite formation, the period may become longer. The distribution of the obliquity is isotropic. In other words, the spin axes of most planets lie close to their orbital planes.