



Forming Mercury by Giant Impacts

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The origin of Mercury's high iron-to-rock ratio is still unknown.

In this work we investigate Mercury's formation via giant impacts and consider the possibilities of a single giant impact, a hit-and-run and multiple collisions in one theoretical framework.

We study the standard collision parameters (impact velocity, mass ratio, impact parameter), along with the impactor composition and the cooling of the target.

We suggest that efficient collisions require to be head-on enough with appropriate high velocities, while in the hit-and-run scenario collisions can be effective closer to the most probable collision angle (45 degrees). We also find that mass loss is more significant when the timescale between two collisions is short.

Although the resulting mean iron fraction is similar, we find that the impactor's composition affects the iron distribution and the final mass of the targeted body by a few to 15 %.

We conclude that Mercury could have formed via multiple collisions.