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The Role of Vaporization in High Angular Momentum Moon-forming Giant Impacts SARAH STEWART, U. California Davis, SIMON LOCK, Harvard, ZOE LEINHARDT, MIA MACE, U. Bristol, MATIJA CUK, SETI — In the giant impact hypothesis, the Moon accretes from a disk around the proto-Earth. In the canonical model, the impact also sets the present-day angular momentum (AM). Recently, an alternative model was proposed where the Moon forms via a high-AM giant impact and the present-day AM was established by a subsequent lunar orbital resonance. The physical state of the Earth after a high angular momentum impact is fundamentally different than in the canonical case. The impact energies are significantly higher, leading to vaporization of several wt% of the Earth. Thus, impact-induced vaporization is a critical component of the new high-AM moon formation models. The post-impact planet possess a continuous pressure- and rotationally-supported fluid-to-vapor structure from the mantle to the disk. The surface of the structure cools radiatively and forms droplets; the droplets settle to the mid plane beyond the Roche radius and form moonlets. If mixing between the outer layers of the structure is efficient, then a wide range of high-AM giant impact geometries may produce the intriguing isotopic similarity between the Earth and Moon.

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