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Grain Dynamics in Enceladus' Dust Plume and Feeding of the E Ring

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The active moon Enceladus ejects water gas and tiny ice grains into the Saturnian system through its south polar plume. The ice particles form Saturn's dusty E ring. We show that three-body effects determine the inclination distribution of the faster plume particles escaping the moon and feeding the E ring. On the other hand, most grains, ejected at small speeds, re-impact the moon on preferred regions which are also determined by the three-body gravitational interaction with Enceladus and Saturn. The grains recorded by the Cassini Cosmic Dust Analyzer on plume traversals show systematic compositional differences, relating composition to dynamical properties.