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Regolith Growth and Darkening of Saturn Ring Particles

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Markov chain simulations compare the regolith growth and darkening on 1 m and 10m particles in Saturn's rings. Our results show that pollution of the larger ring particles is ten times slower, allowing the rings to be ancient and still meet strict upper limits on fractional pollution by meteoroid infall. Example UV spectra are shown. Our results indicate that regolith stirring by higher velocity collisions can mix the ring particle regolith, creating brighter haloes around strong density waves, as observed by Cassini VIMS and UVIS. Unfortunately, our incomplete knowledge of meteoritic bombardment rates, particle adhesion and size/velocity distributions do not allow an age estimate.