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Dynamical evolution of the escaping ejecta from the Nix and Hydra surfaces

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The escaping ejecta produced by impacts of interplanetary dust particles (IDPs) on the surfaces of Nix and Hydra can be the source of putative ring located at Pluto system. These ring particles will be under the gravitational effects of the four massive bodies and the solar radiation pressure. Our results, derived from a sample of numerical simulations, showed that the effects of the solar radiation pressure force are quite effective in removing the small particles: a set of 1μm sized particle remains in orbit around Pluto for at most 10 years, while about 80% of the 10μm sized particles have lifetimes of only 100 years.

In order to estimate an upper limit to the normal optical depth of this putative ring we used an analytical model of an impact-generated dust ring proposed by Krivov et al. 2003 and Porter et al. 2010. By comparing our numerical results, which gives the width and lifetime of this ring and the mass production rate of the escaping dust, the maximum normal optical depth of a ring located near the orbits of Nix and Hydra is $\tau \sim 10^{-11}$. This value, lower than previous estimatives, is consistent with a very tenuous ring of debris.

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