Inward transport of comets as a source of habitable zone dust

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Warm exozodiacal dust clouds (known as exozodis) reside in the habitable zones of stars, and provide an opportunity to study the inner planetary system. An understanding of exozodis is also crucial to the detection of Earth-like planets, as they will obscure the habitable zones of stars. The presence of this dust has been found to correlate with exo–Kuiper belts, suggesting its origin lies further out in the planetary system. I will present a numerical model for the habitable zone dust produced by the inward transport of comets, which spontaneously fragment to produce dust. Dynamical simulations are used to follow comets as they are scattered inwards by interactions with planets. We follow individual comets as they undergo recurrent splitting events and produce dust, whose evolution is followed with a kinetic model that includes the effects of collisional evolution, Poynting-Robertson drag, and radiation pressure. With physically-motivated free parameters, this model is able to reproduce the size and spatial distribution of dust seen in the zodiacal cloud. Having tuned the model parameters to the Solar System, it can be applied to exoplanetary systems. I will apply the model to the exozodi around eta Corvi, which has exceedingly high levels of habitable zone dust that are difficult to explain. I will show whether exocomets can supply enough dust to sustain its exozodi and match the observed distribution of dust. The model also allows us to find observational signatures of exocomets in the habitable zones of other stars, which could indicate cometary bombardment and hint at the habitability of any planets present.