

To see a world in a grain of sand: Using debris to test planet formation theory and the occurrence rate of Solar System analogues



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The production of debris is a common side-effect of terrestrial planet formation theory. Despite being small in mass compared to the planets it is readily detectable due to its large surface area with the first debris disk being discovered over a decade before the first planet. Large surveys in the infrared and sub-mm have provided us with a detailed picture of the population of debris around young stars where we might expect planet formation to be ongoing. Thanks to the Kepler mission large populations of planets and sophisticated statistical analyses of the planet population are now also available. As such we are now in a position to compare the predictions of planet formation theory with both the observed planet population and the observed debris population. We can also analyse the expected imprints of planet formation theory and debris production on the bodies in our own Solar System. I will discuss how the expectations of theory fit with observations in the Solar System and further afield, and the implications of these comparisons for planet formation theory and for the expected occurrence rate of Solar System analogues, which remain as yet unrepresented in the exoplanet population.