Infrared variation at dusty systems

Andrew Swan

University of Warwick

Planetary systems that survive stellar evolution can give access to the bulk compositions of their rocky bodies, whose constituent metals often pollute the atmospheres of their host stars. However, their system architectures remain almost entirely unconstrained. Circumstellar debris is the primary observational contact with the unseen reservoirs of objects that supply the photospheric metals. That debris is most commonly seen through its infrared emission from warm dust. I have shown that the infrared emission is often variable, on timescales ranging from days to decades, establishing these systems as dynamically active environments. The leading hypothesis for the variation is collisional production and destruction of optically thin dust within the closely-orbiting debris. The best-studied system is WD 0145+234, a relatively bright star displaying photospheric metals, an infrared excess, and gas emission. Following a dramatic increase in its infrared flux that lasted for several months, *Spitzer* observations of the aftermath show stochastic brightening events occurring on a timescale of days. I use a simple model to show this behaviour is consistent with ongoing collisions. *JWST* will target WD 0145+234 in the first weeks of science operations. A mid-infrared spectrum will reveal the dust mineralogy, and the near-infrared light curve will be extended on multiple timescales with a 10-s cadence, short enough that we may witness individual collisions. Observations are scheduled to begin shortly before this conference.