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Dust production by supernovae and massive stars

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In this review I will cover the theoretical expectations and the observational evidence as to whether massive stars and their supernovae can form sufficiently large quantities of dust to provide a significant contribution to the dust budgets of galaxies.

A series of papers addressing dust condensation in the ejecta of core-collapse supernovae (CCSNe) have predicted that up to one solar mass of dust could form, with one of the principal uncertainties being the dust' s survivability against destruction by reverse shocks. Observations out to mid-infrared wavelengths of dust formed by extragalactic CCSNe, including those made with the Spitzer Space Telescope, have measured relatively small dust masses, typically less than $10^{-3}\,M_{\odot}$. The advent of the Herschel Space Observatory, covering wavelengths out to 500 μm, has enabled much cooler dust to be detected from young CCSN ejecta and CCSNRs than possible at mid-IR wavelengths. Since cooler dust emits less efficiently than warm dust, larger dust mass detections have resulted. The Herschel mission ended in 2013, which has stimulated the development of alternative methods to measure CCSN dust masses, for example by modelling red-blue emission line profile asymmetries, and their time evolution, in the optical spectra of CCSNe. I will summarise the currently available results from these various methods and their implications.

Consider for a poster?

Author: Prof. BARLOW, Mike (University College London)

Presenter: Prof. BARLOW, Mike (University College London)

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