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The submm properties of dust around carbon AGB stars

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The origin and properties of dust in the universe, and the contribution from AGB stars, is a fundamental question in galaxy evolution. We constrain the properties of the dust grains in the thin detached shells around the carbon AGB stars R Scl, U Ant, V644 Sco, and DR Ser. The shells were created during recent thermal pulses, and the dust properties play a crucial role in understanding the wind-driving mechanism, the evolution of the star throughout the thermal pulse cycle, and the type and amount of dust returned to the ISM from AGB stars. We use new observations from LABOCA and ALMA to model the entire SED including submm wavelengths. For all objects, we find an excess emission in the submm. Spatially resolved observations confine this excess to the detached shells. However, a straightforward explanation for this excess is still lacking. While very large, cold grains can explain the submm flux, they do not reproduce the overall shape of the SED in the FIR and submm. Other obvious grain properties (e.g., composition or geometry) also do not reproduce the observed SEDs. The results imply that the submm observations probe properties of the dust grains that are not typically considered, but may be critical for a complete understanding of dust around evolved stars. A similar SED shape and submm excess has been seen in observations of the small and large magellanic clouds, and has been attributed to unknown dust properties. If the origin of this excess is the same as for the detached shell sources, this would have important implications on the contribution to the total dust budget from AGB stars to galaxies.

Consider for a poster?

Yes

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