IRAS OBSERVATIONS OF THE COOL GALACTIC HYPERGIANTS

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It is still a matter for some debate as to how far the most massive stars ever get towards the right-hand side of the HR diagram during the course of their evolution. The apparent absence of very luminous red stars suggests either that stars never reach this region at all, or that if they do, their sojourn there is very brief indeed. If the latter is the case, one might expect to see an increase in mass-loss activity with luminosity among the brightest stars that we actually do see - the cool galactic hypergiants. An attempt has been made to search for one of the signatures of mass-loss - thermal reemission from ejected dust - using recently released data from the InfraRed Astronomical Satellite (IRAS).

In the first phase of this study, a list of stars with $M_{Bol} < -8.0$ mag. and with spectral type F or later has been compiled, largely from the catalogue of Humphreys (1978). Optical observations have been combined with ground-based infrared measurements from the Catalog of Infrared Observations (Gezari et al. 1984) and colour-corrected results from the IRAS Point Source Catalogue. The fluxes were all dereddened according to their colour excesses; the reddening law of Savage and Mathis (1979) was employed (but with A_λ / E_{B-V} taken as 2.15 mag at 0.7μ).

The dereddened fluxes were then compared with black-body energy curves for temperatures appropriate to the spectral types, with emphasis on good fitting in the optical and near infrared. Any residual flux in the infrared was extracted and characterised by a broad distribution taken to be due to isothermal dust, and a spike at 10μ. For the dust cloud, both the temperature and cross-section on the sky compared with the disc of the parent star were determined.

The main conclusion is that the present sample must be extended to cover a wider range of luminosities. Among the present limited sample (of 10 F,G,K type stars and 11 M type stars) it is apparent

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that infrared excesses only exist for stars cooler than mid-late G type, and for these, the diameters of the dust clouds seem frequently to be ~ 10^4 $R_\odot$. The size of the 10μ feature is probably linked to the size of the general dust emission, at least for the M type stars, but may also be a function of dust temperature.

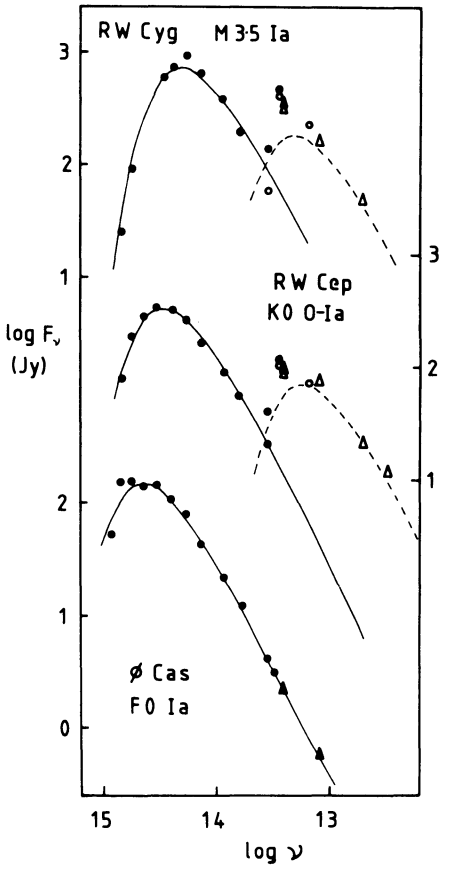

Figure 1. Some representative energy curves of cool hypergiants. Circles represent ground-based observations and triangles IRAS data after correction for reddening. Filled symbols depict the observed points, open symbols the IR excess after subtraction of a black-body curve (continuous line). The dashed curve indicates the dust cloud energy distribution.

REFERENCES

Gezari,D.Y., Schmitz,M., Mead,J.M.:1984, NASA Ref.Publ.1118
Humphreys,R.M.:1978, Astrophys.J.Suppl.,38,309
Savage,B.D., Mathis,J.S.:1979, Ann.Rev.Astron.Astrophys.,17,73

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