
Relating the Infrared to the Visual Sky

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The Infra Red Astronomy Satellite (IRAS) surveyed almost the entire sky with a 16-inch telescope at wavebands of 12, 25, 60 and 100 microns in 1983. The main results of this American-Dutch-British project were a catalogue of over 200 000 sources, the Point Source Catalog (PSC), and the LRS Catalogue of low resolution spectra of over 5 000 objects. Subsequent processing of the basic data has revealed much additional information on these and other sources.

Most of the optically-bright stars which appear in the PSC have very similar colours constructed from photometry to 25 microns: this corresponds to the Rayleigh-Jeans limit and expresses the fact that stellar photospheres of whatever temperature have similar energy distributions in the mid infrared. A minority, most famously Vega and Beta Pictoris, have excess radiation at 60 and 100 microns which comes from cool dust in circumstellar disks or shells which may be larger than our solar system. Most of the stellar sources in the PSC have much redder

colours in the mid infrared and these are mainly long period variable stars. A search for new RV Tauri variables, which have relatively distinctive infrared energy distributions, involved identifying over 1000 sources to find about 12 of the type being sought.

The certain identification of a source becomes difficult for faint stars in crowded regions of the sky. The IRAS positions are generally remarkably good, better than those of many optical catalogues such as those of the variable stars and cool stars which are the primary identifications for the IRAS sources, but confusion between several stars bright in the infrared and the numerous optical stars which fall within the IRAS error circles create ambiguity. The R and I sky survey pairs of photographs, which are unfortunately available only for Milky Way fields, proved invaluable in detecting the red R-I colour which is a signature of TiO absorption in the commonest type of identification, the Mira variables of spectral type M. Several recalcitrant cases, where an optically-invisible star was suspected to have combined with a visible one to create composite infrared colours as seen by IRAS and the 36 arcsecond aperture of the infrared photometer on the 0.75m telescope at Sutherland, have now been satisfactorily resolved into two images using the new PICNIC camera which Ian Glass constructed to work at wavelengths of 1 - 2 microns on the 0.75m telescope.
