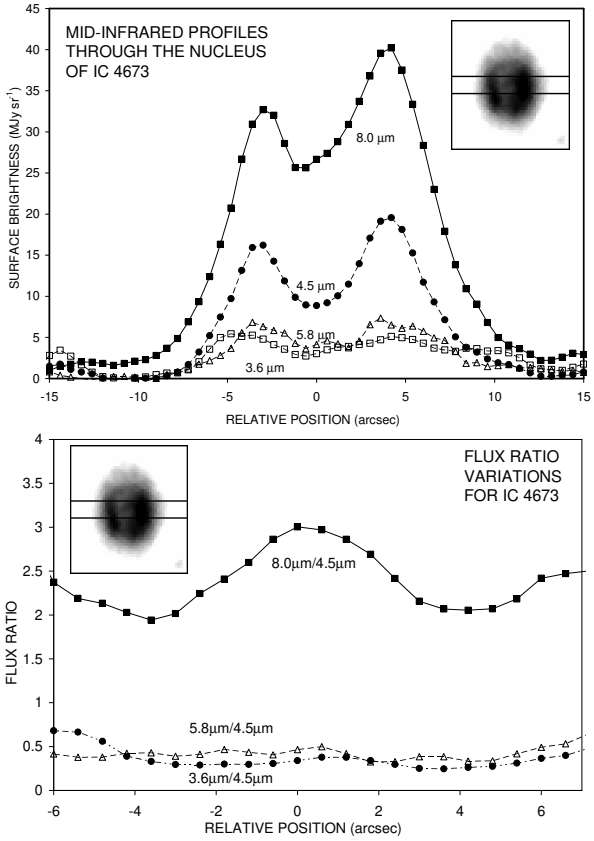

Fig. 6. As for Figure 3, but for the case of IC 4673. The profiles are taken along the major axis of the source, and show a double-humped profile. There is also evidence for lower 3.6 μm/4.5 μm and 8.0 μm/4.5 μm ratios at the positions of peak surface brightness.

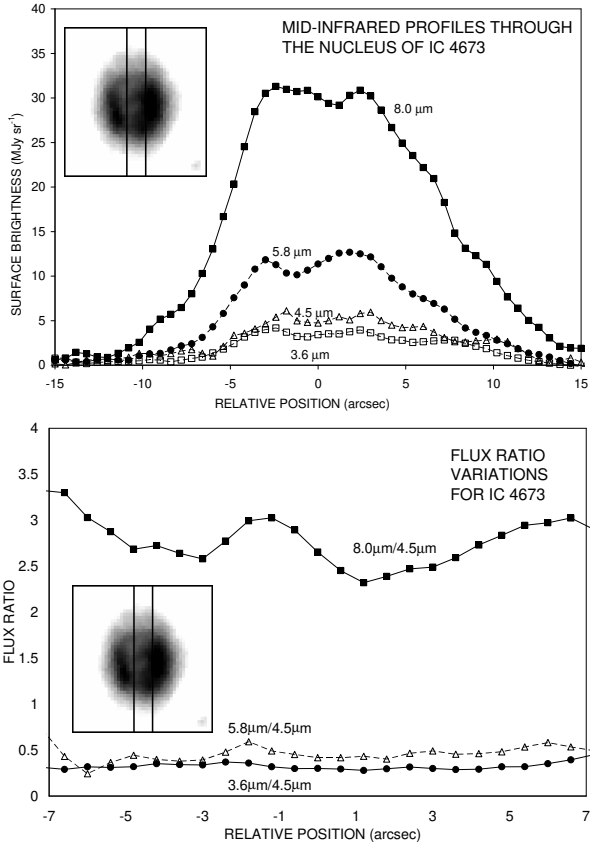

Fig. 7. As for Figure 6, but for an orthogonal direction through the nucleus of the source.

be inconsistent with the assumptions of Patriarch & Perinotto (1994), who proposed that the shell was mostly ionisation bound, although it is consistent with the results in Figure 5.

It is apparent, in the latter case, that the 3.6 and 5.8 μm results are noisier than at 4.5 and 8.0 μm, with the latter emission showing dimensions of 19.6$\times$ 17.0 arcsec^2. These values are comparable to the visual sizes noted above, suggesting that very little of the longer wave emission arises outside of the ionised shell – and that any PDR makes a modest overall contribution.

Profiles through the centre of the source (Figures 6 and 7, upper panels), show evidence for the minor axis surface brightness enhancements seen in the visible (Figure 6 and Figure 1), whilst there is also evidence for a sinusoidal variation in the 8.0 μm/4.5 μm ratio (Figure 6, lower panel). It will be noted however that there is little evidence for the radial increase in ratios noted in many other PNe (see e.g., Phillips & Ramos-Larios 2008a, 2010, and sources Pe 2-12 and M 1-29 in the present study), whereby 8.0 μm/4.5 μm and 5.8 μm/4.5 μm increase with increasing distance from the nucleus. On the contrary, our ratio mapping (Figure 8) shows that much of the variation is due to a decrease in ratios at the positions of peak surface brightness. A similar decrease is also noted for the 3.6 μm/4.5 μm mapping, but appears to be absent from the 5.8 μm/4.5 μm results.

The fact that such variations are present for 3.6 μm/4.5 μm and 8.0 μm/4.5 μm, but absent in the 5.8 μm/4.5 μm map, suggests that the trends are unlikely to be due to PAH emission bands. It is possible however that ionic lines (such as [ArII] λ6.985 μm and [ArIII] λ8.991 μm) are preferentially enhancing 8.0 μm fluxes.

It would therefore appear likely that IC 4673 possesses a highly ionised envelope with little evidence for a PDR or PAH emission bands, leading to a shell morphology and dimensions similar to those observed in the visible.