Diffraction-limited Speckle-Masking Observations of the Red Rectangle and IRC +10216 with the 6 m Telescope

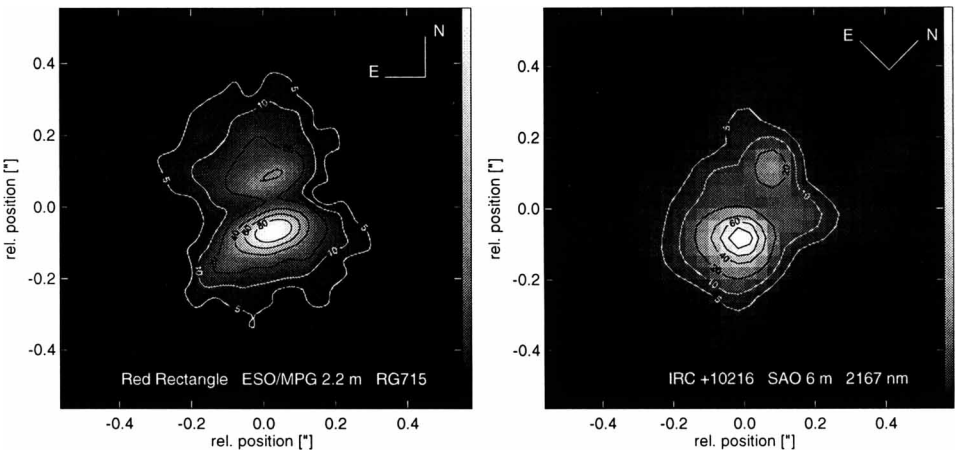
R. Osterbart[1], Y.Y. Balega[2], G. Weigelt[1] and N. Langer[3]

[1] Max-Planck–Institut für Radioastronomie, 53121 Bonn, Germany ;

[2] Special Astrophysical Observatory, Zelenchukskaya Region, 357147 Russia ;

[3] Max–Planck–Institut für Astrophysik, 85740 Garching, Germany

We present the first diffraction-limited speckle-masking observations of the bipolar nebula Red Rectangle and of the carbon star IRC +10216. Both objects were observed with the SAO 6 m telescope in the NIR (resolution 0.″092) and the Red Rectangle with the ESO/MPG 2.2 m telescope in the red (resolution 0.″087).



The Red Rectangle is resolved into two lobes, separated by about 0.″14. The dark lane between the lobes is probably caused by an obscuring dust disk. The central star is found to be a close binary with one of its components being an AGB star (cf. Van Winckel et al. 1995). For close binary systems, mass transfer from the AGB star to its companion is very likely. The process is considered to be dynamically unstable, proceeding to a common envelope evolution. Yorke et al. (1995) find that most of the gas in such a system remains in a disk-like configuration which provides us with a possible explanation of the observed geometry.

The images of IRC +10216 show a resolved central peak surrounded by patchy circumstellar matter. The separation of the brightest clouds is 0.″13 to 0.″21 (a few stellar radii). This structure implies a stochastic behaviour of the mass outflow of pulsating carbon stars, perhaps up to the dust condensation point. This may be caused by shock waves induced by the Mira-type pulsations (Fleischer et al. 1995) in connection with surface inhomogeneities due to large convection cells or non-radial and non-periodic pulsations.

REFERENCES

Fleischer A.J., Gauger A., Sedlmayr E., 1995, A&A 297, 543
Van Winckel, H., Waelkens, C. , Waters, L.B.F.M., 1995, A&A 293, L25
Yorke, H.W., Bodenheimer, P., Taam, R.E., 1995, ApJ 451, 308