MERLIN OBSERVATIONS OF THE OH MASER EMISSION FROM IRC+10420

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MERLIN observations of the 1612 and 1665 Mhz OH masers from the supergiant IRC+10420 reveal several major departures from the usual morphology of OH/IR stars.

IRC+10420 is one of the most unusual OH maser sources yet found. It is an F8 supergiant with strong OH maser emission at 1612, 1665 and 1667 Mhz. A north-south optical nebulosity with an angular size of 2 arcsec has been detected (Thompson and Boroson,1977) and its peculiar IR properties are reminiscent of Eta Carina. These characteristics make IRC+10420 unique among Type II OH/IR stars.

Diamond et al.(1983) have made MERLIN maps of the 1612 Mhz OH masers and found that the structure is very axisymmetric with the most blueshifted masers (42.5 - 50.0 km/s) forming a north-south double separated by 0.5 arcsec, while the masers from 50 - 60 km/s form an almost edge-on disc at a position angle of 108°. The disc has an angular radius of 1.25 arcsec. Diamond et al.(1983) suggest from these and other data that IRC+10420 is a bipolar nebula. Bowers (1983) has observed the 1612 and 1667 Mhz OH masers with the VLA. His maps of the blueshifted 1612 Mhz masers agree with those of Diamond et al.(1983), the redshifted 1612 Mhz masers, which were below the sensitivity of MERLIN, are spread over a larger area. The VLA observations of the 1667 Mhz OH masers reveal an unusual anomaly in that these masers appear to be situated at between 3 and 5 arcsec from the central star. This result is inconsistent with models of maser pumps (e.g.Elitzur et al.,1976)

In Fig.1 we show a) the 1665 Mhz OH spectrum from IRC+10420 and, b) the MERLIN maps of these masers. The 1665 Mhz spectrum covers the same velocity range as the 50 - 60 km/s 1612 Mhz masers and the maps show the same general configuration, namely a disc like stucture oriented along approximately the same position angle. The flux density of both the 1612 and 1665 Mhz disc components have been increasing at a rate of 1.25 Jy/yr since 1976 (Benson et al.,1979) suggesting that at this

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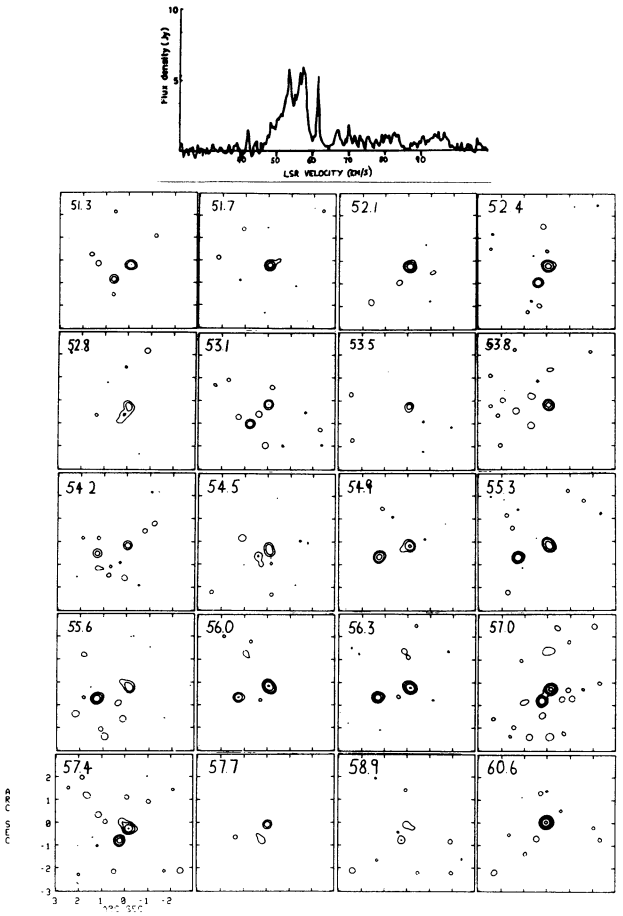

position in the envelope the 1612 and 1665 MHz disc component masers are situated in the same region and/or have a common pump source. Two anomalies are present in the 1665 MHz maps: i) there is no increase in overall emission size as the velocity approaches the stellar velocity and, ii) there is an unresolved point component at 60.6 km s^{-1} instead of at the extreme velocities as is usual in OH/IR stars.

These results are not inconsistent with the suggestion by Diamond et al (1983) that IRC+10420 is a bipolar nebula but the simple geometrical picture requires modification.

REFERENCES

Benson, J.M., Mutel, R.L., Fix, J.D., Claussen, M.J., 1979, Ap.J. 229, L87-90
Bowers, P.F., 1983, preprint
Diamond, P.J., Norris, R.P., and Booth, Astron.Astrophys. (in press)
Elitzur, M., Goldreich, P., Scoville, N., 1976, Ap.J., 205, pp 384-396
Thompson, R.I. and Boroson, T.A., 1977, Ap.J., 216, L75-77

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