

Detection of Radio Emission from MWC957

We have detected radio emission from MWC957, an early-type emission line object with an infrared excess. Unlike our previously reported detections¹⁻³ which are all D-type infrared excess objects, MWC957 is classified as F type by Allen⁴. In this respect it is similar to RY Scuti which also has been detected recently at radio wavelengths⁵⁻⁷.

The observations were made at 2.8 cm (10.63 GHz) using the 46-m telescope of the Algonquin Radio Observatory. The instrument parameters and the observational procedure were as described in ref. 1. MWC957 was observed three times between June 30 and July 5, 1973, giving a mean flux density of 68 ± 10 m.f.u. The quoted error does not include the possible effects of confusing sources; however, at a galactic latitude of -9.4° this effect is likely to be small.

MWC957 = 11-9°1 = HenP422 = H2-48 = Myl121 = MH α 152-1 is a stellar object which has been described as a B₀ star⁸ and as a planetary nebula⁹. If it is assumed that its near infrared excess is due to bremsstrahlung radiation from hot ($\sim 10^4$ K) optically thin circumstellar gas, the expected flux density at longer wavelengths can be calculated. The expected radio spectrum was obtained using the exact mean free-free Gaunt factors of Gayet¹⁰, and it was found that the predicted flux density at 2.8 cm was greater than that actually observed by a factor of ~ 2 . Essentially the same is true even if the circumstellar gas has a temperature as low as has been suggested by Milkey and Dyck¹¹. Therefore, provided that the bremsstrahlung mechanism is in fact responsible for the infrared emission of MWC957, we conclude that this object is optically thick at 2.8 cm, as was found for RY Scuti⁷. We expect the maximum flux density of MWC957 to be ~ 100 m.f.u. at ~ 30 GHz.

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P. A. FELDMAN
C. R. PURTON
K. A. MARSH

Centre for Research in Experimental Space Science
and Department of Physics,
York University, Toronto, Ontario

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Peculiar Object near X2+5

HAWKINS *et al.*¹ have determined that the X-ray source GX2+5 lies within an error circle of diameter 2 arc min in a region of heavy obscuration. On May 26, 1973, I. S. G. scanned an area of 4×4 arc min centred on

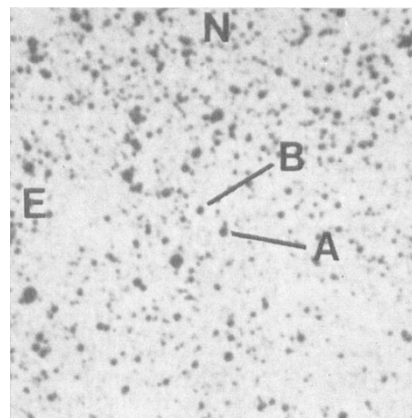


Fig. 1 Reproduction of red Palomar Sky Survey print showing the position of the bright infrared source B.

their best position using an infrared photometer attached to the 74-inch Radcliffe reflector. A bright object was found close to the centre of the error box, having the infrared magnitudes J ($1.25 \mu\text{m}$) = 10.39 ± 0.08 , H ($1.65 \mu\text{m}$) = 8.85 ± 0.10 and K ($2.2 \mu\text{m}$) = 8.10 ± 0.05 . It was not visible in the finder eyepiece of the photometer but its position was estimated to be about 25 arc s north-east of the visible star A in Fig. 1 (taken from a Palomar Sky Atlas red print). The object is identified with star B which may just be visible on the companion blue plate. A recent blue photograph taken by B. L. Webster (on the 74-inch) shows no change in the region.

Spectra of B (140 \AA mm^{-1} and 43 \AA mm^{-1}) were obtained by M. W. F. on June 30 and July 1, 1973, using a Carnegie image tube attached to the Cassegrain grating spectrograph on the 74-inch reflector. The object shows strong H α emission (noticeably broadened on the 43 \AA mm^{-1} plate) and also weak H β and [OIII] 5007 emission ($I(\text{H}\beta) \sim I(5007)$). The H α /H β intensity ratio corrected for instrumental effects is 55. Such a steep gradient indicates heavy obscuration. If normal nebular values are applicable to the Balmer decrement (see ref. 3) we deduce $E_{B-V} \sim 3$ mag and $A_V \sim 9$ mag. With a reddening of this order the infrared colours indicate a late type star. The predicted V magnitude is then ~ 19 mag. This is consistent with the absence or great weakness of a continuum in the spectra. The visual brightness comes almost entirely from H α emission. The high absorption probably indicates a very distant object. If it is in the vicinity of the galactic centre the visual absolute magnitude of the stellar component would be -5 mag. The H α radial velocity from the 43 \AA mm^{-1} plate is -156 km s^{-1} . Velocities of expansion of this order are known to exist for gas in the galactic centre⁴ though radio observations do not seem, so far, to have detected such velocities in the region of GX2+5.

The nature of the object is not entirely clear. It may be related to the symbiotic class. In any case, it seems to be an interesting object on its own account and because of its peculiar nature and occurrence near the X-ray object it should be considered as a candidate for identification with GX2+5.

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I. S. GLASS

South African Astronomical Observatory,
Observatory, Cape,
and
Royal Greenwich Observatory,
Herstmonceux Castle, Hailsham, Sussex

M. W. FEAST

Radcliffe Observatory, Pretoria

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