LETTERS TO THE EDITOR

RADIOPHYSICS

Lunar Occultation of the Radio Source
CTA 21

THE radio sources CTA 21 and CTA 102 have been of considerable interest since they were first reported by Harris and Roberts¹ from observations at 958 Mc/s. Later work² showed that the radio spectra of these sources differed from those of most other sources and that each source had a maximum of emission near 900 Mc/s. It has been suggested^{3,4} that this form of spectrum is produced by self-absorption of synchrotron radiation within a source of small angular size, and from the shape of their spectra the very small angular diameters of ~ 0.01 sec of arc have been predicted for both CTA 21 and CTA 102. CTA 102 has recently been identified⁵ as a quasi-stellar radio source, but for CTA 21 no optical object can be detected on the 48-in. Sky Survey plates within the limits of error (± 6 sec of arc) of the existing radio source position^{6,7}. It appears that an identification of CTA 21 with an optical object can only be made if the radio source position is more precisely known and the region of sky can be examined with more powerful optical techniques.

An opportunity to measure an extremely precise position for the source has been presented by the series of lunar occultations which occurs during 1964–65. No further occultations of this source will then be observable for several years. Two occultations were predicted for the C.S.I.R.O. radio telescope at Parkes, Australia. The first occurred close to the local horizon and could not be observed, and even on the second occasion (February 9, 1965) only the disappearance of the source occurred within the normal working altitude range of the telescope.

This disappearance was observed at 2,650, 416 and 154 Mc/s. The measurements at 2,650 Mc/s showed well-

defined Fresnel diffraction fringes, and preliminary calculations suggest that the source is single and that it has a radio diameter of less than 1.5 sec of arc. This result is consistent with that obtained from some recent interferometer measurements⁸ which have shown that the source has an apparent diameter < 0.4 sec of arc. Re-appearance occurred 8° below the altitude limit of the telescope and was observed at 154 Mc/s only with an offset feed. Even at this frequency the measured signal-to-noise ratio was appreciably reduced from the on-axis observations and no useful off-axis observations could have been made at the higher frequencies. The use of off-axis observations and the low flux density of the radio source at 154 Mc/s have meant that the signal-to-noise ratio and hence the accuracy of timing are much poorer at the re-appearance than at the disappearance.

The measured times are given in Table 1.

	Table 1
Disappearance	10h 10m 47s.8 $\pm$ 0s.5 U.T.
Re-appearance	11h 28m 02s.5 $\pm$ 6s.5 U.T.

These times correspond to a position of the radio source of R.A. 03h 16m 9s.11, Dec. $16^\circ 17' 40''$.3 (1950.0). A value of 33s.5 has been assumed for the difference between ephemeris and universal times in order to bring the deduced position on to the FK3 system⁹. The source position together with the limits of error are shown in Fig. 1.

It is understood that no object can be seen in the new radio position on the best existing plates which have been taken with the 200-in. telescope on Mount Palomar.

We thank Mr. B. F. C. Cooper and many others on the laboratory's staff for their assistance with the observations, and Mr. W. Nicholson of H.M. Nautical Almanac Office for sending details of the circumstances of the occultation.

R. W. CLARKE
R. A. BATCHELOR

C.S.I.R.O.
Radiophysics Laboratory,
Sydney, Australia.

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PHYSICS

A New Role for the Electrophorous

THE electrophorous¹ consists of a flat polymeric plate placed in contact with a flat metal plate. The two surfaces are separated only by the higher asperities of the surfaces and so actual contact is only made at a few points. If the polymer surface has been previously negatively charged by the diffusion of electrons into it, then the metal will be negatively charged at the few places where contact is made and positively charged by induction where there is no contact. If a time-varying dynamic load is now applied to the system so that the plates never lose contact and the variation of the distance between them is due to the elastic deformation of the asperities, then there will be time-dependent variations in the induced electrostatic charge on the metal plate. If the

Fig. 1. Diagram showing the mean position (+) of the radio source CTA 21. The limits of error are defined by the range of possible positions of the limb of the Moon allowed by the uncertainties in the measured times of disappearance and re-appearance.