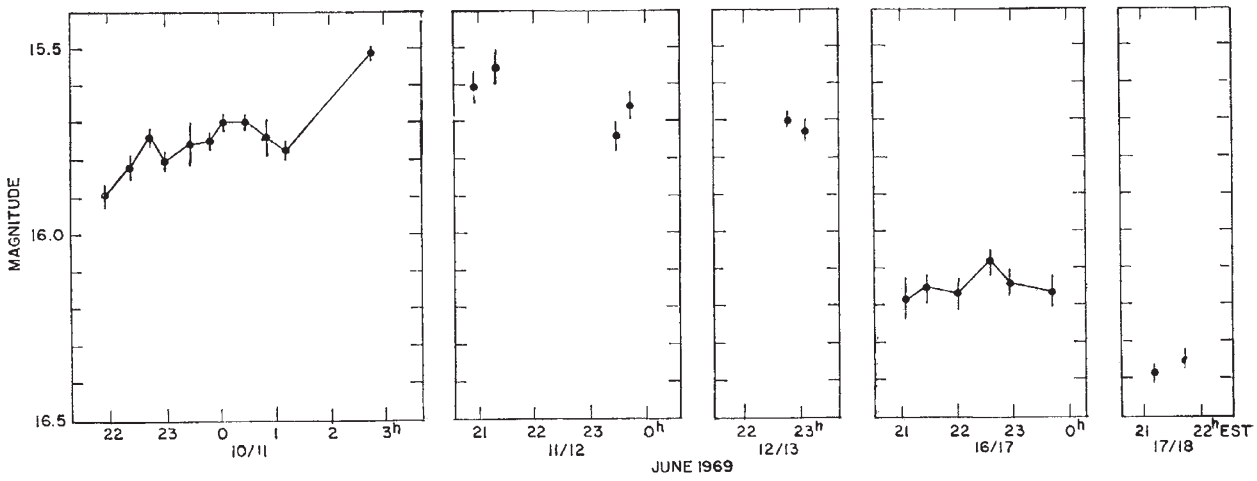

Fig. 3. Light curve for 3C 345.

place within the span of a few hours. By June 22/23 the short period optical activity had ceased, but the object had become fainter by $\approx 1{\cdot}4$ m.

Table 1

Object	m	A
PKS 0159–11 (3C 57)	16·4	0·4
PKS 0232–04	16·5	0·3
3C 181	18·9	0·3
PKS 1004+13	15·7	0·3 decreasing
PKS 1217+02	16·5	0·1
PKS 1354+19	16·0	0·1
PKS 1510–08	15·8	0·3
3C 323.1	15·8	0·1
3C 334	16·4	0·2 decreasing
3C 345	16·0	2·0
PKS 2135–14	15·5	1·3
PKS 2145+06	16·5	0·2
PKS 2251+11	15·8	0·2 increasing
PKS 2344+09	16·0	0·5

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James H. Hunter, jun.
Phillip K. Lü

Yale University Observatory,
New Haven, Connecticut.

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Search for Red-shifted Neutral Hydrogen Absorption in 3C 191

It has been suggested[1] that the red-shift $Z = 1{\cdot}95$ observed in quasars has special significance. We have therefore attempted to detect absorption in the ground state hyperfine transition of neutral hydrogen atoms, normally at 21 cm, red-shifted to 62 cm wavelength of the continuum flux of the quasar 3C 191.

3C 191 has optical absorption lines at $Z = 1{\cdot}9458 \pm 0{\cdot}001$ (ref. 2) and the corresponding neutral hydrogen absorption would be expected at a frequency of $482{\cdot}180 \pm 0{\cdot}160$ MHz. The continuum flux of this source is $S_{482} = 5$ flux units.

On February 7, 1969, the 25·6 m antenna at Dominion Radio Astrophysical Observatory, together with a transistorized preamplifier giving a system noise temperature of 350 K and a 100 channel filter spectrometer spanning the frequency range $482{\cdot}180 \pm 0{\cdot}500$ MHz, was used to observe 3C 191 for a total period of 2 h 10 min with an equal time being spent on an adjacent reference region. The resulting spectrum, smoothed to an effective observing bandwidth of 30 kHz, indicated that the absorption does not exceed 6 per cent ($3 \times$ r.m.s. noise) of the continuum flux of the source.

If an excitation temperature T_s of 100 K is assumed and a Gaussian line of dispersion 30 kHz, the limit corresponds to an integrated column density of neutral hydrogen $\int N_H dl \leq 1{\cdot}7 \times 10^{20}$ atoms cm^{-2}. If, however, the absorbing hydrogen is in the immediate vicinity of 3C 191, the excitation temperature is expected to be considerably higher due to excitation by the radiation of the quasar, and the corresponding limit $\int N_H dl$ will be raised (unpublished work of J. N. Bahcall and R. D. Ekers).

This result is evidence against the hypothesis[3] that quasar absorption lines are produced by normal galaxies in the intervening path, because the disk of a spiral galaxy between us and a quasar would be expected to absorb ~ 25 per cent of the continuum flux of the quasar.

W. L. H. Shuter
J. F. R. Gower

Institute of Astronomy and Space Science,
University of British Columbia,
Vancouver 8, British Columbia.

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Measurements of the "Corner" of the Interstellar Extinction Law

It was shown by Whitford[1] and confirmed by Nandy[2] that, over the visible part of the spectrum, the wavelength dependence of interstellar obscuration, in magnitudes against reciprocal wavelength, can be well represented by two intersecting straight lines. Because the change in slope of the extinction law is near the broad interstellar absorption band at 4430 Å, the question arises as to whether the observed "corner" is associated with this band or is a separate feature of the extinction law. If the latter, it is important to know how rapid is the change of slope and precisely at what wavelength it occurs, for a sufficiently sharp corner would require that the existing theories of extinction which are based on classical scattering by interstellar grains be modified. It is also of some interest to see if the linearity of the two parts of the