Osterbrock, Donald E. Electron densities in the Orion Nebula.

Photometric measurements of the ratio of intensities of the two components of the $[OII]$ $\lambda 3727$ emission line were made for 16 points in NGC 1976 and NGC 1982. The plates were taken with the Newtonian-focus spectrograph of the 100-inch telescope and were developed together with step-slit calibration plates taken with the calibration optics of the coude spectrograph. The probable error of the measurement of the ratio from a single plate is between 0.02 and 0.03 (as judged from the internal consistency) and there are two or three plates of each point.

These measurements were undertaken in an effort to check the theoretical relation, recently published by Seaton (1954), between electron density and intensity ratio of the two components of $\lambda 3727$. For although the absolute densities are not known well, the steep gradient of surface brightness from the center outwards in the Orion Nebula shows that there is sharp decrease in density from the center outwards. Thus the relative run of density is known, at least qualitatively.

The measured line ratios show good agreement with the theory. In the brightest regions of the nebula, near the Trapezium, $\lambda 3729$ is considerably fainter than $\lambda 3726$ and the minimum observed intensity ratio is $\lambda 3729/\lambda 3726 = 0.50$ in an especially bright region. Further out in the nebula, at points of lower surface brightness, the two components are more nearly equal, while at the points observed in the present investigation which are furthest from the Trapezium the intensity ratio is $\lambda 3729/\lambda 3726 = 1.25$. Two points deviate from the otherwise good correlation between surface brightness and intensity ratio, but they are quite evidently regions of especially high absorption, one of them being in the bay just northeast of the Trapezium.

The observations of the $\lambda 3729/\lambda 3726$ intensity ratio in the Orion Nebula thus fit the theory well. The densities derived from this ratio lie between a high of 3×10^4 electrons/cm³ near the Trapezium and a low of about 3×10^2 electrons/cm³ at the faintest point observed in the present investigation, about 15' southwest of the Trapezium.

Seaton, M. J. 1954, *Ann. Astroph.* 17, 74.

Mount Wilson and Palomar Observatories,
Pasadena, Cal.

Payne-Gaposchkin, Cecilia. The spectrum of RR Telescopii.

The very slow nova RR Telescopii is known to have brightened suddenly to about the seventh magnitude late in 1944, as shown in the light curve published by Mrs. Mayall (1949). At least as far back as 1926 it displayed a variation

SPECTRUM OF RR TELESKOPII

J.D.	m_{pg}	Region	Remarks
33043	7.30	photographic	I
33101	6.85	photographic	2
33120	6.95	photographic	3
33124	7.00	photographic	4
33125,26	7.00	photographic	5
33139	7.10	3900-6570	6
33144	7.12	photographic	7
33148	7.15	3900-6570	8
33153	7.20	photographic	9
33172	7.30	photographic	10
33174	7.30	photographic	10
33199	7.40	photographic	11

REMARKS

1. Absorption spectrum resembling an F5 supergiant.
2. Maximum light; primarily absorption, weak bright lines at H and strongest $FeII$ lines. $TiII$ and $SrII$ prominent in absorption.
3. H and $FeII$ emissions strengthening; $TiII$ prominent in absorption.
4. Absorptions have their maximum prominence; H and $FeII$ emissions strengthening; $TiII$ weakening.
5. Similar; absorptions weakening slightly.
6. $H\alpha$ strong; no other feature visible in red.
7. Emissions at H , $FeII$ strengthening; absorptions weakening.
8. $H\alpha$ very strong.
9. Absorptions greatly weakened; emissions strengthened, especially those of Balmer lines.
10. Primarily emission of H , $FeII$, $CaII$; $TiII$ still in absorption.
11. Emissions more conspicuous; weak emission of $TiII$, $FeIII$?, [$FeII$]?

with a period of 387 days, as described by Gaposchkin (1950), but it has been a known variable since 1908; it is thus the only nova that was discussed in some detail before its outburst. In 1946 and 1947 it was of about the seventh magnitude.

Objective prism plates taken at the Boyden Station in 1949 record the spectrum through the maximum, which took place near JD 33100. The first of them, JD 33043, shows a pure absorption spectrum like that of a supergiant F5 star; lines of $FeII$, $TiII$, $ScII$, $CrII$, $SrII$ and very strong $CaII$ are visible as well as the Balmer lines. The last of them, JD 33199, shows a predominantly emission spectrum with prominent lines of