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THE SPECTRUM OF VY AQUARII AT MINIMUM

Considerable interest has been recently expressed (see all references following) in the recurrent nova VY Aquarii. Historical brightenings appear to have taken place in 1907, 1929, 1934, 1941?, 1942, 1958, 1962, and 1973. A suggestion of a recurrence period of 11.0 years is partly borne out by the data and McNaught (1982) proposes that another outburst may take place in 1984.

Two spectra of this star were obtained by the author using the image-intensified White spectrograph and 2.1-meter telescope of the Kitt Peak National Observatory on UT 1983 July 17.401 and July 18.394. The scale was approximately 43 Å mm^{-1} on forming gas baked IIIa-J plates and the wavelength range was nearly 3700 - 5000 Å. Visually, VY Aquarii was clearly at minimum, with the magnitude estimated as $\leq$ 16 from the set-up field. Both spectra were underexposed (despite exposure times of 1.0 and 1.5 hours respectively) but clear indications of some spectral features could be seen. Radial velocities of these features were measured using the single-axis Grant comparator of the Kitt Peak National Observatory.

The spectrum of the star is that of a Be star with all the hydrogen lines visible in emission from H11 to H^{β}. The Ca II K-line and He I lines at $\lambda\lambda$ 4026, 4120, 4143, 4387?, 4471, and 4713? were also seen. All these features took the form of double emission - central absorption profiles. In every case, the central absorption feature did not reach the continuum level

and the violet emission feature was always wider, though V = R in intensity. The helium lines were very weak and not measurable for radial velocity. The K-line was quite strong. H ζ was found to be wider in extent on the violet side which may betoken a contribution from λ 3888 He I in emission. The total widths of the emissions averaged 22.5 Å ($\sim$1600 km s^{-1}) and did not change appreciably over the two nights. The emission widths increased from short to long wavelengths (17.4 Å at H9 to 26.6 Å at Hβ on the second night).

The radial velocities of all features capable of being measured appear in the following table with VEP denoting violet emission peak, CA central absorption, and REP red absorption peak. All velocities are in km s^{-1}.

	1983 Jul 17.401	1983 Jul 18.394
H8 VEP	----------	-509.8
H8 CA	----------	-183.0
K-line VEP	-635.4	-603.4
K-line CA	-35.4	-188.9
K-line REP	+504.1	+355.0
Hϵ VEP	-700.7	-793.1
Hϵ CA	-65.8	-274.8
Hϵ REP	+506.0	+233.7
Hδ VEP	-664.9	-578.7
Hδ CA	+10.1	+5.2
Hδ REP	+417.1	+420.8
Hγ VEP	-531.1	-444.7
Hγ CA	-161.5	-90.4
Hγ REP	+370.3	+408.2
Hβ VEP	-501.0	-430.1
Hβ CA	-137.8	+94.5
Hβ REP	------	+389.9
Mean (all CAs)	-78.1	-106.2
Mean (all hydrogen CAs)	-88.8	-89.7

It may be seen that there is considerable scatter in the velocities of the central absorptions, both internally and night to night. There is no consistent Balmer progression, with the exception of a trend for the VEP velocities to move towards more positive values as longer wavelengths are reached. The similarity in the mean hydrogen CA values is interesting but there exists too much internal scatter to accord it much meaning.

ELAINE M. HENDRY *

Corralitos Observatory
P.O. Box 16314
Las Cruces, NM 88004
U.S.A.

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* Visiting Astronomer, Kitt Peak National Observatory, which is operated under contract with the National Science Foundation.