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LETTERS TO NATURE

PHYSICAL SCIENCES

Spectroscopic Variations in Cyg X-2

THE X-ray source Cyg X-2 has been optically identified with a fifteenth magnitude blue object[1]. Initial spectroscopic observations[2–4] revealed the presence of broad Balmer absorption lines, a narrow, strong Ca II K line and a narrow emission line of He II λ4,686. Radial velocity variations were evident, with the indication that the emission and absorption line velocities varied 180° out of phase. Photometric monitoring[4] showed the object to vary erratically on a time scale of minutes. Later spectroscopic observations[5,6] confirmed the changes in radial velocity, but no certain evidence of binary motion could be demonstrated. A more recent spectroscopic observation[7] showed the He II emission to have developed a P-Cygni profile, and emission at λλ4,640–50 due to C III–N III was present. I report here the results of additional spectroscopic observations of this object.

Spectrograms were obtained on 1972 July 13.340, 1972 July 14.417 and 1973 July 9.367 UT with the 82-inch (207-cm) and 107-inch (272-cm) reflectors at McDonald Observatory. The first two spectra cover the wavelength region from λλ4,400 to 6,700 at a dispersion of 210 Å mm^{-1}. The third spectrogram covers the wavelength region from λλ3,800 to 5,700 at a dispersion of 115 Å mm^{-1}. Both 1972 spectra show the He II and C III–N III emission features and P-Cygni structure is evident in the helium line. The radial velocity of the He II emission is -400 km s^{-1} for both spectra. This same velocity was observed on a spectrogram obtained the previous year[7].

The spectrogram obtained in July 1973 shows a strong Ca II K line, indicating a spectral type of F5 or later. The strength of the Balmer absorption lines, however, indicates a spectral type of A5 or earlier. The C III–N III emission is no longer present. The He II emission line is present, but with no evidence of P-Cygni structure. The measured radial velocity of the He II feature is -390 km s^{-1}. It seems that Cyg X-2 no longer exhibits large radial velocity variations. It should be noted that Cyg X-2 was monitored photometrically in 1971 and 1972 and no rapid variability was seen (P. Vanden Bout, private communication). The above data and the report[8] of radio variability in Cyg X-2 suggest that further optical studies are sorely needed.

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Tungus Event Revisited

THE suggestion of Jackson and Ryan[1] that a "mini" black hole was responsible for the Tungus Event of 1908 is both imaginative and intriguing. Unfortunately, this miniature, hypothetical object cannot account for all the important phenomena known to accompany the event. On the same night of the Tunguska Fall, and for several subsequent nights, the Tungus and adjacent regions experienced abnormally bright skies[2]. Inhabitants of the entire Northern Hemi-