16-in. coronagraph and the 12-m Littrow spectrograph at the Sacramento Peak Observatory during the summer of 1965. Time sequences of simultaneous observations were obtained, using the following combinations of lines: K , H , $H\epsilon$, and D_3 ; H , $H\epsilon$, D_3 , and the O I infrared triplet; H , $H\epsilon$, D_3 , and the Ca II infrared triplet; and $H\beta$ and $H\alpha$. Time intervals between exposures ranged from 5 to 30 sec, and the height separation was 2000 km. Our preliminary conclusions follow.

(a) A strong correlation exists between the intensities of the spectra of spicules in $H\epsilon$ and D_3 , while spectra in H and $H\epsilon$ show less correlation. The rare earth line between H and $H\epsilon$ shows no brightness or velocity structure. This suggests that it is non-spicular in origin.

(b) We see the line-of-sight velocities of some spicules reverse in direction. This suggests that the apparent rising and subsequent falling seen in $H\alpha$ on the limb may represent actual mass motions. Further, most of the spicules with large line-of-sight velocities seem to be moving faster at the higher than at the lower levels.

(c) The profiles of the H and K lines are indeed very broad with respect to the $H\alpha$ line, in agreement with Athay. It is unlikely that these large widths are caused by overlapping spicules.

(d) Many spicular spectra are tilted with respect to the direction of the dispersion. We believe this to be a real effect, caused by differential motions across the spicule.

(e) The H and K lines are strongly self-reversed at low levels. We believe the self-reversal to be non-spicular in origin because it does not share the Doppler shifts of spicules.

Microphotometry and detailed reduction of the data are underway.

Relative Transition Probabilities for Prominent Ni I and Ni II Lines in the Near Ultraviolet. G. D. BELL (present address: *Harvey Mudd College*), D. R. PAQUETTE, AND W. L. WIESE, *National Bureau of Standards*.—Relative transition probabilities of 16 Ni I lines and 53 Ni II lines in the wavelength range from 2000–3600 Å have been measured with a wall-stabilized arc. The arc was operated at 10 Å in argon with a small admixture (0.01%) of nickel-carbonyl. The spectrum was photoelectrically observed along the arc axis through the hollow electrodes. The relative intensity calibrations were performed by utilizing calibrated tungsten strip lamps or the continuous emission of a hydrogen arc operated at known plasma conditions. The axis temperature of the argon nickel-carbonyl arc was determined from intensity measurements of argon lines of known transition probabilities and the application of the arc plasma equations. For most of the relative f values

the experimental and theoretical uncertainties are 8% or better, but for a few weak lines the uncertainties go as high as 30%. Comparisons with other experimental and theoretical results are undertaken and fair agreement is obtained. The relative f values for both the Ni I and Ni II lines have been put on an absolute scale by using the absolute oscillator strengths of a few prominent Ni I lines recently reported by Lawrence, Link, and King (*Astrophys. J.* **141**, 293, 1965).

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Abundance and Temperature of CO_2 in the Martian Atmosphere. MICHAEL J. S. BELTON AND DONALD M. HUNTEN, *Kitt Peak National Observatory*.—Spectrophotometric observations of the R branch of the weak $\nu_1+2\nu_2+3\nu_3$ band of CO_2 at 1.05 μ in the spectrum of Mars yield an atmospheric abundance of 69 ± 26 (atm·m)_{STP}. Taken together with the results of Gray's (1965) analysis of the strong bands of CO_2 at 2.0 μ , this abundance indicates a surface pressure in the range of 3–13 mbar. Individual lines in the branch have been resolved up to $J=28$ and their intensity distribution indicates a rotational temperature of 194 °K. The head region alone yields a somewhat higher temperature of 210 °K. The observations were also analyzed with the help of a polytropic model atmosphere. The most satisfactory fit to the data was found for a mean surface temperature of 270 °K over the illuminated disk and a lapse rate of 5 °K/km.

A brief discussion of the compatibility of the present observations with others that are available concludes the paper.

Wolf-Rayet Binary HD 197406. KATHERINE BRACHER, *University of Southern California*.—HD 197406 is a rather faint single-line spectroscopic binary of spectral class WN7, showing fairly narrow emission lines of He II, He I, N IV, N III, and Si IV. Spectrograms obtained at Kitt Peak National Observatory in 1964, together with plates taken at Mount Wilson in 1946–49 and remeasured for this investigation, yield a period of 4.3207 days. The resulting velocity curves suggest a zero eccentricity, and rather small values of K . These give a mass function of 0.07 $\odot$, and a semimajor axis $a_w \sin i = 3.2 \times 10^6$ km. Photometric observations at the Goethe Link Observatory show a slight diminution of light (0^m.06) during the half of the cycle when the W star is in front. Assumptions concerning the inclination, based on this eclipse, lead to a suggested mass of 5–7 $\odot$ for the WN7 star, and an absolute magnitude of –1 to –2.