shifts of both emissions and central absorptions. Both outer edges of the emission lines shift in the sense stated, so that the absorption remains nearly central in the structure. This behavior appears to be characteristic of all the well-observed stars of this type, such as 25 Orionis (Dodson 1936), β^1 Monocerotis (McLaughlin 1951), and HD 20336 (McLaughlin 1958).

Prior to 1924, the emission components of π Aquarii were equal, and velocities essentially constant. Then conspicuous changes began. The first cycle probably occupied four or five years (unless very rapid changes occurred in 1927 when observations were not obtained). Later cycles were two or three years in length. Velocity amplitudes reached 150 km/sec for central absorption, and 200 km/sec for edges of $H\beta$ emission. Amplitudes of both V/R and velocity were much reduced and the emission somewhat weak from 1935 to 1943. Then followed a stage of extreme weakness or absence of emission lines until 1950. After that time the emissions strengthened greatly, with nearly equal components and velocities near the mean value, -10 km/sec.

A new phase of activity began in 1956. By July, 1959, about three-fourths of a cycle had been completed and the amplitude appeared to be increasing rapidly.

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McNamara, D. H., Hansen, Kimball and Walton, W. *Stellar rotation and the Beta Canis Majoris stars.*

A statistical investigation of all the B1 and B2 stars (luminosity class III-V) north of declination -30° and brighter than magnitude 5.6 has revealed that 23 stars have apparent rotational velocities ($V \sin i$) in the same range as the β CMa variable stars. Of these 23 stars, 11 are known to be β CMa variable stars. According to the difference between the observed $V \sin i$ and true distribution V of rotational velocities derived by Slettebak, this is approximately the number we would expect to be β CMa variables if all B1 and B2 stars (proper luminosity class) with rotational velocities below a certain critical value pulsate and show β CMa characteristics. The 12 other stars, therefore, are probably stars of large rotation with their axis of rotation

approximately in the line of sight. The $\sin i$ factor is near zero and hence the measured values of $V \sin i$ are small.

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McVittie, G. C. *The cosmical constant and the curvature of space.*

The average density of matter in the universe given by Oort at the 1958 Solvay Conference was $\rho_0 = 3.1 \times 10^{-31}$ gr/cm³ with a distance-scale such that the Hubble "constant" H is 75 km/sec/mpc. The retardation of the expansion of the universe seems to be fairly well established, at least as to sign, if not as to magnitude. If h_1 is H expressed in (seconds)⁻¹ and h_2 is the acceleration parameter, then the available data on red-shifts give $h_2 = -q_0 h_1^2$ where q_0 lies between 1.5 and 5. Einstein's field equations for a uniform model universe, combined with these data, then lead to the following conclusions: (a) the cosmical constant has 'the negative value $-(3q_0 - f_0)h_1^2$ '; (b) the space-curvature is also negative, the contemporary radius of curvature being $(q_0 + 1 - f_0)^{-1/2} c h_1^{-1}$. Here f_0 is the ratio $4\pi G \rho_0 / h_1^2$ and is equal to 0.044 if $H = 75$ km/sec/mpc and to 0.088 if $H = 150$ km/sec/mpc. A negative cosmical constant means that, in addition to gravitation, there exists in the universe a second force which prevents the galaxies from flying apart. A zero cosmical constant dispenses with this additional force and thus all the responsibility for the retardation is thrown onto gravitation. The observed density of matter is insufficient to produce the retardation and this is the reason why model universes with zero cosmical constant always predict densities that are too high by a factor of between fifty and two hundred. A negative curvature, of course, implies that space is hyperbolic and therefore open and of infinite extent.

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Meinel, A. B. *Ratio spectra for G8 stars.*

The ratio spectrometer measures the ratio of intensity from a narrow wave length region to that from a broad region, the relative widths of the two slits being 50 and 250 Å, respectively. The narrow band is centered within the wide wave length region. The relative placement of the two slits remains constant as the spectrum is scanned.

It is advantageous to employ a ratio spec-