lution of T Tauri stars into dwarf flare stars or other stars near the main sequence in the H-R diagram.

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White, Marvin L. Oscillatory currents in the ionosphere.

The solar thermal and gravitational excitation of oscillations in the earth's ionosphere is responsible for the production of "worldwide" atmospheric current systems and "quiet day" magnetic variations at the earth's surface. A proper theoretical approach to this problem, attempted here, involves the extension of the resonance tidal theory initiated by Taylor and Pekeris for a neutral component atmosphere so as to include traces of an ionized component in the presence of the earth's dipole field. Also necessary to the problems is a theory for formation of the electrified atmospheric layers by solar ionizing radiation, day and night effects included. Layers so formed are said to be solar controlled. Large distortions from this condition of strict solar control are produced in the F-layers by thermal and tidal oscillatory motions. It turns out that the theory is, in essence, nonlinear due to thermal excitation of sum and difference frequencies by an I^2R source function (electrodynamical viscosity). Even for the lower un-ionized regions of the earth's atmosphere, Stokes' "dissipation function," of second degree, accounts for observable nonlinear effects. The end result in the theory is, in part, to predict spacial and temporal variation of ionospheric electron densities; in Schuster and Chapman's previous dynamo theory, height variations of the current system were ignored as the ionosphere was idealized as a thin shell.

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Wilson, Raymond H., Jr. A gravitational force function for the earth representing all deviations from a spherical geoid.

In the present treatment each area of deviation from a uniform spherical gravitational field is represented by a separate series of Legendre polynomials having its pole of reference centered on the area. Thus the earth's north and south polar oblateness deviations are represented sepa-

ately so that their inequality can be investigated. The series for minor deviations centered at general latitudes and longitudes has been transformed to terms of variables in the inertial coordinate system for practical computation. The vector sum of these expressions for the earth's spherical gravitational field and its deviations, together with explicitly presented geocentric expressions for the fields of the moon and sun, would thus constitute a complete force function for satellite orbit development by numerical integration.

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Wood, Frank Bradshaw. The eclipsing variables, TZ Corona Austrini, V Tucanae, RS Leporis, ST Carinae.

The following systems were selected for observation because the published data assigned them the following characteristics: Algol-type light curve, spectral class A, periods of from 17 to 30 hours, and deep primary eclipses with duration from 3 to 6 hours.

The short periods mean either extraordinarily large masses or small distances between the components. Similar systems which have undergone detailed analysis have shown normal masses for the brighter components; this, plus the short period, calls for a distance between components so small that the radii of the brighter components can only be about $\frac{1}{2}$ those of normal A stars; this in turn locates the A components below their normal place in the HR-diagram. The secondary components in such cases have frequently been found to fill the limiting Jacobian surface and hence are in an interesting evolutionary stage. Lack of appreciable light change between eclipses, in such close systems can be most simply explained by a large mass-ratio. If this explanation survives detailed analysis, the fainter components of these systems must have abnormally low masses.

The photoelectric light curves obtained of these four stars in general confirm the earlier photographic work, and are now being subjected to detailed analysis. The chief features of the different systems follow. Attention is called to the importance of spectrographic observation.

TZ Cr A New: JD 243 6080.035 + 0^d68674954 E. There is no strong evidence for change of period. Depths of eclipse: yellow 0.73 mag., 0.12

mag.; blue 0.73 mag., 0.10 mag. Secondary is central; light is nearly constant between eclipses; there is some reflection effect. There is some suspicion of intrinsic variation. The eclipse is probably partial; duration = $0^d14 = 3^h22^m$.

V Tuc New: JD 243 6139.142 + 0.87091649 E. There is no evidence for change of period. Depths of eclipse: yellow 2.40 mag., 0.11 mag.; blue 2.84 mag., 0.08 mag. Secondary is central; light is nearly constant between eclipses, but third quarter is 0.05 mag. lower than first. There is suspicion of intrinsic variation. The eclipse is probably partial; duration = $0^d18 = 4^h19^m$. There is some reflection effect.

RS Lep New: JD 243 6191.148 + 1.2885439 E. The period has apparently been constant during the interval in which the system has been observed. The curve is Algol type. There is a constant phase of about 25 minutes duration. Depths of principal eclipse: yellow 1.4 mag.; blue 1.7 mag. Duration = $0^d22 = 5^h17^m$.

ST Car This does not show an Algol-type curve, but exhibits appreciable curvature between eclipses. Ranges are 1.14 mag. and 0.32 mag. in the yellow and 1.18 mag. and 0.28 mag. in the blue in primary and secondary respectively.

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Wyller, Arne A. Anomalous C^{13} features in the spectrum of 19 Piscium.

In the course of a vibrational temperature study for the C_2 and CN molecules on a high dispersion plate (5.9 Å/mm) of 19 Piscium (No. C6₂) there was noted a definite absence of any pronounced structure of the $C^{12}C^{13}(0, 2)$ band at λ 6168.1. A superposition of the normal and isotopic origin-to-head structures failed to reveal any common pattern of intensity variations. In the isotopic band region, $\lambda\lambda$ 6168.1 – 6161.1, the multiplets of $CaI(3)$ and $CaI(20)$ are clearly visible, as are also several of the $C^{12}C^{12}(0, 2)$ rotational line triplets. If the absorptions due to

these features are subtracted from the observed equivalent width of the isotopic region, the remaining absorption leads to a $C^{12}:C^{13}$ ratio greater than 10:1 on the thin layer hypothesis. This is significantly higher than the previously established value 3:1, based on the relative intensities of the $(1, 0)C^{12}C^{12}$ and $C^{12}C^{13}$ bands at, respectively, λ 4737 and λ 4744. The ratios of the restintensities of the isotopic to the normal line features near the heads yield abundance ratios greater than 10:1. Likewise the relative intensities of the $C^{12}C^{13}R(14)$ and $C^{12}C^{13}R(14)$ triplets yield even higher ratios than 10:1. It is found that $C^{12}C^{13}R(14)$ coincides with a "continuum window" at λ 6131.

The evidence from the red $(4, 0)$ CN band at λ 6192 definitely confirms the above findings. Within the $C^{13}N^{14}R_2(4, 0)$ region there again appears a "continuum window" at λ 6247. The derived abundance ratios are higher than 10:1. The so-called "6260 band" coincides rather well with the mean position of the R_1 and Q_1 branches of the $C^{13}N^{14}(4, 0)$ band on low dispersion plates. In the present spectrum the band occurs in reality at $\lambda\lambda$ 6258–6259 and is composed of two very strong $Ti(104)$ lines, one $ScI(3)$ line and one $VI(19)$ line, all flanked by two $C^{12}N^{14}$ rotational lines.

In the infrared $(2, 0)$ CN band-six continuum windows have been found at, respectively, λ 7902.4, λ 7955.3, λ 7966.1, λ 7988.6, λ 8036.5, λ 8061.5. One would expect very strong $C^{13}N^{14}$ absorption features in these regions but instead probably continuum emissions are observed. Unfortunately the photometry does not permit any rigorous quantitative abundance estimates. However the observed emission strengths are clearly incompatible with abundance ratios of the order of 3:1.

The conclusion is that for 19 Piscium the $C^{12}:C^{13}$ ratio has to be revised upwards to well above 10:1. Either the observed $C^{12}C^{13}(1, 0)$ feature at λ 4744 is spurious like the "6260 band" or we have a strange case of selective emission possibly due to recombination effects.

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