25.10
Radial Velocity Variability in Arcturus

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We have obtained high precision measurements of variations in the radial velocity of α Boon nine nights during January, February, March, and April 1986, and May 1987. We are able to obtain rms radial velocity residuals of 5-15 m s$^{-1}$ by using the telluric O$_2$ band at 6300Å as a reference source for spectra obtained on the McDonald Observatory 2.7m telescope coudé spectrograph. Significant radial velocity variability is detected. The radial velocity varies by an amount in excess of 200 m s$^{-1}$ over an interval of about two days. Our temporal coverage of the star is insufficient to obtain a precise value of the predominant period of the radial velocity variation. The shape of the radial velocity curve indicates that there may well be a superposition of several different periods present. Similar observations of other stars do not show such variations. These results qualitatively confirm the radial velocity variability reported by Smith et al. (Ap. J. (Letters), 317, L70, 1987).

25.11
Angular Standing Waves in Stellar Pulsations

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Most nonradial stellar pulsations are assumed to have an angular dependence given by the running wave spherical harmonics. Under certain assumptions, valid in the rapid oscillating Ap stars, the standing wave solutions are a better representation. We will show how the line profiles in such an oscillation change with pulsation and rotation phase. At some rotation phases, the profile variations are remarkably similar to radial pulsations, and at others, the profile does not vary at all.

25.12
Near Infrared Photometry of Cepheid Variables in NGC 6822

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CCD photometry of 11 Cepheid variables in NGC 6822 has been obtained with the CFHT 3.6 m telescope on Mauna Kea. Most of the data are in the $I$ and $V$ filters, but we have several $B$ frames and one $U$ observation. The photometry was reduced with the PSF-fitting program DAOPHOT. Although crowding was severe, the combination of the consistently good seeing ($FWHM = 0.8$ arcsec) and the high luminosity of the program stars relative to other stars in the field led to good photometry.

Because the amplitude of Cepheid variability is much less in $I$ than in the optical, it is possible to determine an accurate distance modulus from random-phase observations. Good estimates for the global reddening and for the range of internal reddening were derived from intercomparison of the $I$, $V$, and $B$ P-L diagrams and from a two-color diagram for the one region with $U$ data. We also present a CMD for this region. Based on the random-phase P-L diagram in the $I$ band, and after correcting for the measured reddening, we obtain an absolute distance modulus relative to the LMC of $4.8 ± 0.1$. Some further refinement in this value may occur as we include the final observations in the data set.

25.13
CCD Observations of the Double Cepheid CE Cas

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CE Cas a and b in NGC 7790 are separated by 2.3" and thus cannot be measured individually by conventional photometric techniques. We have observed the pair over a period of three years using CCD detectors on the McDonald Observatory 30" and 82" reflectors. The most numerous observations were in the $V$ band, although some $R$, $I$, and $I'$ measurements were also made. Magnitudes were determined using point-spread-function fitting methods (Stetson’s DAOPHOT package). The resulting light curves show a definite phase shift (particularly for CE Cas a) between our results and the 1960-63 photographic iris photometer measurements of Sandage and Tammann (ST, 1969, Ap. J. 157, 683), which led us to reevaluate the periods determined by Payne-Gaposchkin and Gaposchkin (1963, Pub. A. S. P. 75, 171) from the Harvard plate collection. The periods we derived from a least-squares fit to their tabulated data (as opposed to ones they derived from the same data) are in good agreement with those deduced from the light curve measurements. Corrected periods and epochs are:

- CE Cas a Epoch V(max) = 2415752.667 + 5.1408681E
- CE Cas b Epoch V(max) = 2413439.748 + 5.4792754E

We have fit a three-term Fourier series to our observed light curves in order to predict the combined magnitudes observed photoelectrically by ST and also by Moffett and Barnes (1984, Ap. J. Suppl. 55, 389) and find agreement to <.025 mag. Our intensity-averaged magnitudes and colors for these stars are:

- CE Cas a $V$(mean) = 10.90 (R-V)(mean) = 1.23
- CE Cas b $V$(mean) = 11.02 (R-V)(mean) = 1.16

They differ by 0.03 mag or less from the ST values usually quoted in the literature, which is within the errors.

25.14
Contemporaneous Photometry and Radial Velocities of RR Lyrae Stars

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In the recent past a number of researchers have used surface brightness methods to study distances, absolute magnitudes and radii of RR Lyrae variables (Manduca et al. 1981; Ap. J., 250, 312; Burki and Meylan 1986, Astron. Astrophys., 159, 255; Jones et al. 1987, Ap. J., 314, 605). Necessary to such studies are contemporaneous photometric and radial velocity measures of the candidate stars in order to avoid problems with poorly known or variable pulsation periods.

In this paper we present such contemporaneous $BVRI$ photometry and radial velocities for seven RR Lyrae stars, covering nearly the full span in $ΔS$ and including the $Rr$ star, $T$ Sex. Over 3000 $BVRI$ measures at 100 sec time resolution and over 400 radial velocity measures are included. The photometric uncertainties are of order 0.007 mag in $V$, (B-V) and (V-R) ±0.014 in (R-I). The radial velocity uncertainties range from ±3.8 km s$^{-1}$ to ±8.0 km s$^{-1}$, correlated with $ΔS$. Light, color and velocity curves are given. The stars included are SW And (RRa, $ΔS = 0$), DX Del (RRa, $ΔS = 2$), TT Lyn (RRa, $ΔS = 7$), V445 Oph (RRa, $ΔS = 1$), T Sex (RCr), TU UMa (RRa, $ΔS = 6$), and AA Vir (RRa, $ΔS = 2$).