highest luminosities; but the only variable stars, aside from S Doradus, that are certainly Cloud members, and have maximum apparent magnitudes 13.0 and brighter, are eighteen Cepheids and a few red irregulars. The brightest long-period variables in the field of the Large Cloud are possibly all superposed.

The following results appear of some significance in analyzing the Large Cloud:

1. The superluminous variables show no tendency to follow the highest star concentration, such as is found in the axis and the rich clusterings. Some member variables are actually more than 4° from the Cloud center.
2. If the magnitudes at maximum are used for both Cepheids and long period variables, a joining of the two period-luminosity curves is indicated, thus suggesting that some of the long-period variables may be members. The results are not inconsistent with the work of Wilson and Merrill on the long period variables of the galactic system.
3. Assuming the average color index $+1.5$ at maximum for these variables, and comparing them directly with Betelgeuse of absolute visual magnitude -3.9 and radius of two astronomical units, we obtain the remarkably great linear dimensions given in the following tabulation, which contains also the periods, various photometric

BRIGHTEST CEPHEIDS IN THE LARGE MAGELLANIC CLOUD

Star	P	Max. mag.	Range	M	R	Dist.
					a.u.	$^\circ$
HV2882*	171.482	12.3	2.8	-5.0	6.6	4.0
HV 883*	134.1	12.7	1.7	-4.6	5.5	2.2
HV2447	118.6394	12.6	1.0	-4.7	5.8	0.5
HV8039*	108.93	12.8	2.2	-4.5	5.3	4.5
HV5497*	98.86	12.3	1.3	-5.0	6.6	3.3
HV2369*	48.267	12.0	2.2	-5.3	7.7	1.6
HV 953	47.82607	12.5	1.4	-4.8	6.2	0.7
HV 900	47.52	13.0	1.5	-4.3	5.0	2.2
HV2257	39.26	12.8	2.1	-4.5	5.3	2.8
HV 909	37.585	12.9	1.3	-4.4	5.1	2.4
HV2294*	36.536	12.1	2.0	-5.2	7.2	2.4
HV 873*	34.344	12.6	2.4	-4.7	5.8	3.6
HV1002	30.43	12.0	2.4	-5.3	7.7	2.0
Innes VII*	28.3607	13.0	2.2	-4.3	5.0	3.9
HV2251	28.0	12.5	2.0	-4.8	6.2	2.8
HV 902	26.39	13.0	1.6	-4.3	5.0	2.5
Innes 53*	24.242	13.0	0.8	-4.3	5.0	3.6
HV 886*	23.958	13.0	1.6	-4.3	5.0	3.0

data, and the distances of the variables from the geometrical center of the Cloud. The first variable in the tabulation, with the period 171.82 days and range 2.8 magnitudes, may be a superposed long period variable of our galactic system. Forthcoming radial velocity measurements will clarify its membership.

4. The amplitudes of these long period Ce-

pheids are large, averaging 1.8 magnitudes. Such amplitudes are found frequently for galactic Cepheids of similar periods. The light curves and periods of the stars marked with asterisks have been derived specially for this investigation.

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Sinton, William M. On an achromatic stellar interferometer.

One of the faults of the Michelson stellar interferometer is the chromatism of the fringes. Only the central fringe is colorless; the fringes to either side are progressively more colored.

Attempts to achromatize the fringes fail because the doubling of sources by two slits is not suitable for achromatization. If, however, one uses a Lloyd mirror to produce the double source, the achromatization of the fringes is easily accomplished by the introduction of an optical element to disperse the light into a normal spectrum. Ideally a diffraction grating should be used, but practically it is necessary to use a prism. It is shown that a multiple-prism arrangement can be made to produce an approximately normal spectrum.

With the new interferometer one has an array of perhaps thirty fringes and finds for a double star a minimum of fringe visibility at some position in the array. The position-angle is determined by orientation of the interferometer so that the position of minimum visibility is nearest to one end of the array. Then the measurement of this position in the array constitutes a measurement of the separation of the double star. The limiting resolution of the interferometer is the same as for the Michelson-Anderson type with the slits at the extreme edges of the objective.

Advantages of the new instrument appear to be: (1) the fringes are achromatic. (2) There is always perfect visibility of fringes at one end of the array to which a suspected diminution of visibility can be instantly compared. This opens the possibility of measuring stars of greater difference in magnitudes. (3) Since light from the whole objective is used, the fringes can be as bright or brighter than those of the Michelson interferometer.

An experimental model was built for the 9 $\frac{1}{4}$ inch Warner and Swasey refractor at Johns Hopkins. The limiting resolution for this instrument with the interferometer is $0''.246$. Stars of 5.5 magnitude or less were measurable. Although the instrument was made in a rough form, con-

sistent measurements were made of six stars. They ranged in separation from $0''.25$ to $1''.0$, and in the difference of magnitudes of the two components from 0.2 to 2.5 magnitudes. The measures for these stars are compared to measures made with a Michelson-Anderson interferometer and with the values computed from the orbit when this is known.

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Slettebak, Arne. Rotational velocities of B8-A2 stars.

As a part of a larger program of measuring rotational velocities for the brighter early-type stars, spectrograms of B8-A2 stars brighter than the fifth magnitude are now being obtained at the Perkins Observatory. The object of this investigation is to provide a catalogue of rotational velocities and make a statistical study of axial rotation in stars of this group.

Spectrograms of over three-fourths of the 150 stars included have been obtained with the two-prism spectrograph attached to the Perkins 69-inch, giving a dispersion of 25 Å/mm at $H\gamma$.

The graphical method of Shajn and Struve,¹ in which a line contour from a non-rotating star is used to derive rotationally-broadened line profiles, is being employed. Comparison of the contour as observed in a rotating star with the set of computed contours gives a lower limit to the star's rotational velocity. In this investigation, the $\lambda 4481$ line of $MgII$ has been chosen, with Sirius as the standard non-rotating star.

At least two spectrograms of each star are being taken, and the internal consistency of the measures appears to be good. The agreement between the Perkins rotational velocities and those obtained by Elvey,² for 13 stars, is satisfactory, the Perkins results running generally somewhat higher because of the inclusion of limb darkening in the construction of the computed line profiles.

The largest rotational velocity measured to date in this group is 340 km/sec for the B8 main-sequence star α Leonis.

The shell star 14 Comae Berenices, underlying star of spectral type A5, which is presumably close to the critical rotational velocity at which material is thrown off at the star's equator, has a measured $v \sin i$ of 220 km/sec, relatively small as compared with the B-type shell stars.

A number of giants among the early A's exhibit relatively large axial rotation, among

them the standard A3 II-III star, γ Ursae Minoris, which has a measured rotational velocity of 180 km/sec.

1. *M. N.* **89**, 222, 1929.

2. *Ap. J.* **71**, 221, 1930.

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Smith, Elske V. P. and H. C. van de Hulst. Interstellar polarization by absorbing particles.

The optical theory of long, circular, slightly absorbing cylinders is applied to test the hypothesis that such particles are responsible for the observed polarization. Among the requirements imposed by the observations on any theory of the interstellar polarization are the facts that the amount of the polarization is independent of the wave length and that there is a certain correlation with the reddening. This correlation is such that the reddening is always present when polarization is observed, though the converse is not true.

The theory for cylinders is analogous to the Mie theory of scattering by spheres. The efficiency factor for extinction varies with the direction of the electric vector of the incident light. The extinction is greatest when the electric vector is parallel to the cylinder axis, and least when it is perpendicular. The ratio of the greatest to the least efficiency factor can be considered to define the amount of polarization.

In computing the efficiency factors of cylinders we sum over the coefficients of extinction which appear in the solution of the scalar wave equation. These coefficients are in turn calculated from certain phase angles. The phase angles had already been calculated previously¹ for some real refractive indices. Our problem was to calculate the efficiency factors for slightly absorbing cylinders. A representative refractive index for such particles is $m = 1.50 - 0.10i$, for which the imaginary part is small. The computations were greatly simplified by using the results for real refractive indices and calculating the changes of the phase angles with small changes in the index. A graphical method of solution was used.

Curves are given for theoretical extinction of particles with the refractive index $1.50 - 0.10i$ for the electric vector parallel and perpendicular to the cylinder axis, respectively. These curves follow an approximate $1/\lambda$ law such as that observed for the reddening. These particles could therefore produce the observed reddening. Curves were also calculated by Mr. Grootendorst and