

1954, have permitted a determination of the darkening coefficient of the eclipsing binary AR Cassiopeiae. The following table lists the results:

THE CIRCULAR ELEMENTS OF AR CASSIOPEIAE

$r_1 = 0.1677 \pm 0.0011$	$L_1 = 0.971 \pm 0.002$
$r_2 = 0.0545 \pm 0.0004$	$L_2 = 0.029 \pm 0.002$
$k = 0.325$	Limb Darkening
$i = 86^\circ 52' \pm 0^\circ 14'$	λ
$\theta' = 12.36 \pm 0.07; \theta'' = 0^\circ 03' 43''$	u
$\theta'' = 5.48 \pm 0.05; \theta''' = 0.0152$	5400 0.85 $\pm$ 0.03
$J_1/J_2 = 3.6 \pm 0.2$	4200 0.51 $\pm$ 0.04
	3500 0.58 $\pm$ 0.03

These results show unmistakably that the limb darkening of the principal component of spectral type B3 is greater in the yellow than in the blue or ultraviolet. This is in disagreement with the theory that limb darkening and opacity of stellar atmospheres are governed by electron scattering, which predicts a decrease rather than an increase. The result for $\lambda 4200$ is confirmed by a solution made in 1946 for SZ Camelopardalis, which gave an almost identical result.

The determination of u at $\lambda 3500$ is the first empirical determination of stellar limb darkening beyond the Balmer limit except for the sun.

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Jacchia, Luigi. Measurements of progressive fragmentation in meteors.

In a previous paper (Jacchia, 1955) it was shown that the anomalously large increases in the observed decelerations of fainter photographic meteors could be explained by progressive fragmentation. Meteor bodies must be regarded as being extremely fragile; many of the meteors photographed with the super-Schmidt cameras are completely disrupted into a cluster of fragments over most of the visible trajectory. This theory is supported by a wealth of secondary evidence.

The question naturally arises, whether fragmentation is present in all small-size meteors, including radio-meteors and micrometeorites, or whether there is a lower limit to the size of fragments. A "fragmentation index," based on the observed deceleration anomaly, is introduced to give a combined measure of fragmentation and rate of fragmentation for each individual meteor trajectory. This fragmentation index is nearly zero for big fireballs (in which the fragmented material at any given instant is but a small fraction of the main meteor body), increases

rapidly as we proceed to fainter meteors, reaches a maximum for meteors of visual magnitude +2, and seems to drop off before the limit of the super-Schmidt cameras is reached. Another parameter, the coefficient of the "mass equation," which varies with the amount of fragmented material present at any given instant, rises steadily proceeding from bright to faint meteors and seems to reach a broad maximum just at the super-Schmidt limit.

An obvious interpretation of these results is that the faintest meteors recorded on photographic films show a maximum of fragmentation, but that a lower-size limit for fragments is being approached, so that further sub-fragmentation becomes more difficult.

Jacchia, L. 1955, *Ap. J.* **121**, 521.

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Johnson, F. S., Malitson, H. H., Purcell, J. D. and Tousey, R. Emission lines in the solar ultraviolet spectrum.

On February 21, 1955, a series of solar ultraviolet spectra was obtained at altitudes up to 125 km in an Aerobee rocket fired at White Sands Proving Ground, New Mexico. The spectrograph was kept accurately pointed at the sun during the entire flight by means of the University of Colorado biaxial pointing control. About 30 conspicuous emission lines are present in the region 977 to 1817Å in a 30 sec exposure taken over the peak of the trajectory. The continuous spectrum extended to about 1550Å, with Fraunhofer structure visible to about 1680Å; from 1680Å to 1550Å the spectrum is very weak and it is not clear whether the features are due to emission or absorption lines.

Definite emission lines have been identified as follows:

H	1215.7*, 1025.7
HeII	1640.5
CI	(Unresolved sextuplet from 1656.3 to 1657.9, 1657.0*) (Unresolved quintuplet from 1560.3 to 1561.4)
CII	(1335.7*, 1334.5)
CIII	977.0, (Unresolved sextuplet from 1174.9 to 1176.6)
CIV	(1548.2, 1550.8)
NV	1238.8
OI	(1302.2, 1304.9, 1306.0*)
OVI	(1031.9, 1037.6)