higher chromosphere that were greater than the values predicted on these assumptions.

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Baum, W. A. The cosmological distance scale.

A series of concentric focal-plane diaphragms has been used to investigate photoelectrically the distribution of light in typical Eo galaxies in the Leo group and the Virgo cluster ($\Delta\lambda/\lambda < 0.005$) and in the Corona Borealis cluster ($\Delta\lambda/\lambda = 0.072$). In general these data show that galaxies extend far beyond the angular diameters normally assigned to them, and that their tenuous outer regions, which have not generally been included photometrically, contribute a substantial share of the total light. There seems, in fact, to be no measurable limit to these outer extremities. Since luminosity measurements for nearby galaxies have tended to be less inclusive than those for more distant galaxies, the present distance scale based on so-called total magnitudes contains a systematic error with distance.

Not only is this source of error removed, but the whole problem of defining a system of magnitudes or angular diameters which would be free of systematic distance errors can be avoided if each galaxy is represented by a curve of integrated luminosity l as a function of angular diameter d instead of by a single magnitude or single diameter. When $\log l$ is plotted against $\log d$ for each of two similar galaxies, say, of similar rank in comparable clusters, their relative displacement can be graphically resolved into $\Delta \log d$ and $\Delta \log l$, the former providing a direct measure of the relative distances. After certain corrections, the amount by which $\Delta \log l$ exceeds $2\Delta \log d$ is then a measure of effects due to recession and to apparent changes in absolute luminosity, via evolution and obscuration. Since the relationship of these quantities is the same for all cosmological models of general relativity,¹ and since recession is separately measurable, we thus have a direct hold on apparent changes in absolute luminosity. Preliminary results seem to indicate the existence of a rather large effect, which, if confirmed at distances beyond the Corona Borealis cluster, will lead to a major revision of the distance scale.

1. H. P. Robertson, private communication.

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Baum, W. A. The new photon-counting photometer for the 200-inch telescope.

A photon-counting photometer recently put into use at the prime focus of the 200-inch telescope has made it possible to extend direct photoelectric photometry of faint objects down to 23rd magnitude. Since the photometer would actually be capable of measuring objects somewhat fainter than this if their locations were known, 23rd magnitude really represents a photographic rather than a photoelectric limit; it is, in fact, the first real measure of the Hale telescope's photographic limit. Probing photoelectrically for subphotographic images will not, however, be generally practicable.

The advantage of photon-counting over conventional d.c. registration for the photometry of very faint objects is that the photon count can be totaled over a sufficiently long interval of observation, sometimes hours, to attain statistical accuracy in very small star-minus-sky differences. The counts are commutated between star and sky to make allowance for time variations in the night sky glow, and the scatter in the resulting sub-counts is found to be in good agreement with theoretical expectation based upon the random rate of arrival of photons.

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Billings, D. E., D. H. Liebenberg* and W. O. Roberts. Evolution of coronal regions.

The authors have examined the behavior of regions in the solar corona near sunspot groups, which show intense coronal line emission. The results led them to formulate the following working hypothesis of the origin of the emission line corona.

1. Yellow, red and green line emission at $\lambda\lambda$ 5694, 6374 and 5303 in a coronal region becomes pronounced with infusion into the corona of gas of density considerably higher than that of the corona prior to the infusion.
2. The infusion takes place most strongly from active sunspot centers during their periods of flare activity.
3. The gas spreads out through the corona along magnetic lines of force at about 1 km/sec, at a sufficient rate to replace the entire emission corona in the order of a few weeks.
4. As the gas spreads out, its temperature rises slowly.