The tests required will have the form: if X be any quantity measured in a distant galaxy by an observer in our galaxy, and X_0 be the measure of the same quantity in our galaxy, then

$$X = f\left(X_0, \frac{\delta\lambda}{\lambda_0}\right),$$

where $\delta\lambda/\lambda_0$ is the red shift for the centre of the distant galaxy, and the form of the function f is derived from special relativity. In order to make the test of more than theoretical interest, X must be an observable quantity. If the above equation is not satisfied for the various X 's chosen, then the red shift is probably not a velocity effect, and another interpretation of it will have to be found.

For the first test we put X = time interval. As an observable measure of time intervals we can use the frequency of occurrence of novae, supernovae, etc. Let T, T_0 be the times for n such events to occur. Then

$$\frac{T}{T_0} = \frac{\lambda_0 + \delta\lambda}{\lambda_0}.$$

For the second and third tests we put X = a combination of time interval and luminosity. Thus for the second test we use the period and magnitude of a Cepheid variable, or rather, the period-luminosity curve for Cepheids. The red shift reduces the magnitudes $m = m_0 + 5 \log [(\lambda_0 + \delta\lambda)/\lambda_0]$ and increases the periods as given by test I. Plotting magnitudes as ordinates and periods as abscissae, the above remarks show that the red shift will displace and expand the period-luminosity curve to the right, and displace it in the direction of fainter magnitudes.

For the third test we employ the rate of decline of the light curve of a supernova of Type I. Such a light curve is closely linear from about 100 days after maximum. Special relativity gives the relation

$$\frac{dm}{dt} = \frac{1}{1 + \frac{\delta\lambda}{\lambda_0}} \frac{dm_0}{dt_0},$$

where dm/dt is the rate of decline, for example in magnitudes per day.

The above tests can be treated by general relativity. The first test remains unchanged, as does the time-interval part of tests II and III. For the luminosity, which is the other variable in these two tests, the transformation formula has been derived by Hubble and Tolman for use in a different test.

A weakness of the two tests proposed by

Hubble and Tolman, as well as the first test of this paper, is that the tests would only be valid in a stationary universe, where the average space density of galaxies, their structure, etc., would not change with time. The second and third tests proposed here are not restricted in this way, and would be equally valid in a non-stationary universe.

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Miller, Freeman D. Schmidt objective-prism spectroscopy at moderately high dispersion.

Two 24-inch objective prisms were included in the list of auxiliary equipment planned for the Curtis Schmidt telescope at the Portage Lake Observatory. The experience of others has demonstrated the value of a single prism working at a dispersion of about 250 Å/mm at $H\gamma$: one of the two prisms of the Curtis telescope has a 4° refracting angle, and provides this dispersion.

In writing the specifications for the second prism, consideration was given to the predominantly astrophysical interests of this observatory. The 4° prism is suitable for many investigations of a statistical nature; if it were to be combined with a prism of higher dispersion, it was felt that the Curtis Schmidt would find numerous applications in the spectroscopy of individual, moderately faint stars; and in investigations of a statistical character, involving stars somewhat too faint to be conveniently observed in large numbers with slit spectrographs.

The second prism has a refracting angle of 6° , and, used singly, a dispersion of 180 Å/mm at $H\gamma$. The two prisms in combination give a dispersion of 110 Å/mm at $H\gamma$, intermediate between the two lowest dispersions available with the existing slit spectrographs of the University of Michigan 37-inch reflector.

The performance of the two-prism combination has been examined with respect to quality of spectra and limiting magnitude. In making this evaluation, the principle was adopted that the images should be of a density comparable to that considered desirable in slit spectroscopy. Still fainter spectra may occasionally be useful, but, for such stars it is generally more satisfactory to make use of a single prism.

Inasmuch as this two-prism combination is substantially more powerful than any currently in use with Schmidt telescopes of comparable aperture, a summary of the performance evaluation may be of general interest. The theoretical resolving power is 2.6×10^4 . If it be assumed