stars. Fifteen exposures were compared with a given exposure which was made near a maximum of the combined light. A mean displacement of 0".152 to the south was found for a group of eight exposures taken about midway between maximum and minimum, although no definite displacement was shown by other exposures made near maximum. The shifting of the image southward after maximum shows the north star to be variable. The measured shift of 0".152 in a period less than the interval from maximum to minimum shows the distance between the stars to be somewhat greater than that amount. Both of these conclusions are in agreement with results obtained by Van Biesbroeck from direct observations.

PARALLAXES OF STARS IN THE REGION OF B. D. +31°643.

By C. H. GINGRICH.

From a series of plates taken by van Maanen with the 60-inch reflector, the parallaxes and proper motions of twenty stars with reference to six or seven among them which appear not to be related to the nebula, which surrounds this star, were determined. Five of these have a color-index from 0.74 to 0.95 in excess of normal and seem to be involved in the nebula. The mean of the parallaxes of these five stars is 0".0095 ± 0".006. This is therefore taken to be the parallax of the nebula, equivalent to a distance of 350 light years from the sun.

A FIFTY-FOOT INTERFEROMETER TELESCOPE.

By GEORGE E. HALE.

The mechanical and optical problems presented by a 50-foot interferometer are not difficult of solution, but in order to keep the expense within moderate limits, a simple design, involving but little large-scale machine work, is essential. The instrument, the details of which have been worked out by Pease and Nichols, embodies the optical features used by Michelson for the 20-foot interferometer in a mounting of apparently the simplest possible type.

The plane mirrors are carried on a light skeleton girder of structural steel, to be riveted together on Mount Wilson. This girder is 54 feet long and 10 feet deep in the center, tapering toward the ends. Its cross-section at the center is 4½ feet, tapering to a width of 2½ feet at a point 18 feet from the center, and maintaining this width to the extremity of the girder. On the upper surface of the girder, which is approximately straight, the rails which carry the sliding mirrors, carefully planed in sections 12 feet in length (the limit of our planer bed), are supported by leveling screws, which permit them to be accurately aligned. The outer 45° plane mirrors, 15 inches in diameter, are
mounted on carriages moved simultaneously toward or away from
the center of the girder by long screws driven from a single motor.
Their separation may thus range from 7 to 50 feet. To permit stars
of any declination to be reached, the 45° mirrors can be rotated
simultaneously, by synchronous motors, about the axis joining their
centers. The inner 45° plane mirrors, also 15 inches in diameter, fixed
in position 26 inches apart on opposite sides of the center of the girder,
are provided with fine adjustments, and one of them can be moved
slightly for compensation of path. The light received from the outer
mirrors is reflected to a paraboloidal mirror, of 36 inches aperture
and about 15 feet in focal length, mounted within the girder, at its
base. Since the axis of the mirror is normal to that of the girder, the
rays are reflected back between the fixed 45° mirrors to a diagonal
plane mirror, which sends them to an eye-piece (directly toward the
pole) conveniently placed for the observer. The latter sits on a plat-
form attached to the girder on the north.

The girder is carried by a strong polar axis, consisting of a short
steel forging mounted on standard roller bearings, supported on a
massive pier of concrete. The center of the axis passes through the
center of gravity of the girder, which thus remains in balance in all
positions. The end thrust is carried partly by the bearings of the
polar axis, and partly by two auxiliary rollers moving on curved rails
on the north face of the pier, opposite the 36-inch mirror. A worm-
gear sector of 10 feet radius, bolted to the girder, is driven by a worm
connected with a driving clock at the base of the pier on the north.
The range of motion is 1½ hours on each side of the meridian.

Optically the instrument is similar to the 20-foot interferometer, ex-
cept that a 36-inch mirror replaces the central zone of the 100-inch,
while provision is made for motion in declination by the simple exped-
ient of rotating the outer 45° mirrors. Comparison fringes will also
be arranged for, and the wedge for compensating differences in path
will be like that of the 20-foot interferometer. The new instrument
will be covered by a house with double walls of steel, about 60 feet
long, 18 feet wide, and 20 feet high. The lower walls, to a height of
8 feet, will be fixed in position but the upper section of the house may
be rolled back, leaving the interferometer fully exposed for observa-
tions from declination —30° to the Pole.

With this instrument, which is now under construction, it should be
possible to check the results obtained with the 20-foot interferometer
by simultaneous observations, and to measure the diameters of about
thirty stars brighter than the fourth magnitude.