with the twenty-four-inch telescope at Arequipa, Peru, 70 per cent are globular, 17 per cent are of the spiral family. Fifteen are diffuse nebulae, while 246 show an elongation but could not be called spindles. Two annulars and several new planetaries complete the list.

The number of globular nebulae shows a marked increase with faintness, while of the spindles the reverse is the case. On some of the plates a definite tendency of small nebulae to cluster about the larger spirals was shown. The mean density of nebulae for the southern galactic hemisphere is probably less than the northern.

An examination of plates of the large Magellanic Cloud by Dr. Shapley and the author revealed that seven of the objects described as nebulae in the N. G. C. were actually globular clusters. Five of these objects are close together on the north side of the cloud and are without doubt associated with it. The mean diameters of these gives us a basis for computing the distance of the group.

The known relation between parallax and angular size gives the parallax for the clusters and therefore for the cloud of 0".000029, corresponding to a distance of 35,000 parsecs or 110,000 light years. This makes the linear diameter of the cloud 4,500 parsecs or 15,000 light years. At this distance it shows that there are, in the greater Magellanic Cloud, a number of stars with an absolute magnitude greater than —5.

INTERFEROMETER MEASURES OF STAR DIAMETERS.

BY A. A. MICHELSON AND F. G. PEASE.

During the past year measures have been made with the 20-foot interferometer with two ideas in mind, first to record for a star the highest visibility at 19-feet and second to calibrate the beam by making measures with all sorts of mirror separations and during all grades of seeing, using for the purpose early type stars having small hypothetical angular diameters. The measures for α Orionis and α Scorpii remain as before. The readings of α Orionis are slightly smaller than before but this is to be attributed to poorer seeing. The visibility-curves of α Tauri, α Bootis and β Pegasi are very much the same and intercept the axis at about 22 feet. The seeing factor, at present uncertain, will probably increase this value to nearer 25 feet. γ Andromedae shows indications that the fringes will vanish between 30 and 40 feet and α Arietis between 40 and 50 feet. The following stars have shown high visibilities at the end of the beam: α Canis Majoris, α Canis Minoris, α Cygni, α Geminorum, α Ophiuchi, α Andromedae, α Pegasi, α Cassiopeiae, β Leonis, γ Orionis, γ Cassiopeiae and ϵ Cygni. Finally α Aquilae, α Leonis and α Virginis have at times shown fringes of full visibility and therefore an estimation of their diameter cannot be made with this beam. For months the readings of α Lyrae fell below those of α Aquilae and it was therefore thought to be much larger in diameter. It was later found however that the average seeing was better on α Aquilae, and on several occasions high visibility was obtained for α Lyrae. A number of stars fainter than magnitude 2.8 were observed but measurements could not be made with any certainty.

For calibrating the beam mention was made in last year's report of the Mt. Wilson Observatory of an auxiliary interferometer having one variable aperture which was to serve two purposes, one the matching of the interferometer fringes for visibility and the other the measurement of the seeing by the disappearance of the fringes. It was found easy to match the interferometer fringes with the zero fringes during good seeing, but during bad seeing the two sets varied independently of one another, changing as much as 50 per cent in a few seconds. After much practice however the visibility scale is learned and on nights of unsteady seeing, the eye method of estimating visibilities is used. It has also been decided to try out an artificial star image and see if it can be applied in this case. During good seeing the readings for the vanishing of the zero fringes remain quite constant through the night and the measure of the seeing thus obtained is quite reliable. On nights of poor seeing, however, readings of the visibilities of the 20-foot interferometer fringes and the vanishing of the zero fringes are not directly applicable, and an endeavor is made to judge the seeing from the appearance of the 20-foot images themselves with regard to sharpness, diffraction rings, etc.

The scale of interferometer seeing does not follow that of ordinary seeing. Ordinary seeing is a question of amplitude. Interferometer seeing is only a question of phase. Hard sharp images buffeted wildly about will give excellent readings with the interferometer whenever the two pencils overlap but will give large images on a photographic plate. Large diffuse images, however, yield poor results in both cases An important contribution on the question of ordinary seeing has been answered by the 20-foot interferometer. There is no practical change in the general appearance of the diffraction images given by pencils from 8 feet to 20 feet apart. The size of the central disks is about 20 per cent greater than the disks from pencils 45 inches apart and they are softer in appearance, but part of this is due to the two additional reflections from mirrors not accurately figured. The excursion of the image from the mean center over this range of 8 to 20 feet is practically the same on a night of uniform seeing.