

On the average intrinsic lustre of 225 Helium Stars within about 1000 Light-years of the Sun, and on *Herschel's* Problem of the Construction of the Heavens. By *T. J. J. See*.

In a paper entitled »Determination of the Depth of the Milky Way«, published in the Proc. of the American Phil. Soc., Philadelphia, March 1912, I have shown by half a dozen independent but mutually confirmatory lines of argument that the most distant stars of the Milky Way are removed from us by several million light-years, and thus verified the remarkable prediction made by Sir *William Herschel* in 1800 (Phil. Trans., 1800, p. 83-4) and 1802 (Phil. Trans., 1802, p. 498).

The 225 Helium Stars there discussed, on the basis of distance determinations made at Lick Observatory by the *Campbell-Boss* method, are shown to be at an average distance of about 540 light-years, and thus it may be safely assumed that all these stars are within about 1000 light-years of our Sun. The average magnitude of these stars is found to be $4^m.14$, and if we raise them to first magnitude by dividing the distance by $\Delta = \sqrt{(2.512)^n}$, where $n = 3.14$, we get 127.2 light-years as the average distance at which this group of Helium Stars would have to be situated to appear of the first magnitude. This result is independent of any hypothesis, except that the intensity of light varies inversely as the square of the distance.

Now we can derive some additional information of value from this investigation. In the case of the nearest fixed star, α Centauri, the magnitudes of the two components are 0.3 and 1.7, the average being exactly 1.0. The distance is 4.35 light-years, and the star is of the Solar type. Thus the average first magnitude Helium Star at 127.2 light-years would be 29 times remoter than α Centauri, and intrinsically 821 times brighter than the average of the two components.

Accordingly it appears from this examination that on the average the Helium Stars are nearly a thousand times more luminous than the mean of the members of α Centauri, the components of which have an average magnitude of 1.0: and as α Centauri is also of the Solar type, the 225 Helium

Stars are shown to outshine the typical 1st magnitude Solar Stars in the ratio of 821 to 1. In other words the average Helium Star has a light-producing power equal to a cluster of 410 doubles, each as brilliant as α Centauri.

This is why the Helium Stars may be seen at 29 times the distance of the corresponding Solar Stars, and why in the remoter regions of the Galaxy the stars are nearly all white stars of the Helium type. As the Milky Way is observed to be made up chiefly of small white stars, which are faint from distance alone, we have an impressive verification of *Herschel's* reasoning that the Universe is immensely extended in the plane of this Starry Stratum, but of relatively small thickness.

During the survey of the Southern heavens for the discovery of new double stars, made at the Lowell Observatory 1896-98, I had occasion to examine several hundred thousand stars, from 4th to 11th magnitude, and constantly remarked with surprise on the yellow and reddish aspect of the Stars in the regions remotest from the Milky Way, and on the increasing whiteness of the Stars as that stratum is approached. Exact statistical data on this law of relative decrease of the yellow and reddish stars towards the plane of the Milky Way do not seem to be available; but as the tendency was found to be so pronounced as to have awakened my attention in the survey for double stars, it is a problem of much promise for the future. With modern data I believe it would be a much better method for attacking the problem of the Construction of the Heavens than *Herschel's* method of gauging, and it may therefore prove exceedingly useful to astronomers. At great distances the Solar Stars tend to disappear from the faintness of their light, and thus we see the cause of the whiteness of the millions of small stars along the course traversed by the clustering stream of the Milky Way.

Mare Island, California, 1912 May 29.

T. J. J. See.

Veränderungen der Jupiteroberfläche.

Angesichts der diesjährigen ungünstigen Stellung Jupiters dürfte es Interesse bieten, was hierorts am 16-Zöller, meist auf 30 und 24 cm abgeblendet, gesehen worden ist. Mit einer Aufnahme vom 16. Februar wurden nach der Opposition zusammen 36 Zeichnungen gemacht, die die Form der Hauptvorgänge im SEB erkennen lassen, wo hauptsächlich um die große Bucht herum eine Art Stauungen vorkam. In der STRZ wurde 14mal eine lange ausgedehnte Trübung (Fleck) notiert. Außer dem lebendigen STB war ein SSTB und SAB nebst der Polarkalotte zu sehen.

Der dünne und blasse NEB wurde vom 29. August an dunkler, zeigte am 31. August besondere Ansätze und vom 19. September an steigende Neigung zum Abdunkeln und

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Verbreitern. Mitte Oktober hat Jupiter wieder zwei fast gleiche Äquatorbänder. Der im Sommer stark dominierende NAB, vielleicht mit dem NNTB verschwommen, bläste im August schon ab und ist im Oktober unscheinbar, ein NNAB trat nur selten hervor; dann folgte die Kalotte.

Da das 16" Medial absolut achromatisch ist und sogar das atmosphärische Spektrum tiefstehender Gestirne auszulösen gestattet, so waren erfolgreiche Oberflächenstudien bis zum 14. Oktober möglich, worauf Regen eintrat. Färbungen traten nur auf der S-Hälfte des Planeten auf, wo man die Region des SEB und STB mit einem »rost-gelbroten« bis »gelbbraunlichen« Tone übergossen fand, der manchmal, wie am 14. Oktober, sogar die EZ mit beeinflusste.

Ph. Fauth.

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