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## Photographic magnitudes of stars brighter than $7_m.75$ between $+75^\circ$ and $+80^\circ$ declination (Errata: 11 270)

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## PHOTOGRAPHIC MAGNITUDES OF STARS BRIGHTER THAN $7^m.75$ BETWEEN $+75^\circ$ AND $+80^\circ$ DECLINATION,

BY J. J. M. A. DE KORT

A photometric catalogue has been prepared for the stars specified in the heading; in addition a number of stars of the same brightness north of  $+80^\circ$  have been observed. The catalogue depends largely on the *Mount Wilson Polar Catalogue* with regard to zero point, but is independent as regards scale. Its colour conception nearly coincides with that of the international photographic system. Use was made of the coarse objective grating method, the instrument being a double Zeiss 4-inch camera with moving plate holders. The plates were measured in a Schilt thermopile microphotometer.

In the fourth section of this contribution, "Synopsis of Subsequent Reductions", a survey is given of how the galvanometer readings were reduced to the final magnitudes. These are given in Table 6 and are compared in the last section with three other catalogues. The present scale is about 5% narrower than each of those. The smallness of the differences with HASSENSTEIN's catalogue is noteworthy.

### 1. *The Programme.*

The present work gives the photographic magnitudes of stars between  $+75^\circ$  and  $+80^\circ$  declination, down to  $7^m.75$  magnitude. It is a continuation of a list of photographic magnitudes given by the late Dr A. DE SITTER, who investigated the region within  $10^\circ$  of the North Pole (IX)<sup>1)</sup>. Afterwards DE SITTER supplemented it by a list of photovisual magnitudes for the same region of the sky, extending down to  $8^m.0$  (XI).

In the course of the work I also observed a number of stars north of  $+80^\circ$ .

Though it is unnecessary to emphasize the desirability of accurate magnitudes for the bright stars, their determination in most parts of the sky actually falls below the better photographic standards.

There are in fact special difficulties connected with the photometry of bright stars.

Photometric measurements in astronomy are nearly always relative, i.e. they consist in comparing one star with another. Now with increasing brightness the stars become fewer and fewer and the comparison has to span larger and larger distances. For instance in DE SITTER's zone a circular region occurs of  $5^\circ$  diameter, which contains only three stars of his photographic programme.

With larger distances the differences in atmospheric extinction increase; similarly, in the case of photographic observations, the qualities of the star images are more diverse and the sensitivity of the photographic layer is subject to larger fluctuations.

In the near future, no doubt, the photoelectric method will prove superior for photometric catalogue

work too, but as long as we confine our attention to photographic magnitudes, it seems that these difficulties are best overcome by the use of a moving plate holder behind a short-focus lens.

With the moving plate holder—SCHWARZSCHILD's "Schraffierkassette" (II)—the irregularities that affect the photographic layer within the extent of a star image are to a certain degree smoothed out. The plate, then, need not be taken much out of focus, which would make the defects of the objective more apparent. Even these defects of the star images tend to be compensated. Compared with an out-of-focus exposure a plate taken with a moving plate holder camera consequently warrants the use of a larger field. Over this field the observational errors, as exhibited by measurements in a microphotometer, will show a more or less smooth pattern, which can be described in a numerical or graphical form by a field correction.

The lenses of the double camera which was used by me have a focal length of 51 cm. A shorter focus would perhaps have met the needs even better. The objectives are quadruplets of the Zeiss astrotessar type, which is designed for giving a large field. Full aperture has been used.

The zero point of my list had to be taken from other sources. For that purpose I used the *Mount Wilson Polar Catalogue* (XVII). I have not even attempted to arrange my observations into one self-consistent system with regard to zero point, but continually I had recourse to SEARES' system along the whole northern border of my region. Thus right-ascension errors in magnitude, if they occur in the *Mount Wilson Polar Catalogue*, will reflect upon my results. On the other hand I am confident that the declination errors will be small and that my system will be self-consistent with

<sup>1)</sup> Roman numerals refer to the list of references at the end of this publication.