# BRIGHTNESS DISTRIBUTION IN THE COMA OF COMET HALLEY (1982i)

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**Abstract.** Photographic photometry on a photograph of Comet Halley taken on March 15, 1986, through a Schott GG 385 filter on Kodak 103a-O plate has been carried out. The average magnitude per square mm of the coma at various distances from the nucleus have been estimated. The total integrated magnitude within two arc minutes of the nucleus has been estimated to be 5.5 magnitude.

## 1. Introduction

Comet Halley has been photographed with the 104-cm reflector of the Uttar Pradesh State Observatory, Naini Tal on several nights for positional measurement. Photographic photometry of the coma has been carried out on one of the plates taken for this purpose on March 15, 1986.

## 2. Observations

The comet was photographed with an exposure duration of 5 minutes at the Cassegrain focus ($f/13$) of the 104-cm reflector on Kodak 103a-0 plate through Schott GG 385 filter. A similar exposure of the same duration was also taken of the cluster NGC 2422 on another plate from the same box. The stars were kept out of focus in this plate to obtain extended images of the cluster stars. Both the comet and the cluster exposure were taken at nearly the same zenith distance. Both the plates were developed simultaneously under recommended conditions.

## 3. Reduction

A few stars on the cluster plate were identified and their B magnitudes were derived from the known $V$, $B - V$ and reddening values of the cluster stars. The transmission through an area of $1 \times .02$ mm$^2$ of the stellar image was recorded with the help of a microphotometer. The transmission through the stellar image above the fog level of the plate was converted into photographic density. A calibration curve (Figure 1) was drawn between the photographic density and the $B$ magnitudes of the calibration stars per unit measure (0.02 mm$^2$). The error of the magnitudes determined from this curve comes out to be less than $0^m.25$. The mean area of the out-focus stellar images on the calibration plate comes out to be 0.9274 mm$^2$, from which to

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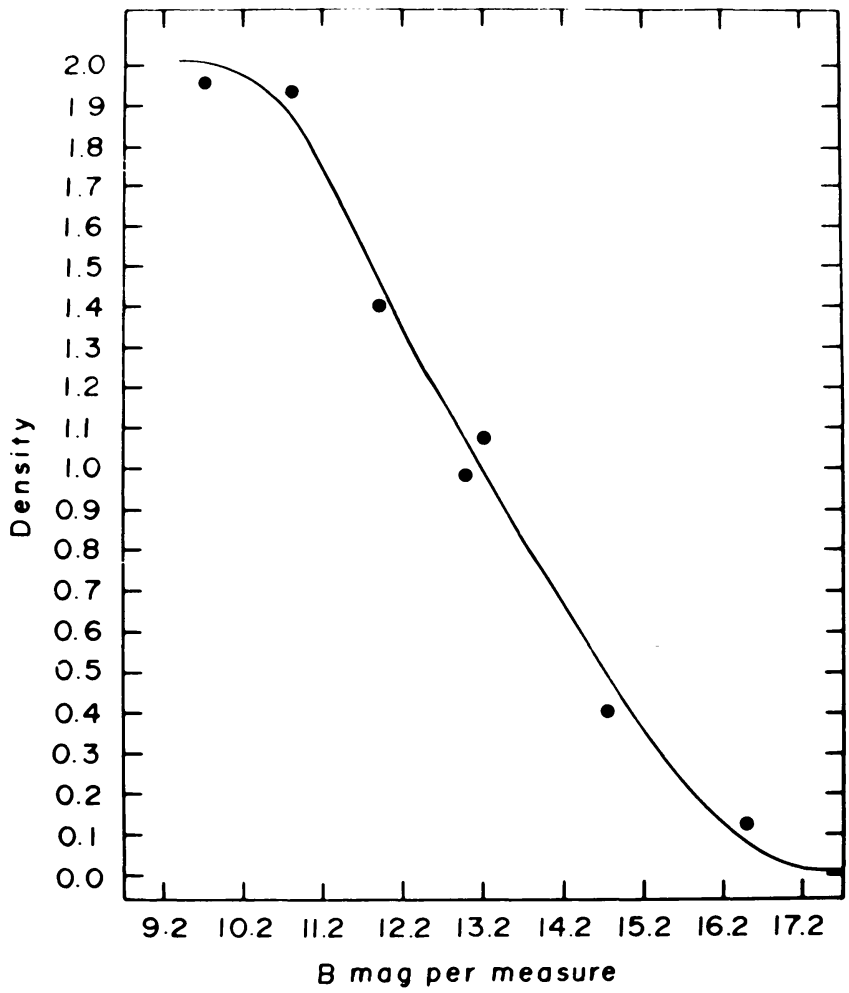


Fig. 1. Calibration curve plotted between the photographic density and B magnitudes per measure of the cluster stars.

determine the magnitude per measure (0.02 mm$^2$) a correction of + 4.16 mag applied to the given B magnitudes of the stars.

The comet photograph was scanned over an area of 20 × 20 mm through the same slit opening area as used above. The tracings have been read at intervals of 1 mm. The transmission above the fog level were converted to photographic densities, corresponding to which magnitude per measure were determined through the above calibration curve. Assuming that the intensity between one measure to another is constant, we have determined the magnitudes per mm$^2$ of the image. This step needed a correction of − 0.08 magnitude to the magnitudes given by the calibration curve.

The magnitude per mm$^2$ thus obtained were integrated over areas having radii of 30, 45, 60, 75, 90, and 120 arc sec. We have excluded the nuclear image in the first integration namely 30 arc sec. Table I shows these results. The integrated total magnitude for the night of observation has been given to be + 4.5 in the IHW manual (Edberg, 1983). We have obtained the integrated magnitude equal to 5.5 over

TABLE I

Total and average magnitudes within various radii in the coma of Comet Halley

| Coma radius arc sec | Total mag. | $I/I_0 \times 10^{-4}$ | Average mag. mm$^{-2}$ | Average $I/I_0$ per mm$^2 \times 10^{-5}$ |
|---|---|---|---|---|
| 30[a] | 7.5 | 10.299 | 10.22 | 8.196 |
| 30 to 45 | 7.9 | 6.986 | 10.88 | 4.447 |
| 45 to 60 | 7.8 | 7.570 | 11.16 | 3.442 |
| 60 to 75 | 7.7 | 8.464 | 11.31 | 2.993 |
| 75 to 90 | 7.7 | 8.447 | 11.53 | 2.444 |
| 90 to 120 | 6.7 | 20.055 | 11.61 | 2.280 |

Integrated total magnitude within an area having radius 2 arc minute = 5.52.

[a] Nuclear region is excluded in this integration.

an area having a radius of 2 arc min. The magnitude derived by us is restricted to the blue region only.

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## References

Edberg, J.: 1983, *JPL Publication* 83-16, Part II, 2–11