

vast numbers of emitting Ca II atoms whose motions are distributed at random and numerically exceed the velocities of rotation and of the orbital revolution of the stellar components.

¹ *Ap. J.*, **79**, 409, 1934.

² *Contr. Dom. Ap. Obs.*, Victoria, No. 17, 1949.

³ *Ap. J.*, **86**, 570, 1939.

⁴ *Ap. J.*, **105**, 212, 1947.

FLARE-UP OF KRÜGER 60 B

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Krüger 60 A,B ($22^{\text{h}} 24^{\text{m}} 5$, $+57^{\circ} 12'$, 1900) is a binary¹ with a period of 44.52 years and semi-axis major of $2''362$; the parallax is $+0''.256 \pm ''004$. The components have visual magnitudes of 9.9 and 11.4, and spectra of class dM4 and dM4.5e, respectively.^{2,3} The visual absolute magnitudes are 11.9 and 13.4, the masses $0.26 \odot$ and $0.14 \odot$.⁴ Since 1931, this star has been photographed at the Sproul Observatory in each year except 1936. The series of 162 plates, with a total of 532 exposures, covers the interval 1931 November 8–1950 October 26. The aggregate exposure time is approximately 17.5 hours. The exposure times range from eleven minutes to twenty seconds, the average being approximately two minutes.

Among the large number of exposures there is one, and only one, on which the faint component equals the other one in brightness; normally it is 1.5 magnitudes fainter. On 1939 July 26 Armstrong Thomas took four plates, each with four exposures of $2\frac{1}{4}$ minutes' duration. Eastman I-G emulsion and Wratten filter K2 were used. The plates are of good quality, both as to seeing and freedom from guiding error. On the last exposure of the third plate, at $2^{\text{h}} 12^{\text{m}}$ EST, the fainter and the brighter components are of equal brightness; the preceding exposure on this plate, taken three minutes earlier, shows no abnormality (Plate VII). On the four exposures of the fourth plate the faint component appears slightly brighter than normal, appreciably so on the first exposure, at $2^{\text{h}} 16^{\text{m}}$ EST.

The measured positions of the two components on the abnormal exposure give the distance $3''.4$ and position angle 159° ; for the three normal exposures the corresponding values are $3''.0$ and 158° . Huffer's ephemeris gives $3''.0$ and 156° .¹ The deviation in distance for the abnormal exposure must to some extent be caused by the Kostinsky attraction which effects close and dense double star images.^{5,6}

We cannot find a more reasonable explanation for the abnormally bright image of the fainter component than that it was photographed coincident with a flare-up, resulting in a fourfold increase in luminosity. Krüger 60 B would therefore be another (the sixth) flare star in our neighborhood. Thus far it is the only flare star for which the mass is known.

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¹ *A.J.*, **40**, 183, 1930.

² *Ap. J.*, **95**, 201, 1942.

³ *Ap. J.*, **105**, 96, 1947.

⁴ *A.J.*, **47**, 1, 1938.

⁵ Monograph, Eastman Kodak Company, No. 5, 1924.

⁶ *Photographic Measures of Close Double Stars*, Utrecht, 1931.

MEASUREMENTS OF POLARIZATION IN NEBULAE

THORNTON PAGE

Yerkes and McDonald Observatories

The possibility that scattering of nuclear starlight might account for the visual continuum in spectra of the planetary nebulae¹ suggested a search for polarization in these objects. The photoelectric photometer constructed by Hiltner² was used at the Cassegrain focus of the McDonald 82-inch telescope for this purpose in observations of NGC 1535, 2392, 3242, 6210, 6543, and IC 3568 during February and March, 1950.

In the first series of observations various parts of each nebula, usually parts of the bright ring N, S, E, and W of the nucleus, were selected by means of the circular diaphragms provided on the photometer, and readings were taken for various position angles of a polaroid filter located in the light beam ahead of the