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1969 TO 2010: MULTICOLOR PHOTOMETRIC OBSERVATIONS OF POPULATION II FIELD HORIZONTAL-BRANCH STARS

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RESUMEN

De 1969 a 2010 he estado involucrado en estudios fotométricos de estrellas de campo de la rama horizontal de población II. Empecé realizando observaciones en los cuatro colores de Strömgren en el Observatorio Nacional de Kitt Peak y posteriormente en el Observatorio Inter-Americano de Cerro Tololo. He tomado placas espectrales de todas mis áreas selectas en las que he marcado todas las estrellas de tipo A. Estas estrellas fueron posteriormente observadas fotométricamente. Se lograron identificar nuevas estrellas FHB por sus altos indices c causados por los elevados valores de sus colores $(u-b)$. Más tarde se añadieron cuatro nuevos filtros (U, V, B, S). En colaboración con Richard Boyle del Observatorio Vaticano hemos observado en Mt. Graham (Arizona) en el Telescopio Vaticano de Tecnología Avanzada. Actualmente estamos haciendo observaciones adicionales de las nuevas estrellas FHB encontradas.

ABSTRACT

From 1969 to 2010 I have been involved in a photometric study of Population II Field Horizontal-Branch Stars and published several papers on this topic in BOTT from 1967 thru 1972. I started by making Strömgren four-color observations at Kitt Peak National Observatory and then at Cerro Tololo Inter-American Observatory. I had taken spectral plates of all my selected areas on which I marked all the A-type stars. These stars were then observed photometrically. New FHB stars could be identified by their large c indices, caused by their greater $(u-b)$ colors. Later four new filters were added (U, V, B, S). With Richard Boyle of the Vatican Observatory we observed on Mt. Graham (Arizona) on the Vatican Advanced Technology Telescope. We are making follow-up observations of the new FHB stars found.

Key Words: stars: horizontal-branch — subdwarfs — white dwarfs

While I was a graduate student at the Case Institute of Technology I had access to the Case Schmidt telescope. During these years, when you were assigned observing time it was up to you set the program. In 1959 Slettebak & Stock (1959) published the paper "A Finding List of Stars of Spectral Type F2 and Earlier in a North Galactic Pole Region". Six hundred and one F, A and B stars were listed, giving right ascension, declination, photographic magnitude and spectral type in a region from right ascension (1950) 12 hr 56 min to 10 hr 30 min and declinatio +50 to +25 degrees. The North Galactic Pole is located in one corner of this region. Among the spectral types found were horizontal-branch stars, A and F subdwarf groups. For stars without BD identifications finding charts, 53 minutes of arc on a side are presented. This list provides the identification of the rare early-type stars at high galactic latitudes. A number of astronomers have made follow-up observations of these stars including me (Philip 1973).

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At the Case Institute of Technology my thesis advisor was Sidney McCuskey who knew Guillermo Haro of Tonantzintla well. They arranged that I could observe on the Tonantzintla Schmidt telescope. So for many years I went to Tonantzintla one or two times a year, taking direct and spectral plates.

The majority of stars that I observed had $c(u-b)$ indices of about 1.1. But there were some stars with values of 1.2 or greater. The brightest stars of this group were observed with the satellite observatory, International Ultraviolet Explorer. The group had a velocity dispersion of 108 km s^{-1}, definitely putting it in the Population II class. Their uv spectra were more intense at short wavelengths and showed mainly the Balmer series of hydrogen lines.

HD 161817 is one of my most observed stars. For over 20 years my observations showed no variation in magnitude or color. Thus I was surprised to see a report from La Silla that the star had varied in magnitude. I contacted Dr. Golay and got the particulars of the observations involved. HD 161817 is a northern hemisphere star and thus when observed from La Silla starts with a fairly large airmass. The observations in question were taken at a high airmass. I concluded that the difference reported in magnitude was the result of incorrect airmass corrections. Papers presenting finding lists of stars A 7 or earlier are published in issues of the Boletin de los Observatorios de Tonantzintla y Tacubaya, BOTT. The issues which contained these papers are listed below:

(a) BOTT 29, November 1967 1 HLF 4
(b) BOTT 30, October 1968 SGP
(c) BOTT 35, November 1970 4 HLF 4
(d) BOTT 35, November 1970 3 HLF 4
(e) BOTT 36, June 1971 1 HLF 3
(f) BOTT 38, December 1972 VI, a strip of 434 square degrees

A number of papers presenting finding lists of A-Type stars in selected areas at high galactic latitude have been published. Among these are Philip (1967), 1 HLF 4; Philip & Sanduleak (1968), South Galactic Pole; Philip & Drilling (1970), 4 HLF 4; Drilling & Philip (1970), 3 HLF 4; Philip & Relyea (1971), 1 HLF 3; Philip & Stock (1972), A Finding List of Stars A 7 and Earlier; Philip (1973), Photometry of Early-Type Stars; and Philip (1984), Finding Charts for FHB Stars.

These observations are continuing at the present time. With Richard Boyle of the Vatican Dbservatory we are going once or twice a year o the Vatican Advanced Technology Telescope on Mt. Graham to make CCD observations of open and globular clusters in an eight color photometric system. We have set the open cluster M 67 as our standard cluster so we can calibrate our observations of other regions by observing it on each run.

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