Spectrophotometric Standards - II

ING Technical Note 65 gave information on 59 Spectrophotometric Standards. A further list, including fainter standards, is presented here. Positions accurate to 1 arcsecond are given for all stars in the list. All the positions are given to equinox J2000.0. Where proper motions are known, positions are given for epoch J2000.0; otherwise the epoch is that of the Palomar Observatory Sky Survey (POSS) plate on which the position was measured. A plot of flux distribution and an identification chart are given for each standard.

Introduction: This Technical Note has been compiled primarily for observers requiring a quick-reference list of stars which can be used for flux calibration purposes. The flux data are obtained from Massey (1988) and Oke (1990). The data from Massey cover the range 3200 to 8100 Å at intervals of 50 Å, and that from Oke 3200 to 9200 Å, with the range 3200 to 4700 given in 1 Å intervals and 4700 to 9200 at 2 Å. Apart from the newly derived positions, all the data given are gathered from other sources and the original references should be consulted for detailed information regarding instruments used, observational techniques and estimates of precision.

Contents: Summary data for all the stars in the list are gathered in the Table. In addition to the star name the table contains: accurate equatorial coordinates and proper motions; an indication of visual magnitude; a spectral type and the local `ING Name` by which the star is known to the La Palma computers at the Isaac Newton Group of telescopes. The main body of the Technical Note consists of data sheets for the standards, set out in order of right ascension with one star per page. Each page is identified, in the top right-hand corner, by the `ING Name` of the standard star. There is also a finding chart produced using the Digitized Sky Survey from the Space Telescope Science Institute, and a plot of the flux distribution. If a standard has been observed by both Massey and Oke, plots using both sources of data are given.

Star names: The names of most relevance to observers visiting La Palma will be those by which the stars are known to the control computers of the various telescopes. The names are constructed using the letters `SP` (to indicate that they refer to spectrophotometric standards) together with a designation (based on its B1950 position) following the IAU convention for the naming of astronomical sources. Using this name at the WHT, or in a control file, ensures that the telescope will set directly on the correct position at the date of the observation, without the observer having to be concerned with the proper motion or precession. On the INT the positions are held in the catalogue SPECPHOT, together with the positions from TN 65.

Positions: As stated in TN 65, since modern telescopes have the capability of setting very accurately, accurate positions should be provided to make efficient use of telescope time. Any star in this list which did not have a measured position accurate to 1 arcsec was re-measured from the POSS copy plates using either a PDS or a Coradograph measuring machine. Each standard was referred to 8–10 nearby PPM reference stars. The star positions held in the system catalogues on the control computers will be edited when improved positions appear for any of the stars, so will not necessarily agree exactly with those in this note.

Proper motions: All proper motion catalogues available were searched for relevant entries. Some of the standards appear in lists published by Giclas in various Lowell Observatory Bulletins, or the proper motion catalogues of Luyten, published by the University of Minnesota. Their proper motions have been adopted here except where given in the Carlsberg Meridian Catalogues (CMC).

Magnitudes and spectral types: The magnitudes and spectral types given in the table are all taken from the papers in which the relevant spectrophotometry appear. The magnitude given is intended to give an approximate 'visual' magnitude for identification and planning purposes. The magnitude for stars from the Massey (1988) publication are m_{5556}, and those from OKE are m_{5460}. The spectral types are intended to give a broad idea of the overall light distribution, so that a suitable object can be selected for the required purpose.

Charts: The identification charts were made using the Digitized Sky Survey from the Space Telescope Science Institute. Each chart is centred on the J2000.0 position of the standard. If a star has a large proper motion, and the epoch of the chart is not close to 2000.0, then the star appears off-centre. The epochs of the charts vary between 1949 and 1985 and each one is labelled. For any star with a known proper motion the chart is accompanied by a simple line drawing showing the magnitude and direction of fifty years' proper motion to the same scale as the chart.

Flux distributions: The spectrophotometry of the standards has been taken from the sources indicated in the notes to the Table. The plots of flux distribution were made using data from the original publications, or in the case of the Oke data, from files available on the Starlink STADAT computer at RAL. These files are in the directory:

Directory STADAT::SPECTRAL_ATLASROOT:[OKE]

AAAREADME.OKE;5	BDP254655.TAB;2	BDP254655A.TAB;2	BDP284211.TAB;2
BDP284211A.TAB;2	BDP332642.TAB;2	BDP332642A.TAB;2	BDP75325.TAB;2
BDP75325A.TAB;2	FEIGE110.TAB;2	FEIGE110A.TAB;2	FEIGE34.TAB;2
FEIGE34A.TAB;2	FEIGE66.TAB;2	FEIGE66A.TAB;2	FEIGE67.TAB;2
FEIGE67A.TAB;2	G138M31.TAB;2	G138M31A.TAB;2	G158M100.TAB;2
G158M100A.TAB;2	G191B2B.TAB;2	G191B2BA.TAB;2	G193M74.TAB;2
G193M74A.TAB;2	G24M9.TAB;2	G24M9A.TAB;2	G60M54.TAB;2
G60M54A.TAB;2	GD108.TAB;2	GD108A.TAB;2	GD248.TAB;2
GD248A.TAB;2	GD50.TAB;2	GD50A.TAB;2	GRWP705824.TAB;2
GRWP705824A.TAB;2	HD93521.TAB;2	HD93521A.TAB;2	HZ21.TAB;2
HZ21A.TAB;2	HZ4.TAB;2	HZ44.TAB;2	HZ44A.TAB;2
HZ4A.TAB;2	LTT9491.TAB;2	LTT9491A.TAB;2	NGC7293.TAB;4
NGC7293A.TAB;4	SA95M42.TAB;2	SA95M42A.TAB;2	

I have typed in the Massey data from the publication. The files are held together with the Oke standards in the anonymous FTP account ftp.ast.cam.ac.uk, in subdirectory pub/fluxstds. They are also available from the RGO www page, in the LPINFO Calibration section. WWW Address http://www.ast.cam.ac.uk/~jes/index.html, replace ~ by %7E if no ~ key is available. If anyone has any trouble accessing them, I could email the flux values for any of the standards in this note.

jes@ast.cam.ac.uk

References

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Luyten, W.J., 1944. *Pub. Univ. Obs. Minnesota* **III** No. 4.

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