2.12: Summary of Photometric Quantities

With this chapter we have completed the description of the basic photometric quantities used in planetary photometry (although we have yet to embrace *magnitude*). These are summarised in Table III, in which those names in the first column correspond to those in *standard usage*, the exception being flux density **F**. The third and fourth columns correspond to standard symbols and units. In the second column may be found some names commonly, and not so commonly, used in astronomical literature.

Table III. Photometric Quantities

Name	Synonyms	Symbol	SI Units
Radiant Flux	Radiant Power	P, Φ	W
Radiant Flux Density	Collimated Intensity	**F**	$W \cdot m^{-2}$
Irradiance	Insolation	E	$W \cdot m^{-2}$
Exitance	Emittance	M	$W \cdot m^{-2}$
Radiance	Surface Brightness Specific Intensity Intensity	L	$W \cdot m^{-2}\ sr^{-1}$
Intensity	Integrated Brightness	I	$W \cdot sr^{-1}$

The author has seen the term “collimated intensity” used by only one author (Hapke) when referring to a plane parallel beam, and he finds it a more meaningful term than “flux density”, so much so that in standard usage the term “collimated radiance” would make a splendid alternative.

The symbols have been used in their most general sense, without any subscripting or other embellishments so that *e.g.* L could mean L_λ, the radiance in the wavelength interval $[\lambda, \lambda + d\lambda]$, or L_V, the “visual radiance” in the Johnson V-band or indeed it could mean the radiance integrated over all wavelengths, the “bolometric radiance”.

Reference Notes.

Much of the content of this chapter is an adaptation from, and an extension to, the *Theory of Planetary Photometry* by

1. Lester. P. L., McCall, M. L. & Tatum, J. B., 1979, *J. Roy. Astron. Soc. Can.*, **73**, 233.

Further definitions, and interesting insights into the photometric quantities and standard usage may be found in the above reference, as well as in

2. astrowww.phys.uvic.ca/~tatum/ *Stellar Atmospheres, Chap. 1*.

Sections 9 and 10 are based on an article by the author

3. Fairbairn, M. B., 2004, *J. Roy. Astron. Soc. Can.*, **98**, 149

in which a numerical example may be found in the appendix.