Standard photometric systems

Standard U, B, V, R, I and long wavelength systems

Filter band	λ_0[a] (μm)	$\Delta\lambda_0$ (FWHM) (μm)	Absolute spectral irradiance for mag = 0.0: $f_\lambda(0)$ (erg cm^{-2} s^{-1} Å^{-1})	$f_\nu(0)$ (W m^{-2} Hz^{-1})
U	0.365	0.068	4.27×10^{-9}	1.90×10^{-23}
B	0.44	0.098	6.61×10^{-9}	$4.27(4.64)$[b] $\times 10^{-23}$
V	0.55	0.089	3.64×10^{-9}	3.67×10^{-23}
R	0.70	0.22	1.74×10^{-9}	2.84×10^{-23}
I	0.90	0.24	8.32×10^{-10}	2.25×10^{-23}
J	1.25	0.3	3.18×10^{-10}	1.65×10^{-23}
H	1.65	0.4	1.18×10^{-10}	1.07×10^{-23}
K	2.2	0.6	4.17×10^{-11}	6.73×10^{-24}
L	3.6	1.2	6.23×10^{-12}	2.69×10^{-24}
M	4.8	0.8	2.07×10^{-12}	1.58×10^{-24}
N	10.2		1.23×10^{-13}	4.26×10^{-25}

[a] $\lambda_0 = \int \lambda S(\lambda)\,d\lambda / \int S(\lambda)\,d\lambda$, where $S(\lambda)$ is the photometer response function.
[b] From S. Kleinmann.
U, B, R, I, N values from Allen, C. W., *Astrophysical Quantities*. The Athlone Press (1973). *V, J, H, K, L, M* values from Wamsteker, W., *Astron. Astrophys.*, **97**, 329 (1981).

The spectral irradiance for a star of a given magnitude is given either by:

$$\log f_\lambda(m_x) = -0.4m_x + \log f_\lambda(0),$$

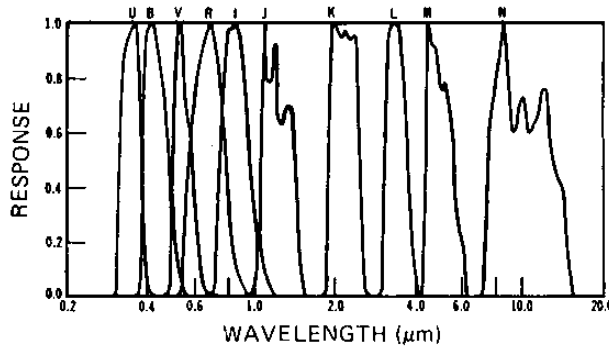
where $f_\lambda(m_x)$ is the spectral irradiance in erg cm^{-2} s^{-1} Å^{-1} of a star of magnitude (m_x) in the x filter band at the mean wavelength $\lambda_0(x)$, or

$$\log f_\nu(m_x) = -0.4m_x + \log f_\nu(0),$$

where $f_\nu(m_x)$ is the spectral irradiance in W m^{-2} Hz^{-1}.

The relationships above are for the irradiance at the top of the Earth's atmosphere and are valid for *B* through *M* stars.

Photometer response curves for UBVRI and long wavelength systems. (Adapted from Webbink, R. F. & Jeffers, W. Q., *Space Sci. Rev.*, **10**, 191 1969.)



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