Dust, extinction and reddening

When light from a star passes through dust, it suffers extinction which is different in different wavelengths, and stronger at blue wavelengths

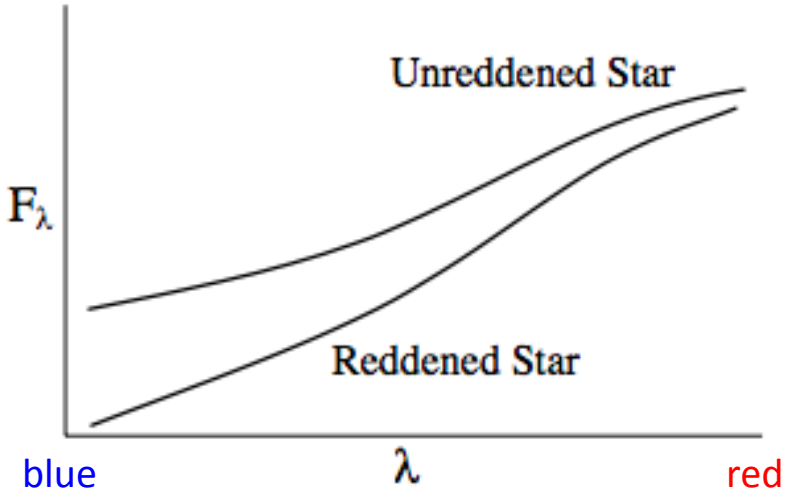

Figure IV-1: Effect of extinction on a stellar spectrum. Extinction is both a total diminution of the stellar light, and is wavelength-selective, in the sense that bluer wavelengths are more extinguished than red wavelengths.

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We use the terms A_B, A_V, A_g and A_r to describe the amount of extinction in the B,V ,g and r passbands respectively

- We use the term E(B-V) (the reddening):

$E(B-V) = A_B - A_V$

- We also use the subscript 0 to show when a magnitude or color has been de-reddened

  So $(B-V)_0 = B-V - E(B-V)$

  $V_0 = V - A_V$

An important resource for reddening for field stars is Schlegel, Finkbeiner and Davis (1998)

They give estimates of E(B-V) for all over the sky and also (in the Appendix) have a table which gives formulae to convert E(B-V) to many other photometric systems

TABLE 6

RELATIVE EXTINCTION FOR SELECTED BANDPASSES

Filter	λ_{eff} (Å)	$A/A(V)$	$A/E(B-V)$	Filter	λ_{eff} Å	$A/A(V)$	$A/E(B-V)$
Landolt U	3372	1.664	5.434	Strömgren u	3502	1.602	5.231
Landolt B	4404	1.321	4.315	Strömgren b	4676	1.240	4.049
Landolt V	5428	1.015	3.315	Stromgren v	4127	1.394	4.552
Landolt R	6509	0.819	2.673	Strömgren β	4861	1.182	3.858
Landolt I	8090	0.594	1.940	Strömgren y	5479	1.004	3.277
CTIO U	3683	1.521	4.968	Sloan u'	3546	1.579	5.155
CTIO B.....	4393	1.324	4.325	Sloan g'	4925	1.161	3.793
CTIO V	5519	0.992	3.240	Sloan r'	6335	0.843	2.751
CTIO R.....	6602	0.807	2.634	Sloan i'	7799	0.639	2.086
CTIO I	8046	0.601	1.962	Sloan z'	9294	0.453	1.479
UKIRT J	12660	0.276	0.902	WFPC2 F300W.....	3047	1.791	5.849
UKIRT H	16732	0.176	0.576	WFPC2 F450W.....	4711	1.229	4.015
UKIRT K	22152	0.112	0.367	WFPC2 F555W.....	5498	0.996	3.252
UKIRT L'	38079	0.047	0.153	WFPC2 F606W.....	6042	0.885	2.889
Gunn g	5244	1.065	3.476	WFPC2 F702W.....	7068	0.746	2.435
Gunn r	6707	0.793	2.590	WFPC2 F814W.....	8066	0.597	1.948
Gunn i	7985	0.610	1.991	DSS-II g	4814	1.197	3.907
Gunn z	9055	0.472	1.540	DSS-II r	6571	0.811	2.649
Spinrad R_S.....	6993	0.755	2.467	DSS-II i	8183	0.580	1.893
APM b_J	4690	1.236	4.035				

NOTE.—Magnitudes of extinction evaluated in different passbands using the $R_V = 3.1$ extinction laws of Cardelli et al. 1989 and O'Donnell 1994. The final column normalizes the extinction to photoelectric measurements of $E(B-V)$.

From Schlegel et al 1998

For ugriz use Sloan u' etc; Landolt UBVRI is the most common UVBRI system

JHK passbands: near infrared
orange line is atmospheric transmission