Estimating interstellar extinction toward to elliptical galaxies and star clusters (# 2188)

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I. Models for interstellar extinction in the Galaxy

The models were proposed by Amôres & Lépine (2005) and are available in IDL and Fortran at:

http://www.astro.iag.usp.br/~amores

Assumption that the dust are well mixed with the gas and the extinction is proportional to the hydrogen colunar density. The radial gas distribution HI and H2 used in the models is given by the expression below:

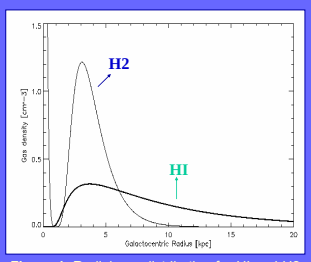

Figure 1. Radial gas distribution for HI and H2 used in the models.

$$n_{H,H_2} = c \exp\left[-\frac{r}{a} - \left(\frac{b}{r}\right)^2\right] \quad cm^{-3} \qquad (1)$$

	a (kpc)	b (kpc)	c (cm^{-3})
HI	7.00	1.5	0.70
H_2	1.20	3.50	57.55

Table 1. Parameters used in the expression 1.

II. Main differences between the models

✓ **Model A (Axisimetric):**

i–) Galaxy with azimutal symmetry; ii–) Extinction grows linearly with the distance.

✓ **Model S (Spiral)**

i–) HI and H2 distributed in the spiral arms; ii–) agreement with the longitudinal profile (HI and CO) and the longitude-velocity diagrams for HI and HII regions (Amôres, 2005); iii–) extinction grows by steps.

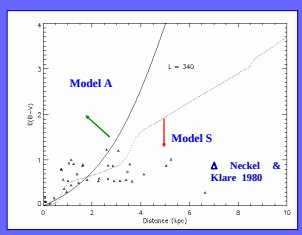

Figure 2. Extinction versus distance for (l,b) = (340.0,0.0) predicted by the models in comparison with the stars of Neckel Klare 1980 catalog.

III. Comparison of the Model A with a sample of elliptical galaxies

We used the catalog with 402 elliptical galaxies compiled by Burstein (2003) which contains the E(B-V) determined by Burstein & Heiles (1978,1982, BH) and Schlegel et al. (1998, SFD) methods. The figure 3 presents the comparisons of the Model A using two zero point definitions: (BH:SFD-0.016) and (SFD:BH+0.019), respectively. The Table 2 shows the rms values obtained in these comparisons.

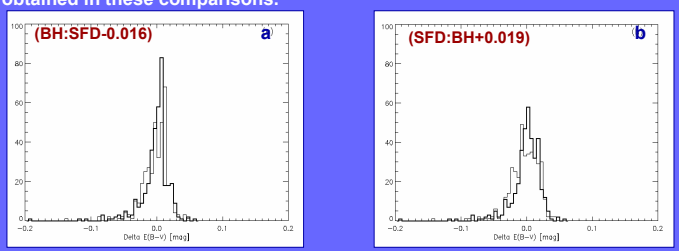

Figure 3. Comparison between model A and BH and SFD, for gE galaxies, with two zero points: a-) (BH,SFD-0.016); b-) (SFD,BH+0.019); the thick line represents the comparison against the SFD data and thin line the comparison against the BH data.

	BH		SFD	
Zero point	Total	3σ limited	Total	3σ limited
BH:SFD-0.016	0.0200 (0.84)	0.0169 (0.88)	0.0233 (0.79)	0.0177 (0.86)
SFD:BH+0.019:	0.0216 (0.84)	0.0187 (0.87)	0.0238 (0.79)	0.0184 (0.86)

Table 2. Rms differences of model A2 with BH and SFD, for gE galaxies, for the two definitions of zero points. The values between brackets represents the correlation coefficient.

We also separated the galaxies in two groups, as proposed by B03: i-) galaxies with E(B-V) ≤ 0.100 mag (the low reddening galaxies); ii-) the galaxies with E(B-V) > 0.100 mag.

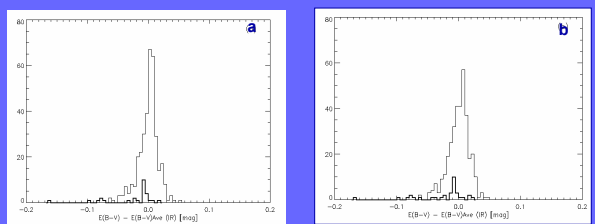

Figure 4. δE(B-V): extinction calculated by the model A minus averaged E(B-V),for gE galaxies, with two zero points; a-)(BH,SFD-0.016); b-)(SFD,BH+0.019). Thin line: galaxies with E(B-V) ≤ 0.100 mag and thick line: galaxies with E(B-V) > 0.100 mag.

IV. Global comparison of the Model A

We also elaborate a map (Figure 5) of the δ E(B-V) of the difference between the Model A and the SFD method for each 0.25° for both longitude and latitude.

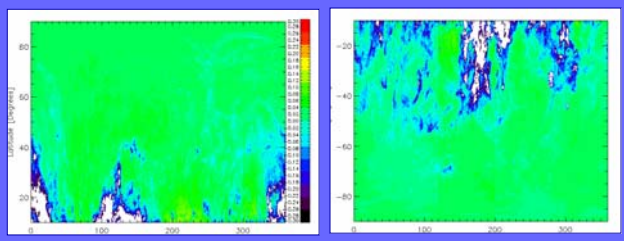

Figure 5. δ E(B-V) map.

V. Comparison with star clusters

We used the Dutra & Bica (2000) catalog for open and globular clusters and calculated the E(B-V) for the distance of each cluster given in the catalog and also the 'integrated extinction (obtained from SFD data). For the globular clusters, using model A the total rms of δE(B-V) is 0.323. With the model S, the rms difference is 0.302. The Person's correlation coefficient was 0.82 and 0.84, respectively.

a-) Globular clusters

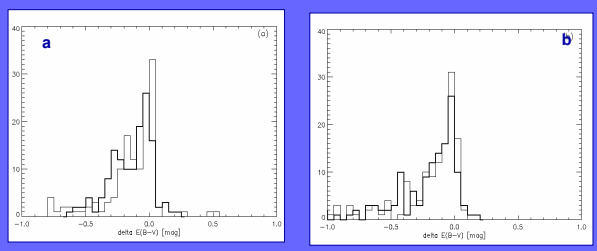

Figure 6 shows the histogram of δE(B-V) for models A and S for globular clusters, with E(B-V) computed up to the distance of the cluster in (a), and the total integrated E(B-V) along the line-of-sight in (b).

b-) Open clusters

Using model A for the open clusters of the DB00 catalog, and integration up to the distance of the clusters, the rms of the E(B-V) differences is 0.231; with model S, it is 0.241. The correlation coefficients are 0.72 and 0.70 , respectively.

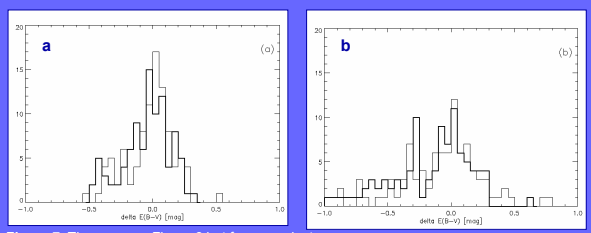

Figure 7. The same as Figure 6 but for open clusters.

VI. References

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