INTERSTELLAR POLARIZATION IN THE SMALL MAGELLANIC CLOUD

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ABSTRACT. Data of our on-going program on the interstellar polarization in the Small Magellanic Cloud (SMC) seem to show a correlation between the UV extinction and the parameters of the Serkowski law which describe the polarization. Fits of popular interstellar dust models to the polarization data are not always satisfactory, being better for stars with small wavelength of maximum polarization, λ_{max} .

Introduction

Studies of dust in the SMC, mostly based on extinction data, show in the infrared and visible no strong differences to the galactic law and indicate an $R = A_V/E(B-V)$ = 2.7 ± 0.2(Bouchet *et al*, 1985), slightly smaller than the galactic value. The UV extinction is generally characterized by the absence of the 2175Å bump and shows an extremely steep FUV rise (Prévot *et al*, 1984). However, one object, AzV456, possesses an extinction similar to the typical galactic law and also its gas-to-dust ratio is typical of the Milky Way(Lequeux *et al*, 1984). Our aim is to use optical polarization in order to further constrain grain models.

Results

Magalhães *et al* (1989) have presented the first wavelength dependent polarization data for the SMC. From that sample, we consider here only the stars whose polarization is large compared to the foreground (galactic) polarization correction. They are AzV211, AzV215, AzV221, AzV398 and AzV456.

Fits to the Serkowski law show that these stars can be divided in two groups. AzV211, AzV221 and AzV398 show maximum polarization at wavelengths bluer than the galactic average, while AzV215 and AzV456 possess λ_{max} in the V filter (Table 1). Also, the growth of K (i.e, the progressive narrowing of the curve) with λ_{max} seems to be faster in the SMC than in the Galaxy. AzV456 presents, as mentioned, a Galactic extinction law while AzV398 shows a 'typical' SMC law.

Preliminary IUE results for AzV211 (Magalhães *et al*, 1991) indicate that it does not show the bump as well. Therefore, it seems that the distinct SMC extinctions are related to distinct polarization curves as well.

Conclusion

The SMC polarization data show typically small λ_{max} values. The absence (or presence) of the 2175Å extinction bump in the SMC may be correlated with smaller (or larger) λ_{max} values found in our polarization data. It would also seem that the dust models able to reproduce the Galactic interstellar polarization may face difficulties in reproducing some of the polarization curve in the SMC.

Table 1: Fitted Parameters of the Serkowski Law

Star	$\lambda_{max}(\mu)$	K	$P_{max}(\%)$	UV bump
211	0.37 ± 0.22	0.48 ± 0.67	0.956 ± 0.089	no
215	0.537 ± 0.047	2.5 ± 1.9	0.706 ± 0.071	
221	0.42 ± 0.12	1.2 ± 1.3	0.892 ± 0.073	
398	0.459 ± 0.039	1.26 ± 0.55	1.870 ± 0.067	no
456	0.572 ± 0.017	2.06 ± 0.53	1.189 ± 0.051	yes

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