Fitting extinction and polarization spectra of the diffuse ISM

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We present a model for the diffuse interstellar dust that explains the observed wavelength-dependence of extinction and linear polarisation of light. The model is set-up with a small number of parameters. It consists of a mixture of amorphous carbon and silicate grains with sizes from the molecular domain of 0.5nm up to about 500nm. Dust grains with radii larger than 6nm are spheroids. In the presence of a magnetic field, spheroids may be partly aligned and polarise light. We find that the spectra help to determine the upper particle radius of the otherwise rather unconstrained dust size distribution. Stochastically heated small grains of graphite, silicates and polycyclic aromatic hydrocarbons (PAHs) are included. For each dust component its relative weight is specified, so that absolute element abundances are not direct input parameters.

The dust model (2014A&A...561A..82S) is confronted against new FORS polarization spectra taken within the ongoing Large Interstellar Polarization Survey at the VLT. At present for 9 of these sight lines UV extinction properties are known from IUE. The polarization and extinction curves are fit simultaneously by the model. This allows deriving typical parameters of the dust in the diffuse ISM. We find that prolate rather than oblate grains gives a better fit to the observed spectra; the axial ratio of the spheroids is typically two and aligned silicates are the dominant contributor to the polarisation.