populations and not starburst galaxies. This results agrees with local rich clusters which display a lack of galaxies undergoing starburst. Preliminary work seems to indicate that distant blue-populated clusters display an enhancement in the number radio galaxies compared to current epoch rich clusters.

6.17
The Intrinsic Magnetic Field Structure of the Interacting Galaxy Pair V Zw 191

A. Minter (NRAO)

Total intensity and linear polarization maps of V Zw 191 (UGC 01651, 4C 35.03) at 1360, 1427.5, 1507.5 and 1638 MHz using the VLA are presented. V Zw 191 consists of a pair of interacting elliptical galaxies. The radio continuum emission is found to be ~6% polarized at 1360 MHz. Maps of the rotation measure and intrinsic magnetic field of V Zw 191 reveal complex structure in both maps. The average observed rotation measure of ~65 radm$^{-2}$ is found to be consistent with the observed rotation measures of other nearby extragalactic sources. Large variations of up to 30 radm$^{-2}$ are seen however. The intrinsic magnetic field of V Zw 191 is partially comprised of two distinct areas where the magnetic field lines form closed loops.

Session 7: Gas and Dust in the ISM
Display Session, 9:20am-6:30pm
96/06/10, Great Hall

7.01
A Computerized Visual Interstellar Extinction Model: Preliminary Results

B.J. Stidham, J.M. Myers, R.L. Stepanek, J. Hakkila (Mankato State Univ.)

The local distribution of visually-absorbing interstellar material has been studied over the years by many authors, yet few attempts have been made to synthesize and directly compare results of these studies. This has been in part due to the different presentation styles employed: many results have been presented graphically, analytically, or as contour plots. Few of these have been presented in the form of computer code. Modern computing techniques allow many of these obstacle to be overcome. We present here preliminary results of a FORTRAN computer program (Hakkila et al. 1996, submitted; to be made available electronically) for calculating visual interstellar extinction and its error given inputs of Galactic longitude, Galactic latitude, and distance. The code represents a synthesis of a number of published studies, and can be used both for making corrections to individual observations and to statistical samples.

7.02
A New Measurement of the FUV Extinction Curve at High Latitude

T.P. Sassen, M. Hurwitz, W.V. Dixon, S. Bowyer (CEA/SSL, UCB)

We have used far-ultraviolet spectra of several early-type stars to measure the FUV extinction curve in the wavelength region 900—1200 Å. The spectra were obtained with the Berkeley EUV/FUV spectrometer during the ORFEUS-1 mission in 1993. From a sample of 21 stars at high Galactic latitude, we have selected pairs of stars with unambiguous spectral type and different reddening to measure the differential FUV extinction between the two stars. We remove the effects of molecular hydrogen in order to determine the extinction by dust. We then interpret the dust extinction curve using standard grain-size and composition model, and compare our results with earlier findings. This work is supported by NASA grant NAG5-696.

7.03
Grain Destruction and Depletions in the Interstellar Medium


We combine the recent calculations of grain destruction rates in shocks of Jones et al. (199x) with previous studies of grain destruction (Draine & Salpeter, 1979) and calculate the grain destruction timescales in a multiphase interstellar medium. These timescales are used to address the problem of grain evolution and depletions in the interstellar medium.

7.04
Correlation between Hydrogen-alpha and 100-micron Emissions

P.R. McCullough (Univ. of Illinois)

Observations of diffuse Hα emission in a ~12 degree field at Galactic latitude ~65 degrees show a correlation with infrared cirrus previously observed by IRAS. Anisotropy of the Hα surface brightness is typically 0.2 Rayleighs (i.e. emission measure ~0.5 cm$^{-2}$pc) on angular scales of 0.1-1.0 degrees. Significantly for further observations of this type, sensitivity appears to be limited by confusion of real structures in the ISM, rather than by telluric sky brightness. The Hα emission associated with infrared cirrus likely is due to a combination of emission from gas at high latitude and emission from Galactic H II regions that has been backscattered by dust at high latitude. Observations of this type may provide a means to distinguish between Galactic foreground and cosmic background for both the free-free emission and the thermal dust emission associated with the warm ionized medium of the Milky Way.

7.05
Hyperfine Induced Transitions as Diagnostics of Low Density Plasmas and Isotopic Abundance Ratios

T. Brage (CSC and NASA/GSFC), P. G. Judge (HAO, NCAR), A. Abousaid, M. R. Goddefroid (ULB, Brussels, Belgium), P. Jönsson (Lund U., Sweden), D. S. Leckrone (NASA/GSFC)

We propose a new diagnostics of isotopic abundance ratios and electron densities for low density plasmas, in the form of $J'=0\rightarrow J'=0$ radiative transitions. These are usually viewed as being allowed only through two-photon decay, but they may also be induced by the hyperfine (HPF) interaction in atomic ions. This predicts a companion line to the $E1$ and $M2$ lines in the UV0.01 multiplet of ions isoelectronic to beryllium (e.g. C III, N IV, O V and Fe XXII) or magnesium (e.g. Si II, Ca IX, Fe XV and Ni XVII). As an example the companion line to the well known λ1906.7,1908.7 lines in C III will be at 1909.57 Å, but only present in the $^{12}$C isotope (which has nuclear spin different from zero).

We present new and accurate decay rates for the $nnp^0P^0_{2S} \rightarrow n^2S_{1/2}$ transitions in ions of the Be ($n=2$) and Mg ($n=3$) isoelectronic sequences. We show that the HPF induced decay rates for the $J = 0 \rightarrow J = 0$ transitions are many orders of magnitude larger than those for the competing two-photon processes and, when present, are typically one or two orders of magnitude smaller than the decay rates of the magnetic quadrupole ($J = 2 \rightarrow J = 0$) transitions for these ions.

We show that several of these HPF-induced transitions are of potential astrophysical interest, in ions of C, N, Na, Mg, Al, Si, K, Cr, Fe and Ni. We highlight those cases that may be of particular diagnostic value for determining isotopic abundance ratios and/or electron densities from UV or EUV emission line data. We present our atomic data in the form of scaling laws so that, given the isotopic nuclear spin and magnetic moment, a simple expression yields estimates for HPF induced decay rates. We examine some UV solar and nebular data in the light of these new results and suggest possible cases for future study. We could not find evidence for the existence of HPF induced lines in the spectra we examined, but we demonstrate that existing data have come close to providing interesting upper limits. For the planetary nebula SMC N2 we derive an upper limit of $^{13}$C/$^{12}$C of 0.1 from GHRS data obtained by Clegg. It is likely that more stringent limits could be obtained with newer data with higher sensitivities in a variety of objects.