Our studies in the optical band showed that the cloud is surrounded by a MF which is well aligned with the projected small axis of the cloud. Our H-band data show in general the same tendency in the inner parts of the MDC. The comparison between the V and H bands allow us to conclude that the same type of grains are polarizing the light throughout the cloud at least up to Av $\sim$ 8-9, and that these are the same as those in the general ISM. Utilizing the dispersion of the polarization vectors, we estimated the MF intensity (0.02-0.16 mG) across the cloud. We compared the magnetic and gravitational energies and concluded that Musca is a subcritical cloud. From the structure function of the polarization at the H band, we obtain 0.21-0.29 pc for the range of correlation lengths of the MF in the cloud, comparable to the size of the optical condensations.

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THE EXTINCTION ON THE SOUTHERN GALACTIC DISK AS SEEN FROM THE VVV SURVEY: A RAYLEIGH-JEANS EXTINCTION MAP

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We report on the development of an extinction map for the Southern Galactic disk based on the combination of Near-Infrared (NIR) observations of the ESO public survey VISTA Variables in the Milky Way (VVV), complemented with GLIMPSE and 2MASS data. The 520 deg^2 observed by VVV in 5 near infrared bands (J, H, K_s, Y, Z), and multiple epochs, are a wealth of information which are important to address fundamental questions about the structure and formation history of the Milky Way. The region surveyed by this work, the 152 VVV tiles/fields of the Southern Galactic disk, overlaps with the 2MASS and GLIMPSE surveys, and thus allows the sources surveyed to have multiband photometry ranging from the near to mid-infrared wavelengths. Our results, using the Rayleigh-Jeans Color Excess method (RJCE), have allowed us to obtain an extinction map with a pixel size of 1'×1', which is consistent with other maps developed recently. Furthermore, our results show a systematic underestimation of extinction by previous work based on 2MASS NIR data alone.

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THE DISCREPANT KINEMATICS OF RECOMBINATION AND COLLISIONALLY EXCITED LINES IN NGC 7009 AS A FUNCTION OF IONIZATION STRUCTURE

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We have analyzed the kinematics of emission of the planetary nebula NGC 7009 from long slit spectroscopy from the UVES spectrograph at the VLT of ESO. In particular we are interested in comparing lines excited by recombination and collisions with electrons to determine whether similarities or differences could be useful in elucidating the well-known abundance discrepancy derived from them.We construct position–velocity maps for recombination, fluorescence, charge transfer, and collisionally excited lines.We find a plasma component emitting in the C II, N II, O II, and Ne II recombination lines whose kinematics are discrepant: they are incompatible with the ionization structure derived from all other evidence and the kinematics derived from all of these lines are unexpectedly very similar. We found direct evidence for a recombination contribution to [N II] λ5755. Once taken into account, the electron temperatures from [N II], [O III], and [Ne III] agree at a given position and velocity. The electron densities derived from [O II] and [Ar IV] are consistent with direct imaging and the distribution of hydrogen emission. The kinematics of the C II, N II, O II, and Ne II lines does not coincide with the kinematics of the [O III] and [Ne III] forbidden emission, indicating that there is an additional plasma component to the recombination emission that arises from a different volume from that giving rise to the forbidden emission from the parent ions within NGC 7009. Thus, the chemical abundances derived from either type of line are correct only for the plasma component from which they arise. Apart from [N II] λ5755, we find no anomaly with the forbidden lines usually used to determine chemical abundances in ionized nebulae, so the abundances derived from them should be reliable for the medium from which they arise.

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