IONIZATION OF THE GALACTIC CENTER ARCHED FILAMENTS

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The remarkable filament system seen in radio observations in the vicinity of the galactic center includes two thin filaments which arch away from the galactic plane (E.G. Yusef-Zadem et al 1984). The brightest part of each of these thermal structures is located at GO.10+0.02 and GO.07+0.04. Morris and Yusef-Zadem (1989) reason that photoionization by OB stars is unlikely on geometrical and morphological grounds. They suggest a magnetohydrodynamic mechanism to account for the radio emission and ionization. Erickson et al. (1968) were able to explain most of their observations of the far infrared (FIR) fine structure line emission from these locations in terms of a photoionization model.

Here we expand on the ionization mechanism of Morris and Yusef-Zadem, which is based on a retrograde high velocity (~100km/s). Cloud encountering the strong ambient poloidal magnetic field. Any charged particles go into helical motion with velocities of ~0 - 200 km/s relative to the neutral material in the cloud. Collisional ionization produces more ions by the critical ionization velocity phenomenon (E.G. Fornisano et al. 1982). The average energy of proton collisions is ~52 eV.

Through plasma waves, there is a collisionless transfer of part of the kinetic energy of the cloud, involving the magnetic field, to the electrons. At the densities prevalent, the distribution of newly produced ions is isotropic along the gyro orbits and the enrgy transfer efficiency is expected to be near the lower limit (Galeev et al., 1986), yielding an average velocity of the free electrons of a few eV. Assuming a Maxwellian distribution, definite predictions can be made of the collisional ionization equilibrium. At the densities involved, this should be independent of density and only depend on electron temperature, T_e.

Measurements of the electron density, N_e, from [OIII] 52/88 μm at peaks of the radio emission indicate a value $\approx 300\ \mathrm{cm}^{-3}$ (Erickson et al., 1988). Under this scenario, it is reasonable to assume that this N_e applies for all species that coexist in the same space. The intensities of various IR and radio lines will then depend on T_e and, of course, an assumed elemental abundance set. Predictions of a set of these line intensities have been made. By comparing with observed FIR line flux ratios (Erickson et al, 1988) it is apparent that only a narrow range in $T_e \lesssim 40000K$ satisfies most of the observations.

However, the collisionally ionized volume is not sufficient by itself to match all the data: (1) The predicted OI (63μm) flux is much to weak; (2) The $T_e \sim 5300K$ derived from the radio is much less than the value of $T_e \sim 40000k$ required by ionization equilibrium; and (3) in the collisionally ionized volume nearly all He would be He^+. Hence the expected radio recombination line ratio $< He^+/H^+ >$ would be the He/H abundance ratio ~ 0.1 and not the upper limit of < 0.03 observed by Pauls and Mezger (1980). These observations suggest that a "secondary" HII

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region/PDR (Photodissociation Region) has formed in the underlying neutral/molecular cloud, which is photoionized/dissociated by the diffuse photons produced in the volume of collisional ionization.

Using the same elemental abundances and N_e, photoionization models similar to those of Erickson et al (1988) are also found to fit the FIR and radio data equally well and to be narrowly confined to a radiation field characterized by a Kurucz atmosphere $T_{eff} \lesssim 35000K$, $\log g = 4$ sequence.

THE CHAMAELEON DARK CLOUDS COMPLEX: PRELIMINARY ANALYSIS OF THE COLOUR EXCESSES E(b-y) TOWARDS THE SELECTED AREA 203

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The Chamaeleon dark clouds form a large complex of interstellar obscuring material situated at $\approx$ 15° below the galactic plane. Although it is accepted as being one of the closest low-mass star formation region to the Sun, its distance has been debated issues. The proposed distance is in general dependent on the value assumed for the ratio of total-to-selective extinction, which in the Chamaeleon clouds has proved controversial, leading to distances estimates ranging from 115 to 215 pc.

Selected Area 203 ($l = 300\overset{\circ}{.}0, b = 13\overset{\circ}{.}1$) lies approximately in the geometric center of the Chamaeleon cloud complex, in a relatively less obscured area, when compared with the surrounding dark region. As part of an investigation of the interstellar dust distribution towards the Chamaeleon dark clouds complex, all stars earlier than G0 and brighter than $m_{pg} \approx 10\overset{m}{.}4$ in the Potsdam Spektral Durchmusterung of SA 203 were selected for observation. About 200 selected stars were observed in four-colour uvby and H_β photometry.

A preliminary analysis of the distribution of the colour excesses, E(b-y), as a function of the distance is presented. The obtained E(b-y) versus distance diagram clearly suggests the presence of a sheet-like structure at a distance of $\approx$137 pc, indicating that at least part of the Chamaeleon complex is located nearer than 140 pc.

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