RevMexAA (Serie de Conferencias), **3**, 293–297 (1995)

ABSTRACTS OF CONTRIBUTED PAPERS

TEMPORAL EVOLUTION OF THE H_2 ABUNDANCE IN THE INTERSELLAR MEDIUM

Anabel Arrieta and José Franco
Instituto de Astronomía
Universidad Nacional Autónoma de México
and
José Guichard
Instituto Nal. de Astrofísica, Optica y Electrónica
Tonantzintla, Pue., México

We calculate the abundance of molecular hydrogen (H_2) for a wide range of interstellar conditions, including the following cases: *i)* constant density and temperature, *ii)* constant density and variable temperature (isochoric case), and *iii)* constant pressure (isobaric case). Starting with a diffuse atomic medium, the time evolution of the H_2 abundance can be followed with $dn_{H_2}/dt = R_f - R_{Ph,d} - R_d$, where R_f is the formation rate of H_2 on interstellar grains, $R_{Ph,d}$ is the photodissociation rate, and R_d is the collisional dissociation rate. The formation and collisional dissociation rates depend on the gas temperature and density, and a self-consistent treatment of the problem should include the effects of H_2 cooling. Photodissociation of interstellar H_2 is initiated by absorption of discrete lines of the Lyman and Werner series, and within the clouds the general interstellar radiation field is quickly attenuated at those wavelengths. As the optical depth increases, the photodissociation rate decreases and becomes negligible at large optical depths ($\tau_v > 1$). Also, in the absence of local energy sources, at large optical depths the collisional dissociation rate becomes negligible (i.e., R_d tends toward zero at temperatures below $T \sim 2000°$ K). For all three cases considered, we find that the time required to convert atomic to molecular hydrogen is longer than the timescale for a number of cloud formation mechanisms. For the isochoric case we find that the molecular formation timescale can be written as a power-law of the total density, $t_{for} = A_0(n/1\ \text{cm}^{-3})^{\alpha}$ yr, with $A_0 = 1.06 \times 10^{10}$ and $\alpha = -1.02$. Similarly, for the isobaric case, the formation timescale can be written as $t_{for} = B_0(P/10^{-12}\ \text{dyn cm}^{-2})^{\beta}$ yr, with $B_0 = 1.7 \times 10^8$ and $\beta = -0.88$.

IMAGERY AND SPECTROSCOPY OF THE REGION AROUND HH80-81

Sandra Ayala and Miriam Peña
Instituto de Astronomía
Universidad Nacional Autónoma de México

Preliminary results of Hα imaging and low dispersion spectrophotometry of the HH80–81 region are presented. Data were obtained at the Observatorio Astronómico Nacional, San Pedro Mártir B.C., México. The spectral range from 4200 to 7200 Å was covered with a resolution of 8 Å. Spectrophotometric results for HH80 show that it is a high excitation object; our data are similar, within the errors, to data reported by Reipurth & Graham (1988, A&A, 202, 219). We derived an electron density N_e([S II]) = 3000 cm^{-3}, so HH80 has an intermediate density compared to other HH objects.

Continuum-subtracted Hα images clearly show the HH80 and 81 objects. A stellar object with strong Hα emission, located to the southwest of HH80, was also detected. This stellar source has not been reported previously. The spectrum of this object shows a stellar continuum with wide Balmer absorption lines; Hβ and Hγ have $EW \sim 15$ Å. The Hα profile has two components: the photospheric absorption line and an intense, narrow (unresolved) emission line. These spectral characteristics are similar to those of some Ae/Be Herbig stars (Cohen & Kuhi 1979, ApJS, 41, 743). From the calibrated flux at λ5500 and λ4400 we derived apparent magnitudes $m_V = 12.3$ and $m_B = 12.5$, respectively. By assuming a distance of 1.7 kpc to the HH80–81 complex (Martí, Rodríguez, & Reipurth 1993, ApJ, 416, 208), we found an absolute visual magnitude $M_V = -1.0$ for the stellar object, which is consistent with a spectral classification of B9e.