OBSERVING A COLUMN-DEPENDENT ζ IN THE HORSEHEAD PDR

P.B. RIMMER, *Department of Physics, Ohio State University, Columbus, OH 43210*; O. MORATA, *Institute of Astronomy and Astrophysics, Academia Sinica, Tapei 11677, Taiwan*; E. ROUEFF, *Observatoire de Paris, LUTH and Université Denis Diderot, Place J. Janssen 92190 Meudon, France*; E. HERBST, *Departments of Astronomy, Physics, and Chemistry, Ohio State University, Columbus, OH 43210.*

The molecules CCH, C_4H, HCO^+, and HC_3N have been observed at the edge of the Horsehead Nebula in abundances far higher than those predicted by Photodissociation Region (PDR) models[a]. Using a column-dependent cosmic ray ionization rate (ζ)[b], we model the edge of the Horsehead Nebula as a one-dimensional nearly-"edge-on" heterogeneous PDR with temperature ranging from 15-250 K, number density from 10^3 - 5×10^5 cm^{-3}, and $\zeta = 10^{-16}$ - 10^{-14} s^{-1}. The resulting abundances for the molecules listed above are much closer to the observed abundances. In this talk, we will discuss this method, its results, and the usefulness of incorporating a column-dependent ζ in astrochemical PDR models, especially in the advent of ALMA.

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[a] J. Pety et al., A&A 435, 885 (2005)
[b] M. Padovani, D. Galli, A.E. Glassgold, A&A 501, 619 (2009)