H II REGIONS IN S0 GALAXIES; CLUES TO THE ORIGIN OF THE ISM IN S0s

Richard W. Pogge

McDonald Observatory, The University of Texas at Austin

Paul B. Eskridge

Dept. of Astronomy, University of Illinois
Champaigne-Urbana

Preliminary results of a long-slit spectroscopic study of H II regions in four S0 galaxies are reported. The galaxies (NGC 473, NGC 694, NGC 1819, and NGC 7013) were selected from those S0s with H II regions previously detected in a CCD $H\alpha$+[N II] emission-line imaging survey being carried out by the authors (Pogge and Eskridge 1987, *A. J.*, **93**, 291; 1989, in preparation). The H II regions have low- excitation spectra consistent with solar or greater metallicity. Metal-rich nebulae are expected if the massive stars are forming from interstellar gas originating internally to the galaxies, the most likely source being mass-loss from evolved stars. In addition, rotational tilts are observed in the long-slit spectra in both the nebular emission lines and underlying stellar absorption lines. While a detailed rotation curve is impossible with these low resolution data, the observed line tilts have the same sense and magnitude ($\Delta V \sim 150 - 200$ km s^{-1}) for both the emission and absorption components. This suggests that the gas and stars are co-rotating, again consistent with an internal origin for the ISM. Both of these results are in contrast to recent statistical studies of S0 galaxies in which accretion of a low-mass (low-metallicity) gas-rich companion as an *external* origin of their ISM is suggested (Wardle and Knapp 1986, *A. J.*, **91**, 23; van Driel 1987, Gröningen Ph. D. Thesis), and the observations of counter-rotating gas disks in the centers of a very few S0s (Galetta 1987, *Ap. J.*, **318**, 531; Bertola, Buson, and Zeilinger, 1988, *Nature*, **335**, 705).

SULPHUR ABUNDANCES IN EXTRAGALACTIC H II REGIONS

Donald R. Garnett

Astronomy Department, University of Texas at Austin

I have observed the emission lines of [S III] at 9069 A and 9532 A in thirteen extragalactic H II regions. Such observations are necessary for the determination of sulphur abundances in H II regions, because S^{++} contributes much more than S^{+} to the abundance of sulphur in ionized nebulae, and thus is a better indicator of the true sulphur abundance in such objects. The observations presented here are used, together with photoionization model analysis, to derive sulphur abundances in objects where the oxygen abundance is already known.

The result of this study is that the S/O abundance ratio appears to be constant over the abundance range $-4.8 < \log(O/H) < -3.0$, with the average value of S/O being similar to that observed in the Sun (log(S/O) = −1.7; Grevesse (1984, *Physica Scripta*, **T8**, 54). The scatter in the data is rather large (about ± 0.3 dex). The trend seen here is in clear contrast with earlier claims that S/O increases with decreasing O/H (cf. Talent and Dufour 1979, *Ap. J.*, **233**, 888; French 1980, *Ap. J.*, **240**, 41; Evans 1986, *Ap. J.*, **309**, 544). My results are consistent with measurements of [S III] in H II regions in the Milky Way and the Magellanic Clouds made by Dennefeld and Stasińska (1983, *Astr. and Ap.*, **118**, 234), and in M101 by Shields and Searle (1978, *Ap. J.*, **222**, 821).

PHYSICAL CONDITIONS OF H II REGIONS IN M101 AND THE PREGALACTIC HELIUM ABUNDANCE

S. Torres-Peimbert[1], M. Peimbert[1], and J. Fierro

Instituto de Astronomía
Universidad Nacional Autónoma de México

Spectrophotometry in the 3400-7400 A range is presented for eight H II regions and the nucleus of M101. The He, N, O, Ne, S, and Ar abundances relative to H are divided. The O/H ratios are smaller than previously found by about 0.2 dex. We find negative gradients with galactocentric distance of the O/H, N/O and He/H ratios. We do not find any gradients in the S/O, Ne/O and Ar/O ratios. The pregalactic helium abundance by mass has been determined from H II regions in NGC 2363, NGC 5471, and the SMC and amounts to 0.230 ± 0.006(1σ).

1. Visiting Astronomer, KPNO, National Optical Astronomical Observatories. Operated by the Association of Universities for Research in Astronomy, Inc., under contract with the National Science Foundation.