FUV AND OPTICAL SPECTROPHOTOMETRY OF X-RAY SELECTED SEYFERTS

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ABSTRACT. Nearly simultaneous FUV and optical spectrophotometry of X-ray selected Seyfert galaxies has revealed an average Ly α/H β ratio of 22, a positive correlation between the ratio Ly α/H β and the width of the lines, and additional Ly α emission in the wings of one source which is not matched by emission in the Balmer line wings. However, we find no distinguishing features in the continuum emission from these X-ray selected objects compared with other samples. If the correlation between Ly α/H β and the width of the lines is found to apply to larger samples of Seyferts, it may be that our objects appear Ly α bright because they are also broad-lined compared with other samples.

1. OBSERVATIONS

Observations of five X-ray selected Seyferts from the sample of Reichert et al. (1982) were performed in May 1983 with the Lick 120" telescope and a CCD spectrograph and roughly two weeks later with the IUE. The objects observed were E0849+08, E1426+01 (also known as Mrk 1383), E1530-08 (a Seyfert II), E1556+27, and E1613+65 (a.k.a Mrk 876). We have compared the continuum and line emission properties of these objects with the larger sample presented by Wu, Boggess, and Gull (1983) and found significant discrepancies only in the areas to be discussed.

2. RESULTS

Indications of variability in these sources, even over the two week interval between our optical and FUV observations, stresses the importance of nearly simultaneous observations in the study of correlations between emissions in different wavelength bands. The X-ray to optical continuum spectra and most emission line properties of the Seyfert I's appear very similar to those of previous samples of Seyfert I's, but the observed ratio Ly α/H β in our sample averages 22, which is significantly higher than that observed in previous samples (although individual sources with high ratios have been observed). In our limited sample there also appears a positive correlation between

G. Swarup and V. K. Kapahi (eds.), Quasars, 347–348.

Ly α/H β and the width of the lines, coupled with the knowledge that existing larger samples of sources have, on the average, lower Ly α/H β values by a factor of 4 and narrower H lines by roughly a factor of 2. Comparisons between the Ly α and H α line profiles in these sources further indicate that while part of this effect may be due to an increasing Ly α/H β ratio in the wings of the lines, there must also be a generally higher ratio Ly α/H β throughout the line profiles to explain the difference between our average value of Ly α/H β = 22 and averages of roughly 5 from previous studies. Finally, from our data and the larger sample of Wu, Boggess, and Gull (1983) it is known that while the individual line strengths correlate well with continuum luminosity, the ratio Ly α/H β does not appear to correlate with either continuum luminosity or slope.

3. DISCUSSION

Since the explanation for the previously observed anomalously low ratio Ly α/H β = 5 from Seyfert I's has been the "trapping" of Ly α photons by a high optical depth of H, possibly coupled with some additional extinction by dust or variation in electron density, it may be that the broad-lined objects that we have observed are least affected by this phenomenon and therefore have ratios Ly α/H β much closer to those predicted by the early photoionization calculations. Further observations to check the strength and slope in this correlation will have to use nearly simultaneous observations, however, since variations in the strengths and shapes of the lines (as observed from NGC 4151) would tend to wash out this correlation.

4. REFERENCES

Reichert, G., Mason, K., Thorstensen, J. and Bowyer, S. 1982, Ap. J., 260, 437.

Wu, C., Boggess, A. and Gull, T. 1983, Ap. J., 266, 28.