HIGH CHEMICAL ABUNDANCES IN STRIPPED VIRGO SPIRAL GALAXIES

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Based on a comparison of the oxygen abundances in H II regions in field and Virgo cluster late type spiral galaxies, Shields, Skillman, & Kennicutt (1991) suggested that the highly stripped spiral galaxies in the Virgo cluster have systematically higher abundances than comparable field galaxies.

In April 1991 and May 1992 we used the blue channel spectrograph on the MMT to obtain new observations of 30 H II regions in Virgo spiral galaxies. These spectra cover the wavelength range from [O II] λ3727 to [S II] λ6731. We now have observed at least 4 H II regions in 9 spiral galaxies in the Virgo cluster. Combining [O II] and [O III] line strengths, we calculate the H II region oxygen abundances based on the empirical calibration of Edmunds & Pagel (1984). Figure 1 shows a mosaic of empirical oxygen abundances versus galactic radius (normalized to effective radius) for the 9 Virgo spirals. Figure 2 compares the (HI diameter/optical diameter) ratios for the galaxies in Warmels (1986) field sample to those of our observed Virgo spirals as a function of RC3 morphological T-type. These observations show: 1) The stripped, low luminosity Virgo spirals (N4689, N4571) truly have abundances characteristic of much more luminous field spirals; 2) Virgo spirals which show no evidence of stripping (N4651, N4713) have abundances comparable to field galaxies; and 3) Evidence for transition galaxies (e.g., N4254, N4321), with marginally stripped disks and marginal abundance enhancements.

The new observations presented here confirm the validity of the oxygen overabundances in the stripped Virgo spirals. Shields et al. (1991) discussed two different mechanisms for producing the higher abundances in the disks of stripped galaxies in Virgo. The first is the suppression of infall of near-primordial material, the second is the suppression of radial inflow of metal-poor gas. Distinguishing between the two cases will require more observations of the Virgo cluster spirals and a better understanding of which parameters determine the variation of abundance with radius in field spirals (cf., Garnett & Shields 1987).

References

Edmunds, M.G., & Pagel, B.E.J. 1984, MNRAS, 211, 507.
Garnett, D.R., & Shields, G.A. 1987, ApJ, 317, 82.
Shields, Skillman, & Kennicutt 1991, ApJ, 371, 82.
Warmels, R.H. 1986, Ph.D. thesis, Groningen University.

Figure 1: Radial Oxygen Abundance Gradients for 9 Virgo Spirals

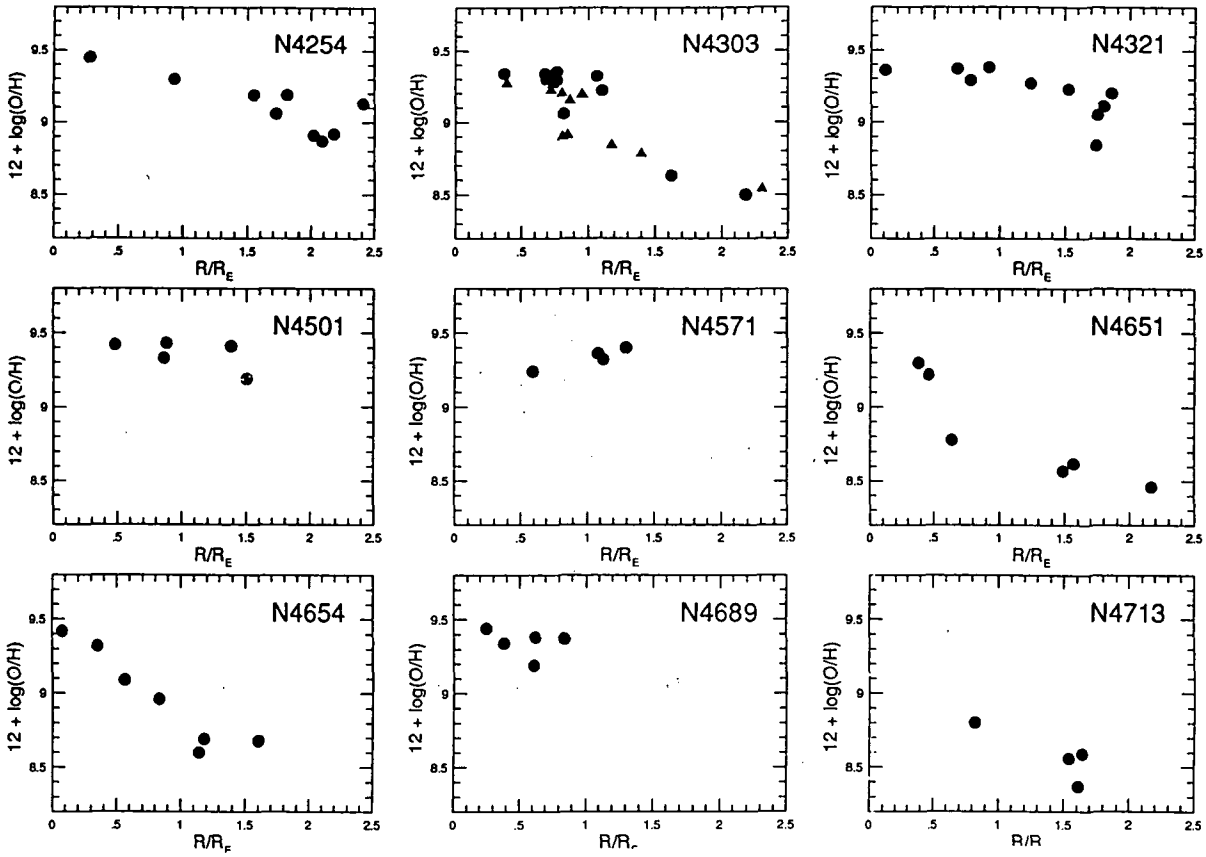

Figure 2: Virgo Galaxies vs. Warmels Field Sample