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FIRST RESULTS OF METALLICITY GRADIENTS IN ELLIPTICAL GALAXIES

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We intend to test predictions from models of formation and evolution of elliptical galaxies by using metallicity indices. Among these models the one called *monolithic collapse* (Larson, MNRAS 169, 229, 1974), predicts a radial metallicity gradient. An alternative scenario is the one of *coalescence* (Toomre & Toomre, ApJ 178, 623, 1972), in which protogalaxies with some on-going star formation, would be in a process of merger. In this model, violent dynamical relaxation inhibits a radial metallicity gradient.

Spectroscopic data with resolution of ≈ 3 Å were obtained with ESO 1.52 m telescope for a project to map peculiar motion of galaxies (ENEAR, da Costa et al. AJ 120,95,2000) with a long slit aligned along the major axis of the objects. After the standard reduction procedures (bias, flatfield, cosmics ...), to obtain 1D spectra series, we initiate with a central extraction (3 pixels), followed by successive lateral extractions. As the S/N decreases towards external parts of the galaxy, the apertures are increased in order to compensate this behavior. If, for a given extraction the S/N is ≤40, then a pixel is added and the extraction repeated for a maximum number of interactions. The last extraction is accepted if the S/N is ≥20. Due to the great number of objects to be examined and the need of a more homogeneous treatment of the spectra, a script in IRAF Command Language was developed to optimize the process without automation. The sky region is manually selected for the central aperture and applied to the others.

The velocity dispersion (σ) is obtained to correct the measured line indices. Flux calibration is not necessary since the differences in line indices measurements are negligible. We are dealing first with Mg_2 (≡ MgH+Mgb) and ⟨Fe⟩ (≡ Average of FeI(5270 Å) and FeI(5335 Å)) indices of Lick system.

To test consistency and estimate error of line indices measurements, we observed during several runs a set of galaxies to determine the scatter of the measurements. The uncertainties in the line intensities are 10% for Mg_2, and about 20% for ⟨Fe⟩ . One example of the results being obtained is presented in Fig. 1 for the S0 galaxy NGC 3115. Radial gradients for Mg_2 and ⟨Fe⟩ for a small subsample of objects already measured present a variety of behaviors. We intend to use a sample of about 400 (E+S0) galaxies to examine the predicted correlations between index gradients, their ratios, and σ or total mass of the galaxy. Possible influences of the environment over these properties will also be investigated.

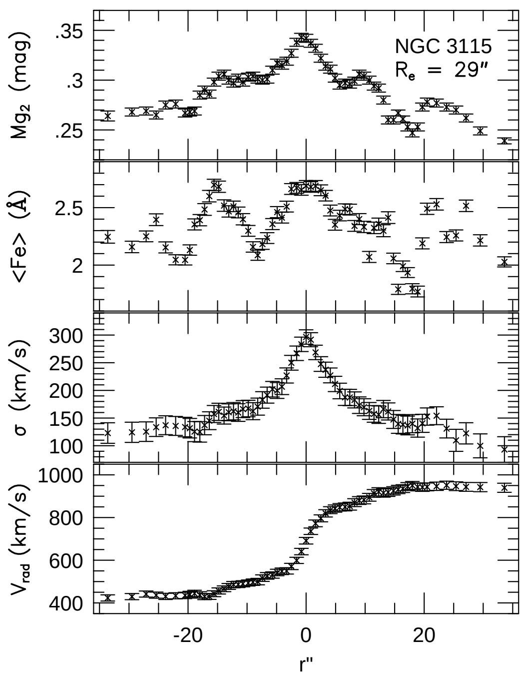

Fig. 1. Metallicity gradients for galaxy NGC 3115.

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