RevMexAA (Serie de Conferencias), **17**, 249–249 (2003)

Galaxy Evolution: Theory and Observations (Cozumel, Quintana Roo, México, 8-12 April 2002)
Editors: Vladimir Avila-Reese, Claudio Firmani, Carlos S. Frenk & Christine Allen

TESIS - THE TNG EROS SPECTROSCOPIC IDENTIFICATION SURVEY

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The epoch at which massive galaxies ($M_{star} > 10^{11}M_{\odot}$) have assembled provides crucial constraints on the current galaxy formation and evolution models. The LCDM hierarchical merging model predicts that massive galaxies are assembled through mergers of pre-existing disk galaxies at z$\leq$ 1.5 (Kauffmann & Charlot 1998; Cole et al. 2000). In the alternative view massive ellipticals formed at z> 3 in a single episode of star formation and follow a pure luminosity evolution (PLE). The number density of $M_{star} > 10^{11}M_{\odot}$ galaxies predicted in the LCDM model by Baugh et al. (2002) is $\sim 10^{-5}h^3\mathrm{Mpc}^{-3}$ at $z \simeq 1$. which gives an upper limit to the surface density of massive galaxies of 0.02 gal/arcmin^2 in the redshift range $1.2 < z < 1.5$. Given this low predicted probability, searching for massive galaxies at $z \geq 1.2$ and estimating their number density provide strong observational constraints on models. With the aim of identifying massive evolved galaxies at $z \geq 1.2$, we started a near-IR very low resolution spectroscopic survey of a complete sample of K'< 18.5 EROs (R-K'> 5). Indeed, K$\sim$ 18.5 is the expected apparent K-band magnitude of a $M_{star} = 10^{11}M_{\odot}$ galaxy at $z \sim 1$. The sample (15 EROs at K'< 18 and 52 at K'< 18.5) has been selected from two no-adjacent wide areas of about 180 arcmin^2 each of the Munich Near-IR Cluster Survey (MUNICS, Drory et al. 2001). The observations are based on the Amici prism dispersing element mounted at the near-IR camera NICS of the Telescopio Nazionale Galileo (TNG). This observing mode provides the spectrum from 8500-24000 Å in one shot, with a nearly constant resolution ($\lambda/\Delta\lambda \sim 50$) and a high throughput ($\sim$ 80%). For these reasons the Amici data are very efficient in estimating redshift of old stellar systems in the $1.2 < z < 2$ range through the detection of the Balmer break. On the other hand, both the low resolution and the low S/N ($\sim$ 3) achievable at these magnitudes make the detection and the estimate of absorption/emission lines uncertain. During the observing run of March 2002, we carried out near-IR spectra of 4 EROs with K< 18 under unclear sky and poor seeing conditions (1.5-2.5 arcsec). We clearly detect in two of them the sharp decrease of the continuum expected at 4000 Å . The remaining two spectra have a lower S/N and the analysis is still in progress. The two analyzed spectra are shown in Figure 1. The decrease happens in the range 0.88-1.0 μm in both of them, constraining the ERO S7F5-45 at $1.3 < z < 1.35$ and the ERO S7F5-254 at $1.25 < z < 1.3$. Given the redshift and the absolute K-band magnitudes derived ($M_K \simeq -27$) we estimate a lower limit to their stellar mass of $M_{star} \geq 10^{11}M_{\odot}$ under the very conservative assumption of M_{star}/L_K=0.1 $[M/L]_{\odot}$.

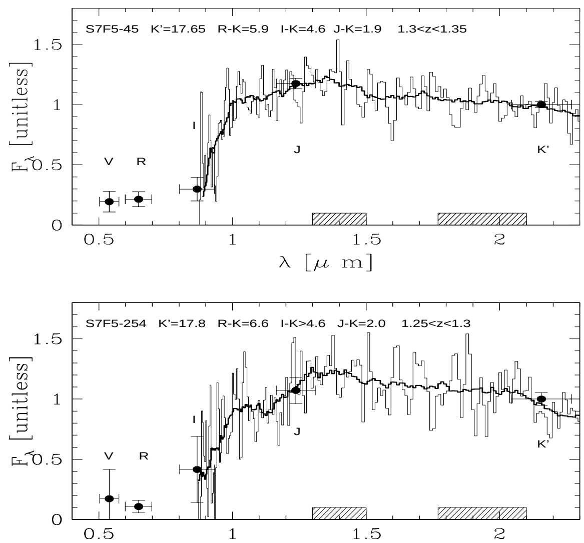

Fig. 1. NICS-Amici low resolution spectra of two observed EROs. The thick histogram is the observed spectrum heavily smoothed to match the continuum. The spectra are scaled to the K'-band flux so that F_K=1. The shaded areas represent the atmospheric windows characterized by an opacity larger than 80%. The filled symbols are the photometric data in the V, R, I, J and K' bands from the MUNICS survey.

REFERENCES

Baugh C. M., et al. 2002, astro-ph/0203051
Cole S., et al. 2000, MNRAS 319, 168
Drory N., et al. 2001, MNRAS 325, 550
Kauffmann G. & Charlot S. 1998, MNRAS 297, L23

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