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TESIS - THE TNG EROS SPECTROSCOPIC IDENTIFICATION SURVEY

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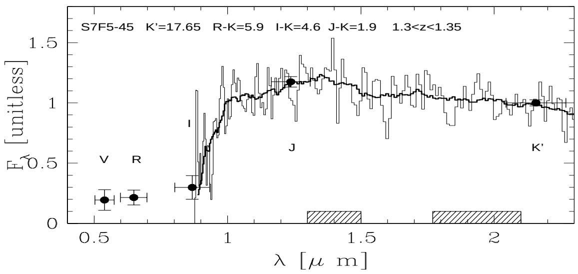
The epoch at which massive galaxies ($M_{star} > 10^{11}M_{\odot}$) have assembled provides crucial constraints on the current galaxy formation and evolution models. The LCDM hierarchical merging model predicts that massive galaxies are assembled through mergers of preexisting disk galaxies at z$\leq$ 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 $[M/L]_{\odot}$.



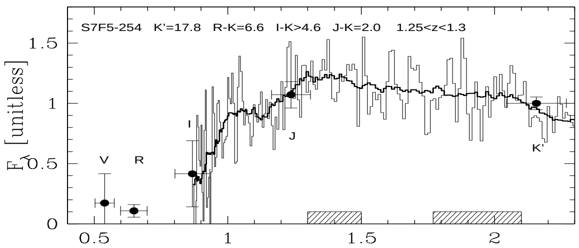


Fig. 1. NICS-Amici low resolution spectra of two observed EROs. The thick histogram is the observed spectrum heavily smoothed to match the continuum. The spectra are scaled to the K'-band flux so that F_K=1. The shaded areas represent the atmospheric windows characterized by an opacity larger than 80%. 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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