S-PLUS: Emission line objects in the southern photometric local Universe survey

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Accepted XXX. Received YYY; in original form ZZZ

ABSTRACT
The emission line objects are very important objects in astronomy because

Key words: keyword1 – keyword2 – keyword3

1 INTRODUCTION

The existence of an ionizing radiation field can lead to Balmer hydrogen emission lines. From the presence of the H Balmer lines in the optical spectra of some sources it is well known the possible presence of ionized gas. Many important astronomical objects involve the physics of photo-ionized gases and the interpretation of the emission-line spectra. Emission line objects as the H II regions allow us to study the star formation history of the far reaches of our Galaxy and of distant galaxies. Planetary nebulae let us to see the remaining envelope of dying stars. Star-burst galaxies and QSOs are one the most luminous objects and hence the most distant that can be observed. Their spectra can reveal details about of the first generation of star and the formation of heavy elements in the young universe. On the other hand, emission lines can also infer the presence or lack the accretion discs (Schwope et al. 2000; Ratti et al. 2012), the properties of single or double picked line can allow us to infer geometrical characteristics (Horne & Marsh 1986), the nature of donor stars in binary system (Steeghs & Casares 2002; van Spaandonk et al. 2010; Casares 2015) and the compact objects as black holes (Casares 2016).

Emission lines are also associated with stars in very early-type and/or very late evolutionary stage which are short phase. As already mentioned are also associated with binaries that experiencing mass transfer. These group of emission line stars includes young stellar (YSOs) and Herbig-Haro (HH) objects, post-asymptotic and some asymptotic giant branch (AGB), some red giant stars (RGB), Wolf-Rayet (WR) stars, supernova remnants, classical Be stars, active late-type dwarfs, interacting binary system like symbiotic stars (SySt) and cataclysmic variables (CV). Most of these class of object are in-homogeneous and some contains many few identified members, for instance at the moment around 323 symbiotic system have been identified from which 257 belong to the Galaxy and ∼66 are extra-galactic objects (Akras et al. 019a). The same occurs with PNe from witch around 3500 of them are been cataloged (Parker et al. 2016), this current number of PNe represents only about 15-30% of the estimated total of Galactic PNe (Frew, 2008; Jacoby et al., 2010) showing that a small fraction of the PNe have been cataloged. Many galaxies, in addition to harbor Planetary nebulae and H II regions, show characteristic nebular in their spectra. In most of these objects, the gas is photoionized by hot stars in the nucleus, which is thus much like giant H II region, or perhaps many H II regions. The galactic nucleus with very strongest emission lines of this type are often called blue compact galaxies, extragaltic H II regions, star forming or starburst galaxies (Osterbrock & Ferland 2006). There are also spiral galaxies that present emission lines.

In the past H surveys with modest spatial resolutions have been used to identified extended nebular emission to study supernova remnants, galaxy groups and star forming regions (Davies, Elliott Meaburn 1976). More recently, higher resolution surveys such as the INT Photometric Hα survey (IPHAS; Drew et al. 2005; Barentsen et al. 2014) have focused in the study of compact emission line sources on the Galactic plane, typically with objects in different stage of stellar evolution. The Anglo-Australian Observatory UKS chmidt Telescope Supercosmos Hα Survey (Parker et al. 2005) is anothe Hα survey of the Southern Galactic Plane and Magellanic Cloud which has covered to b $\sim$ 10-13° (verificar esto). Currently ongoing is the VST Photometric Hα Survey of the Southern Galactic Plane and Bulge (VPHAS+; Drew et al. 2014) that will cover the Galactic bulge and plane in five filters.

Like VPHAS+, others ongoing surveys that are used to study the population of emission line objects are the The Javalambre Photometric Local Universe Survey (J-PLUS[1], **?**) and the Southern-Photometric Local Universe Survey (S-PLUS[2], Mendes de Oliveira et al. 2019) are providing observations of the Galactic halo covering both northern and southern celestial hemispheres in a systematic way with twin telescopes using the same set of multi-band filters. In addition to the Hα filter, which is already vastly applied to systematically searching for Hα emitters the telescopes offer 11 more filters. And more ambitious yet the JPAS survey that will the same area of J-PLUS in 56 narrow-band filters.

Traditionally, color-color diagrams are been used to identiy Hα emitters

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[1] https://www.j-plus.es
[2] http://www.splus.iag.usp.br

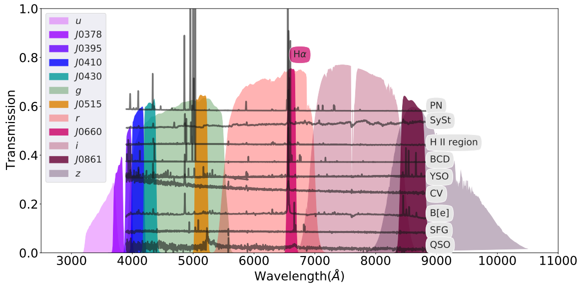

Figure 1. Transmission curves...

2 OBSERVATIONS

The S-PLUS survey is a multi-band photometric survey...

3 METHODOLOGY

Witham et al. (2008) presented a catalogue of point-sources Hα emission objects identified in IPHAS.

Appliyng the selection criteria to selecting Hα emitters. We used the same procedure in Wevers et al. (2017). The objects with Hα excess meet the condition:

$$(r-J0660)_{obs}-(r-J0660)_{fit} \geq C \times \sqrt{\sigma_s^2-\sigma_{phot}^2}$$

where σ_s is the root mean squared value of the residuals around the fit and σ_{phot} is the error on the observed $(r-J0660)$ colour

Firts see an aproximation of the 4σ cut away from the ariginal fit.

3.1 Maths

3.2 Figures and tables

4 RESULTS

5 CONCLUSIONS

We have found a important sample of emission line objects.

ACKNOWLEDGEMENTS

DATA AVAILABILITY

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APPENDIX A: SOME EXTRA MATERIAL

This paper has been typeset from a TEX/LATEX file prepared by the author.

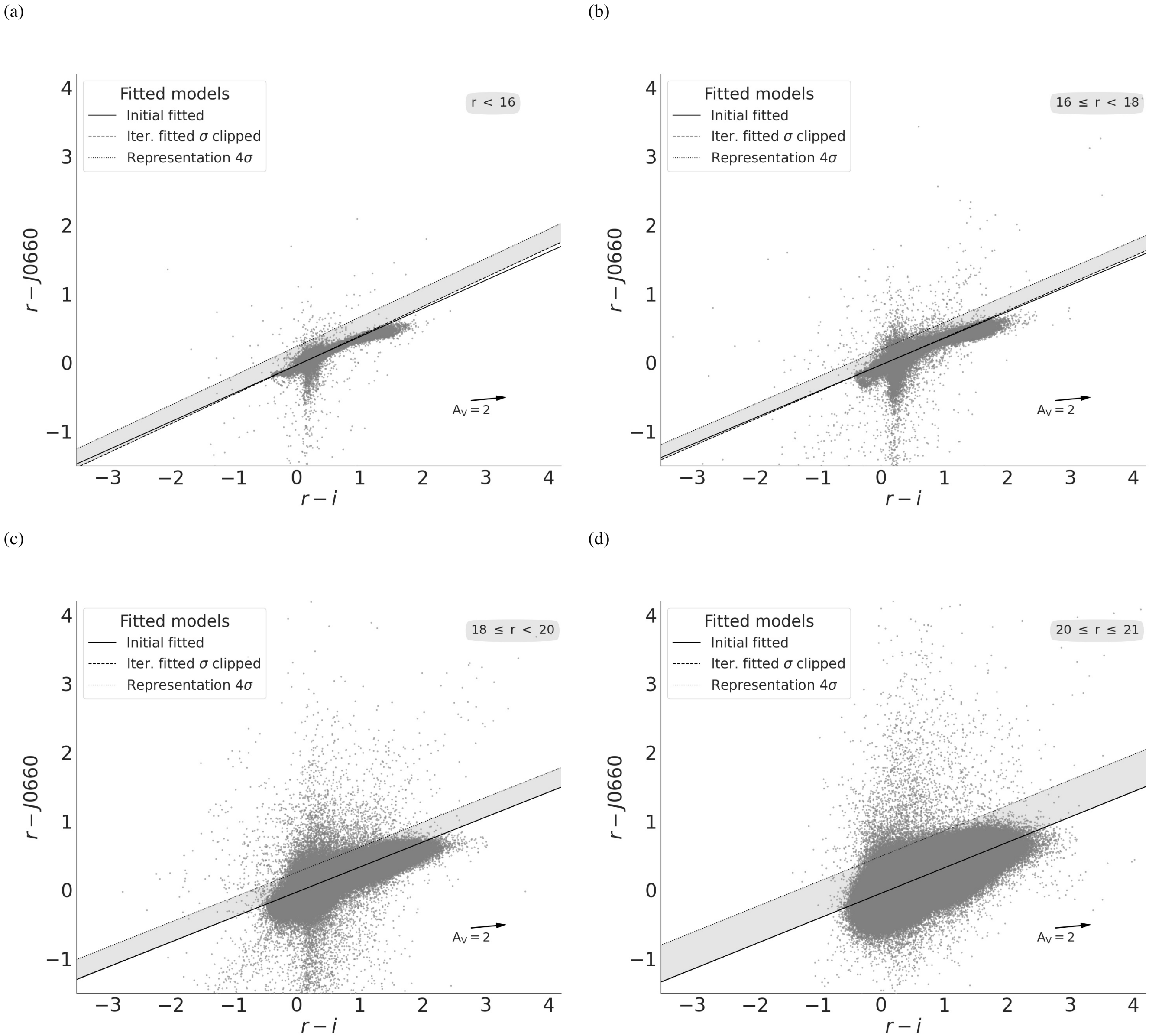

Figure 2. Color-color diagrams with all objects...

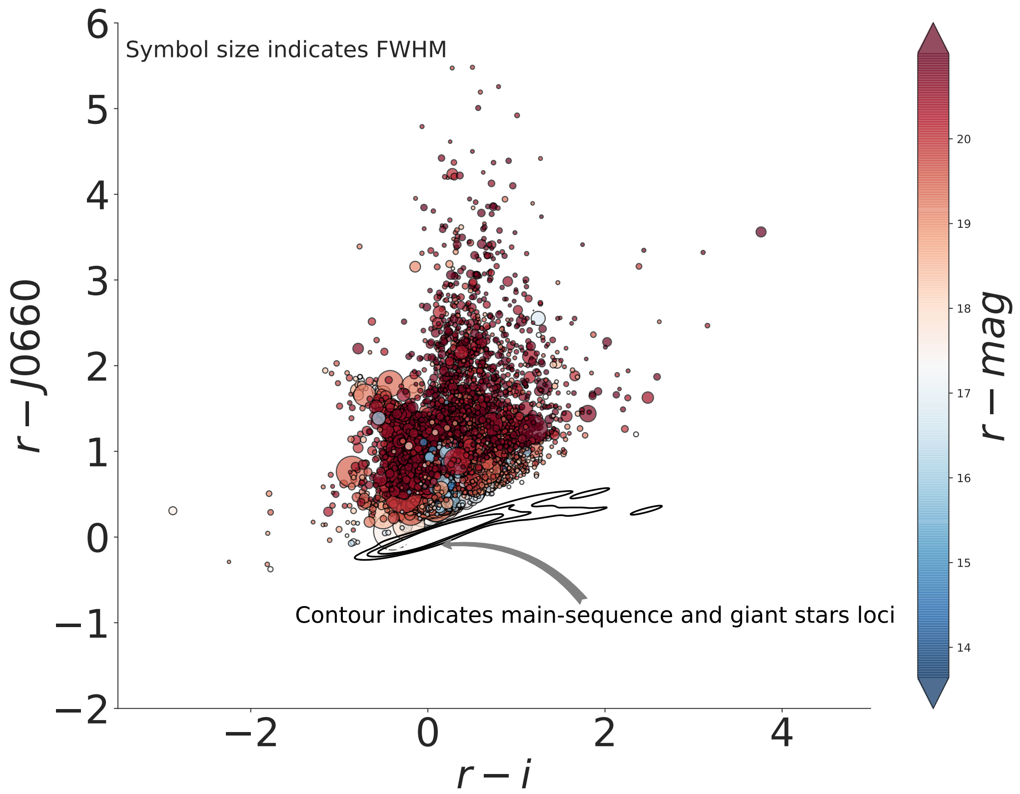

Figure 3. Emission lines selected...

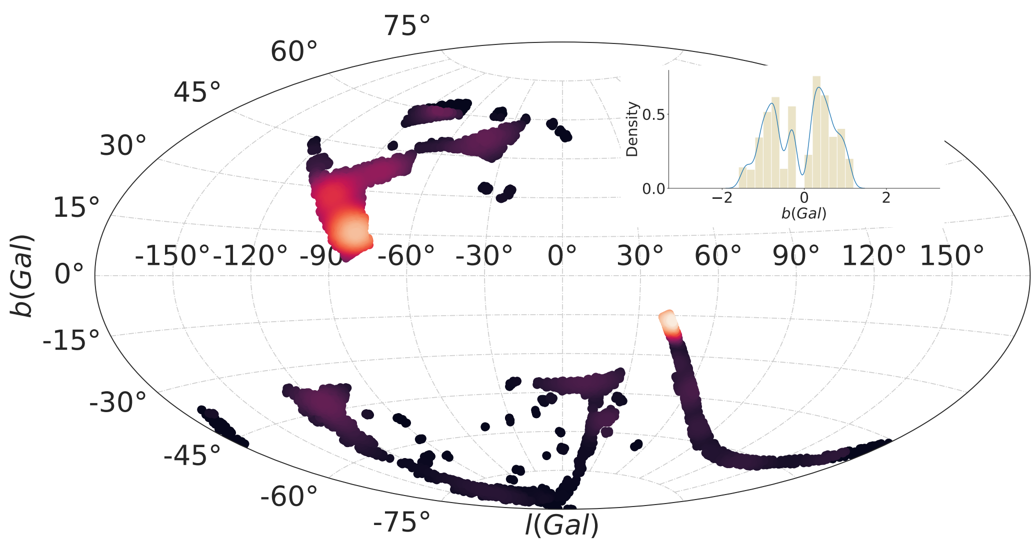

Figure 4. This is my embedded figure

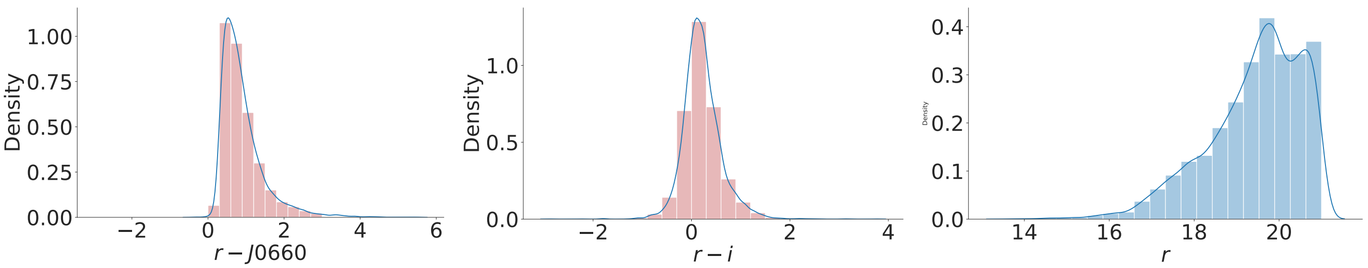

Figure 5. Emission lines selected...

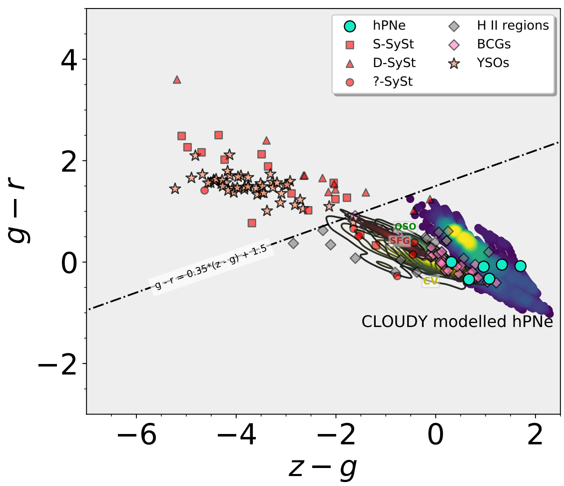

Figure 6. Classifying...

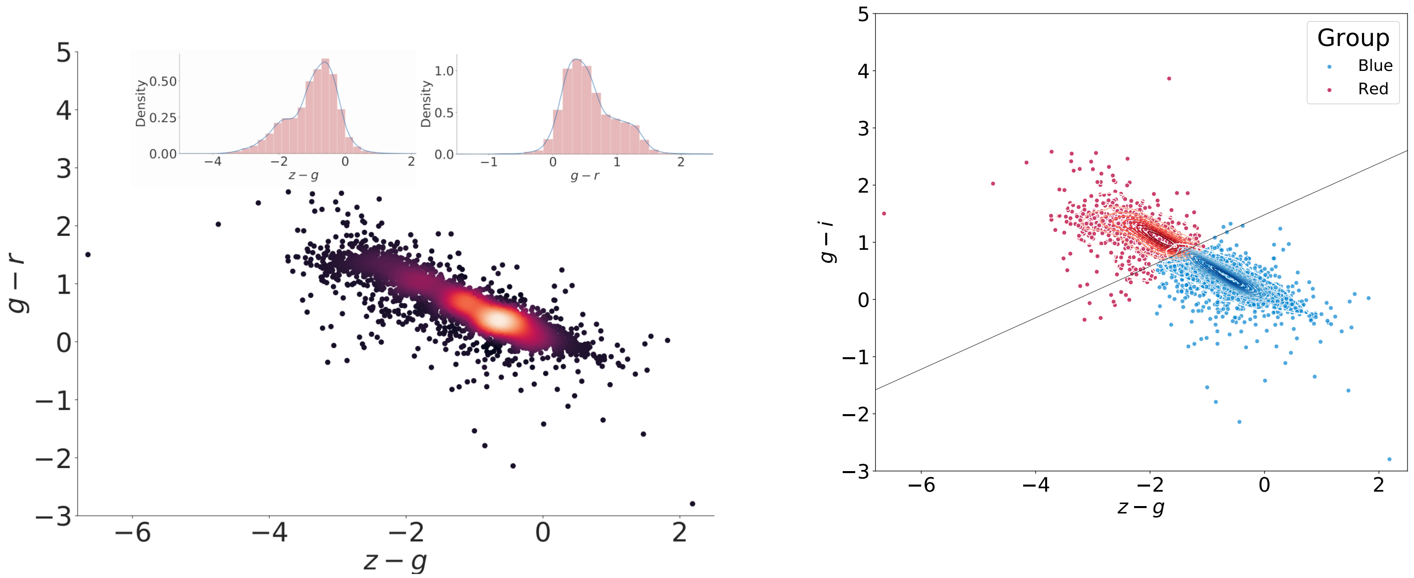

Figure 7. New color-color diagram to separate the blue objects from the red ones.

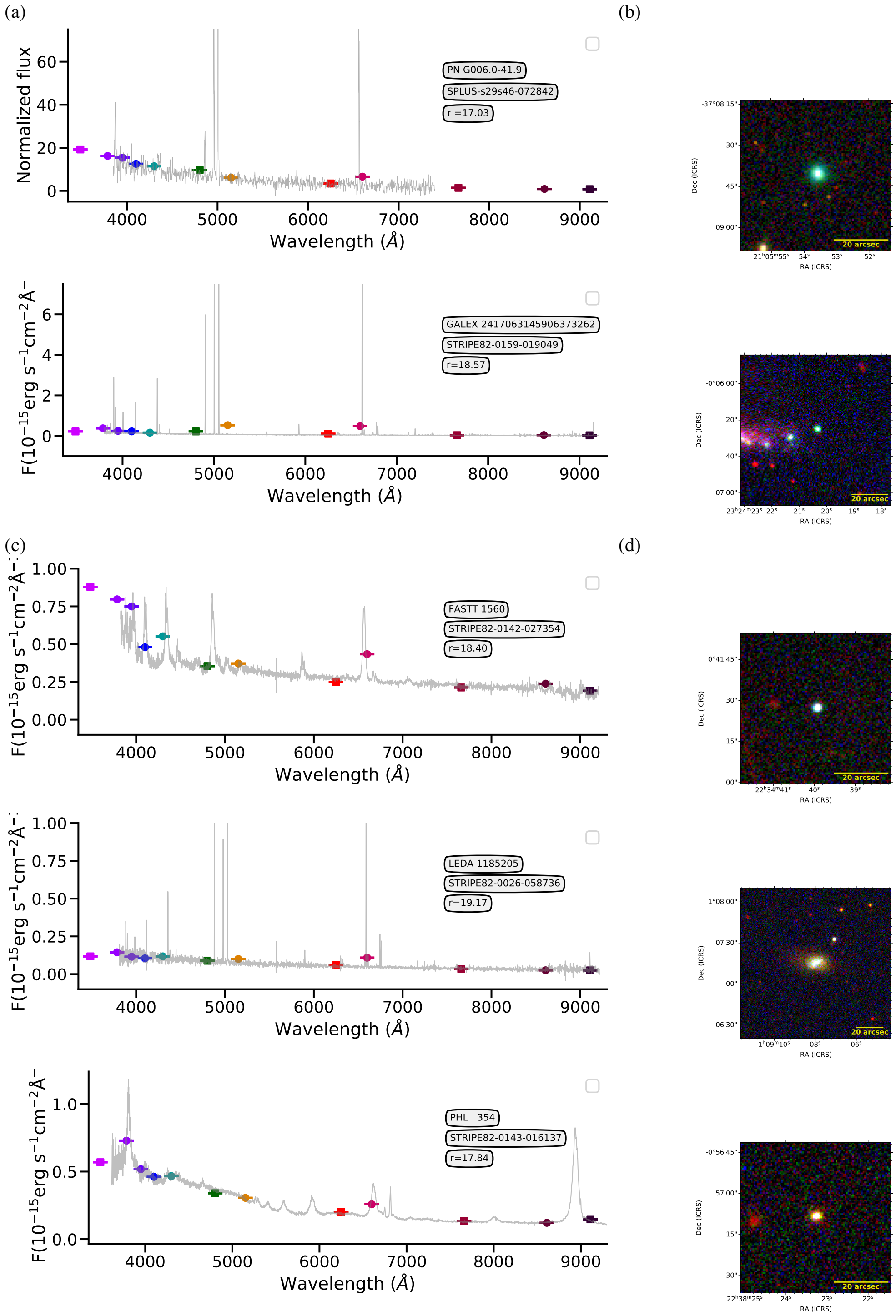

Figure 8. Spectra of the known objects select with our algorithm

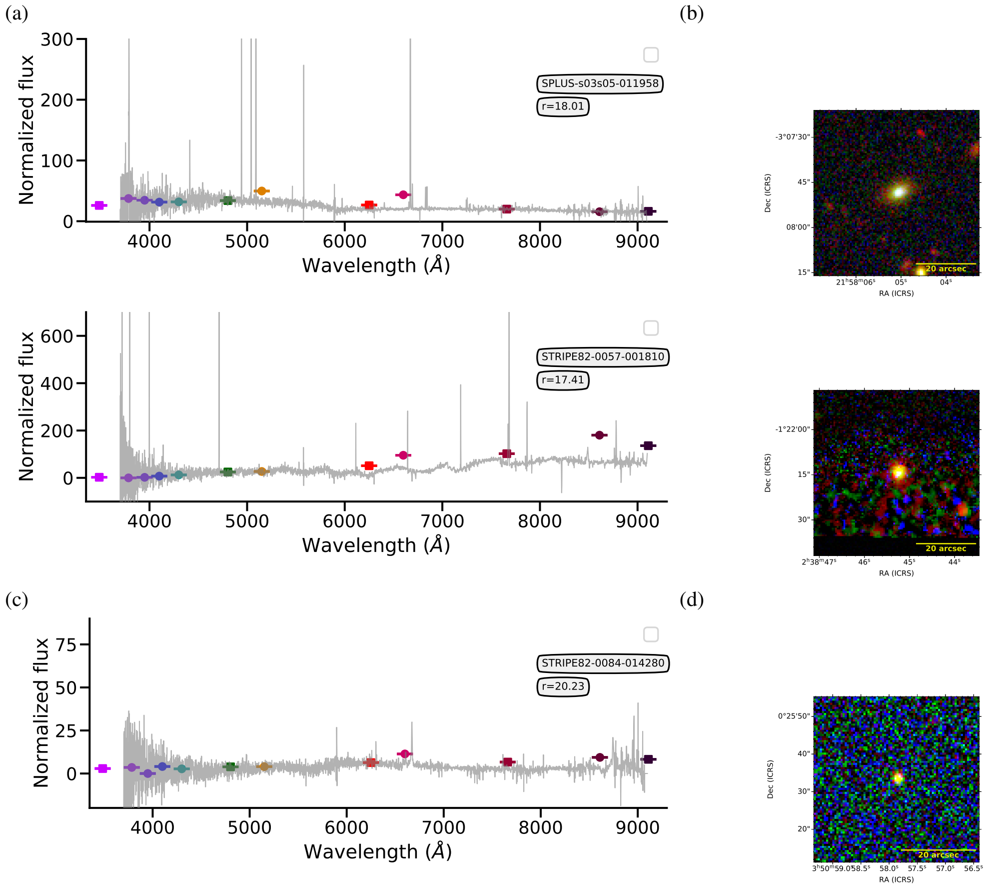

Figure 9. Spectra of the Lamost

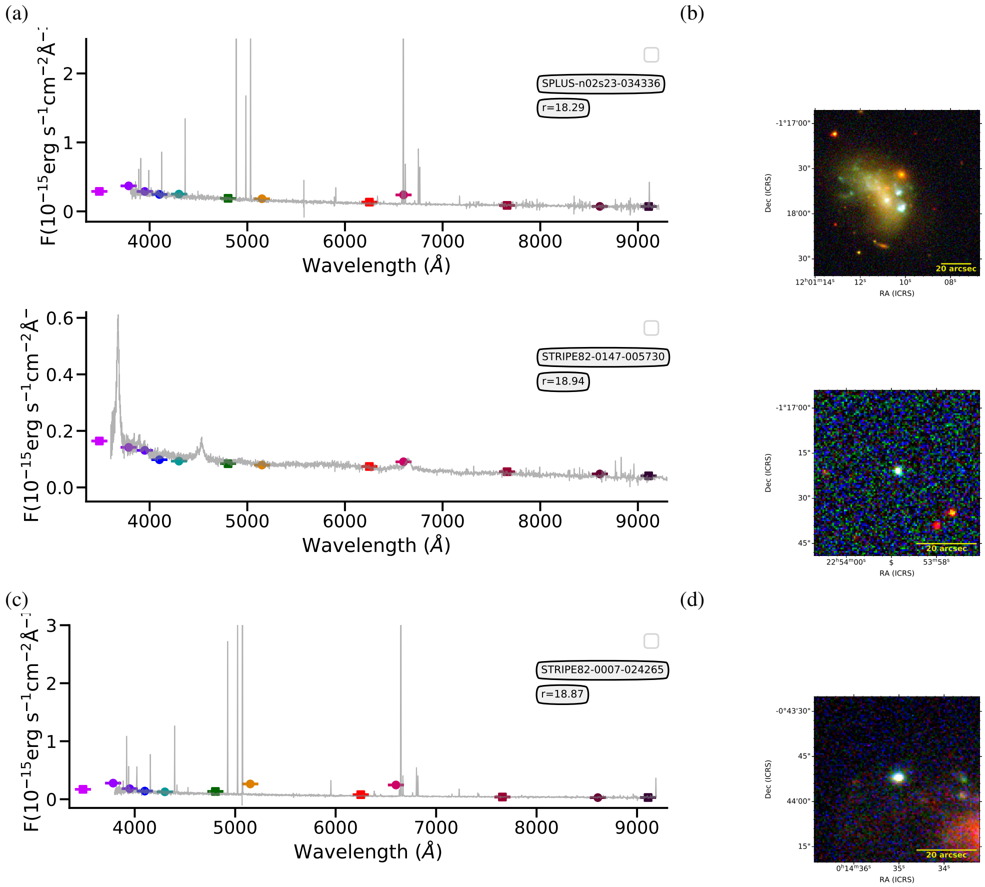

Figure 10. Spectra of the SDSS