Physical properties of low mass Star-Forming Galaxies at intermediate redshifts (z<1)

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Introduction

Dwarf galaxies play a key role in galaxy formation and evolution:
- They resemble the first structures that hierarchical models predict to form first in the Universe (Dekel & Silk 1986) and that are responsible for the reionization process (Bouwens et al. 2012).
- The way or epoch they form and how they evolve are still open questions of modern astrophysics:
  - Early formation model (Dekel & Silk 1986)
  - Delayed formation model (Kepner et al. 1997)
  - Mass dependent scheme (Mamon et al. 2012)

VIMOS spectroscopy

Deep R=580 VLT/VIMOS spectroscopy reduced using VIPGI (Scodeggio et al. 2005) and Reduceme (Cardiel 1999) at UCM and Laboratoire d’Astrophysique de Marseille (LAM).

Morphology

The spectrum is characterized by a faint, blue and flat continuum and strong emission lines, revealing that the systems are dominated by an underlying star formation burst.

Physical Properties

- Daylight-based properties of the sample of objects confirmed spectroscopically in VIMOS/VLT survey. Stellar masses were obtained using the Pacifici et al. (2012) approach:
  - 62 M < 10^8 M⊙ dwarfs and
  - 32 BCDs

- For more information about stellar masses and Star Formation Histories see Rodríguez-Muñoz talk.

Conclusions

- a) Unique sample of extremely low-mass star-forming galaxies at intermediate z. Our sample extends the available data range to extremely low stellar masses (<10^8 M⊙).
- b) SFRs and Stellar Masses are consistent with the SF main-sequence over 2 dex range. More massive objects show higher SFRs than low-mass objects, following the SF main sequence.
- c) Distant Dwarfs and BCDs follow the overall star-formation sequence in the excitation-luminosity diagram, populating the high excitation, low metallicity and high strength region.
- d) Low Mass SFGs (M<18) present short SFHs that form
  - 90% of mass in the 0.8 – 2.3 Gyr period prior to the obs
  - 50% of in the 0.4 – 0.6 Gyr period
  - “Late” epoch of formation
    - Confirms SLOAN results
    - Compatible with Downizing
- e) Key science-case for the future E-ELT/MOSAIC Spectrograph

The Sample

We selected the sample on the CDFS field. Photometry (40 bands, from UV to far-IR) and preliminary photometric redshifts and stellar masses were obtained from RAoW database (Pérez-González+ 2008). Morphology from Griffith+ (2012). Main selection was done by stellar Mass. We consider two different galaxy samples selected from the SUBARU-NB816 image:

Sample 1: 675 Dwarfs M < 10^8 M⊙
- 0.3 < zphot < 1
- m_v,ab < 26

Sample 2: 900 BCDs Tracers of dwarfs at intermediate z
- M_B,0 > -18.5
- (B-V)_0 > 0.6
- v_pec,0 > 23 mag arcsec^{-2}

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Example of Dwarf candidate to low metallicity

Deep VIMOS survey spectroscopy

- Their study has been biased to local universe or clusters
- Evolved stellar population; hamper accurate estimations of age
- Evolution dominated by interactions with near neighbors.

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