Galaxy Evolution across the Hubble Time
Proceedings IAU Symposium No. 235, 2006
F. Combes & J. Palouš, eds.

doi:10.1017/S1743921306010556

Obtaining the (dust-obscured) star formation history using the VLA-COSMOS survey

V. Smolčić[1], E. Schinnerer[1], M. Scodeggio[2], C. L. Carilli[3], P. Franzetti[2] and K. Jahnke[1]

[1]Max Planck Institut für Astronomie, Königstuhl 17, Heidelberg, D-69117, Germany
email: smolcic@mpia.de

[2]IASF Milano-INAF, Via Bassini 15, I-20133, Milan, Italy

[3]National Radio Astronomy Observatory, P.O. Box 0, Socorro, NM 87801-0387

Abstract. Using the multi-wavelength COSMOS survey (Scoville *et al.* 2006), we develop a method based on purely photometric data to separate the *faint VLA-COSMOS radio population* into star-forming (SF) galaxies and active-galactic nuclei (AGN). Based on this classification method we select SF galaxies within our sample and present first results on the cosmic (dust-obscured) star-formation history based on VLA-COSMOS (Schinnerer *et al.* 2006) radio data.

Radio emission at 1.4 GHz (20 cm) is dominated by the emission from SF galaxies and AGN, hence a reliable SF/AGN separation is essential for a robust determination of SF rates utilizing radio data. While AGN dominate radio counts at larger flux densities, their contribution compared to SF galaxies at low fluxes (<1 mJy) is still controversial. The VLA-COSMOS survey ($1\sigma = 10\,\mu$Jy) at 1.4 GHz provides enough targets to allow for a statistically significant characterization of the 'population mix' of faint radio sources: Our sample consists of ~2000 radio sources that have an optical counterpart within $1.5''$. Out of this sample we select SF galaxies in two steps:

(*a*) We exclude broad line AGN (type 1) by rejecting objects that show medium or hard X-ray emission and are defined as point sources in HST images (Leauthaud *et al.* 2006) or visually classified as containing a point-source.

(*b*) We exclude narrow line AGN (type 2) by fitting the UV to NIR spectral energy distribution of our sources with PEGASE stellar population synthesis models using a package called GOSSIP (Franzetti 2005). We derive the rest-frame P1 color (see Smolčić *et al.* 2006) and select SF galaxies by applying $P1 \leqslant 0$. A sample of SF galaxies selected in a such a way is ~65% complete and up to ~ 20% 'contaminated' by AGN type 2.

Our preliminary results indicate that SF galaxies are not the dominant radio population at faint flux densities (<1 mJy), but rather have a fairly constant contribution with decreasing fluxes. Without any completeness corrections, we derive lower limits of the SF rate density, ρ_*, as a function of redshift, following Haarsma *et al.* (2000) and Condon et al. (1992). ρ_* shows, as expected, an increase with redshift up to $z = 1$.

References

Condon, J. J. 1992, ARA&A, 30, 575
Franzetti, P., 2005, PhD thesis, Universita' di Milano-Bicocca, Milano
Haarsma, D. B., Partridge, R. B., Windhorst, R. A., & Richards, E. A. 2000, ApJ, 544, 641
Leauthaud, A. *et al.* 2006, ApJS, in press
Schinnerer, E., Smolčić, V., *et al.* 2006, ApJS, in press
Scoville, E., *et al.* 2006, ApJS, in press
Smolčić, V., *et al.* 2006, MNRAS, 371, 121