

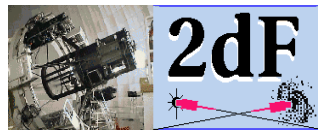
Cosmological evolution of physical properties of galaxies

- When and how did galaxies form?
- Links between high-z (young) and local (old) galaxies?
- Timescales for galaxy evolution?
- Dependence with environment?
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→ Needs for **large statistical samples** of galaxies at **various epochs**

Local universe:

2dFGRS & SDSS



**~ 10⁶ galaxies
high-res. spectra**

Distant universe: **VVDS**, DEEP, GDDS, zCOSMOS, etc

**~ 10⁴-10⁵ galaxies
low/med-res. spectra**

Physical quantities derived from VVDS spectra

Quantity	$z < 0.45$	$0.45 < z < 0.95$	$z > 0.95$
STB vs. AGN	H α , [NII], [SII] [OIII], H β	[OIII],[OII],H β	<i>X-rays, FIR?</i>
SFR	H α	H β	[OII] (-> $z=1.55$)
Reddening	H α /H β	H β /H γ	
Gas-phase Metallicity	[NII]/H α	[OIII]+[OII]/H β	UV abs. lines? [NII]/H α in NIR
Stellar mass	$(D_{4000} + H\delta_A)(0.3 < z < 1.3) + \text{photometry}$		
Stellar mass, age metallicity & SFH	stellar cont. + abs. lines + photometry		



VVDS and other deep surveys: pros & cons

Survey	Redshift range	$R = \lambda / \Delta\lambda$	N_{gal}	Limiting mag.
SDSS, 2dF	$z < 0.3$	~ 2000	$\sim 10^6$	$R_{AB} < 17.8/19.5$
VVDS	$0.2 < z < 3.5$	~ 250	$\sim 10^5$	$I_{AB} < 22.5/24$
zCOSMOS	$0.2 < z < 3.5$	$\sim 600/250$	$\sim 10^4$	$I_{AB} < 22.5/24$
DEEP2	$0.7 < z < 1.5$	~ 2000	$\sim 10^4$	$R_{AB} < 24$
GDDS	$1.0 < z < 2.0$	~ 500	$\sim 10^2$	$I_{AB} < 24.5 / K_{AB} < 20.5$

Con

Pro

VVDS: low spectral resolution BUT - high statistics
- minimal selection
- multi- λ coverage



- Autumn 2003: start of spectrophotometric activities (WG created spring 2004, 1st WG meeting last week, ~ 15 participants)
- 1st step: make sure to have an **efficient automatic tool** to measure spectral features in VVDS spectra
 - The "**platefit**" software developed originally by C. Tremonti, J. Brinchmann & S. Charlot for SDSS spectra
- Adaptation of "**platefit**" for the analysis of VVDS spectra (F. Lamareille, J. Brinchmann et al.)
- **Quality assessment** of spectral measurements using "realistic" simulations (S. Paltani, F. Lamareille, J. Brinchmann et al.)



- Summer 2005: "*platefit*" has been applied on ~ **6000 spectra** ($z < 1.5 - \text{flag} > 2$) of the F02 field
 - 1st version of **catalog released on the WG web page** (2nd version last week)
 - Catalog contains **emission-line** ([OII], [OIII], Hb, Ha, etc) and some **stellar continuum** (D_{4000} , $H\delta_A$) measurements (flux, EW) with **associated errors**. More to come soon ...
- First spectrophotometric **analysis** can start ...
- Spectral classification: star-forming vs. narrow-line AGNs (Sey2, LINER)
 - Mass estimates using (D_{4000} , $H\delta_A$) + photometry
 - Metallicity (gas-phase O/H) estimates using ELs and different calibrations
 - Age of formation of the reddest galaxies
 - etc ...



Priorities for **1st papers**:

- Evolution of the Sey2/STB fraction vs. redshift
- Evolution of the Mass-metallicity relation vs. redshift
- Constraining the age of formation of the reddest galaxies
- Evolution of the mass function with redshift
- Evolution of the color bi-modality of galaxies with redshift
- Evolution with z of various spectrophotometric properties of galaxies

Future analysis: make use of other informations

- environment
- multi- λ data (X, UV, FIR, radio, ...)