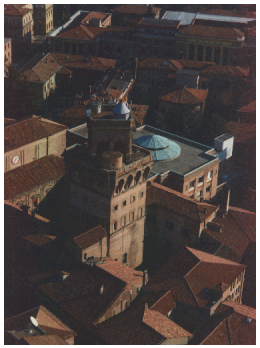


“Stellar Populations via high-R/SNR spectroscopic surveys as tracers of galaxy evolution”

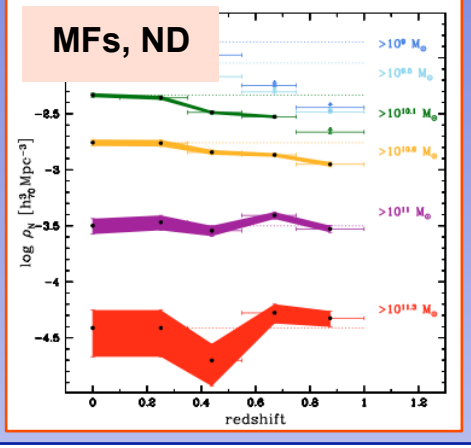
Lucia Pozzetti
INAF Osservatorio Astronomico di Bologna

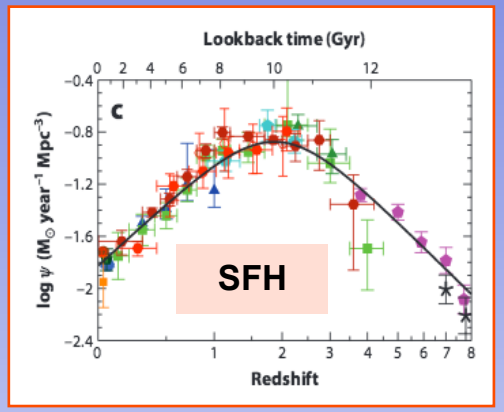
Credits: A. Iovino, A. Mercurio, S. Zibetti

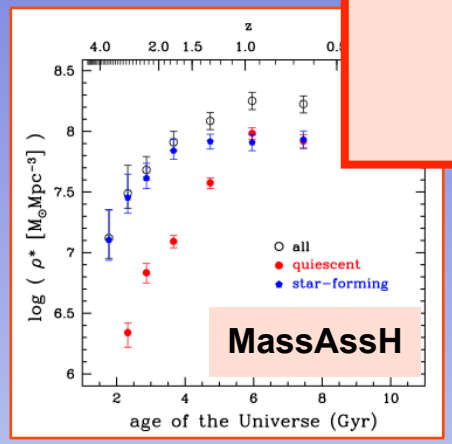
Observational evidences from spectroscopic surveys

Lookback statistical approach up to z~4
(lowR+low S/N+MOS]

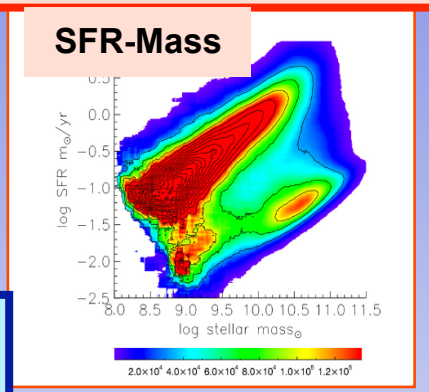
MFs, ND



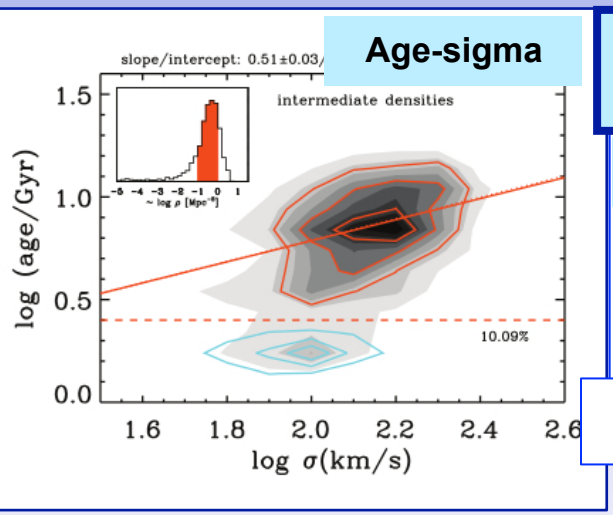




SFR-Mass

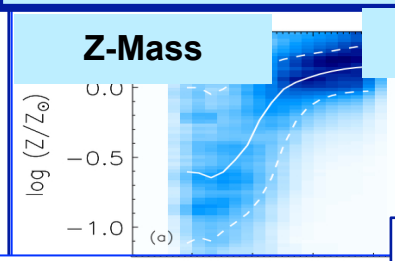


Age-sigma

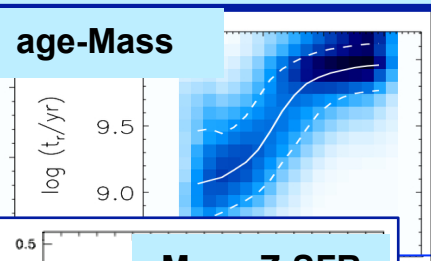


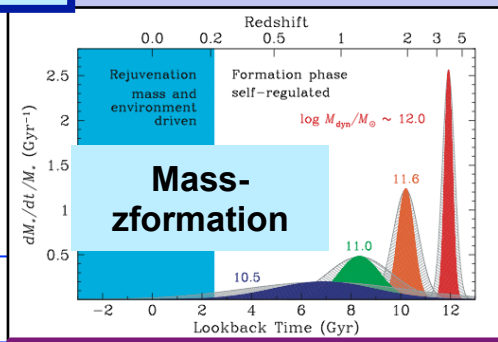
Archeological approach at z~0
(highR+highS/N]

Z-Mass

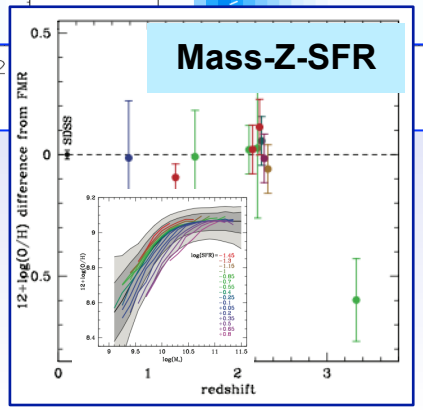


age-Mass





Mass-Z-SFR



MFs, SFH, Mass Assembly History
bimodal distribution of galaxies
Age-Z_{STAR}-Mass-sigma-color
Mass-Z_{GAS}-SFR relations

Evolution is driven by quenching of SFGs into local ETGs: Downsizing scenario

Key questions & observations

Key questions:

- How galaxies form and evolve ?
- Which is the role of the environment in galaxy evolution ? (see Olga's talk)
- Which is the chemical enrichment history of galaxies ?
- What physical mechanisms drive the quenching of SF galaxy into passive ?
- Which is the star formation history (SFH) in individual galaxies ?
- Which is the size evolution history of galaxies ?
- Is the IMF universal and which is its evolution ?
- What drive scaling relations and their evolution ?

Key future observations & approaches and instruments:

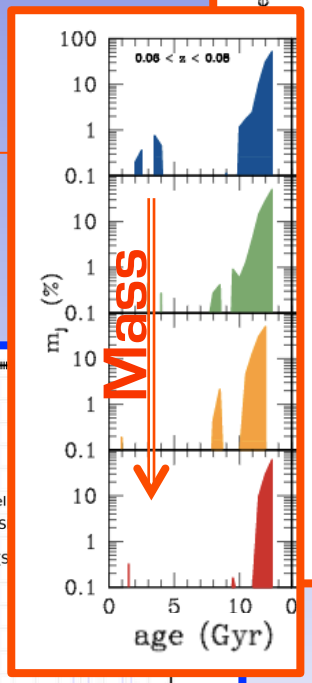
- Medium/high Resolution spectroscopy with high multiplexing to analysis individual galaxies
- Spatially resolved stellar population inside galaxies with IFU
- Archeological approach and lookback reconstruction at z>0.3
- Population Synthesis models + Photoionization codes
- Constrains to galaxy formation models and sub-kpc scale hydro simulations

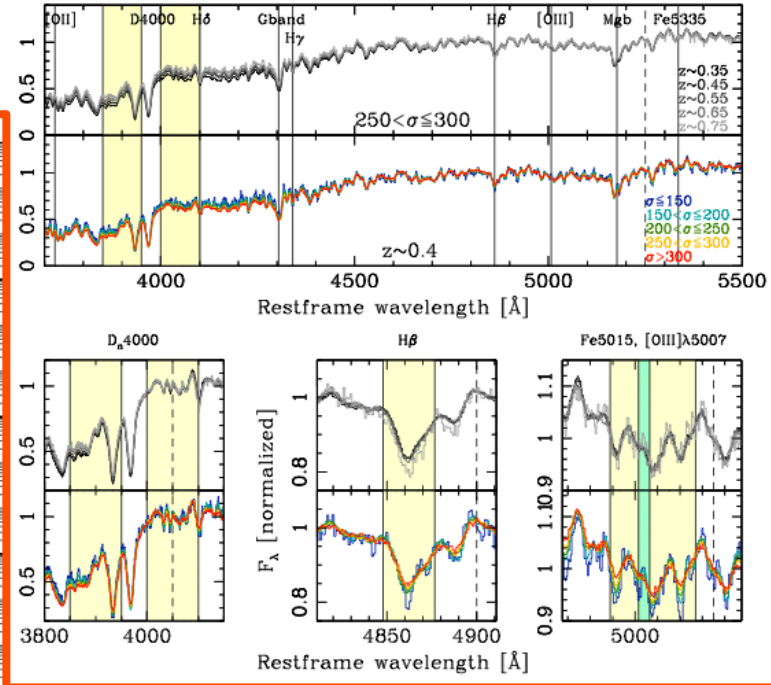
Physical Properties
from High Resolution & high S/N spectroscopy

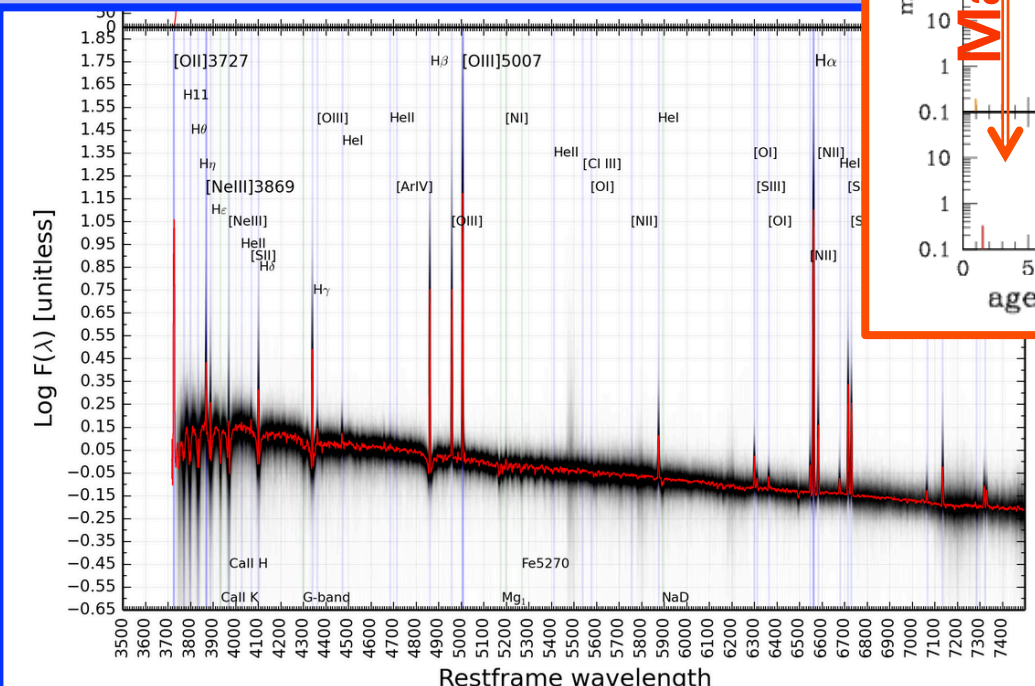
➢ Passive galaxies:

From spectral indices, breaks and continuum

→ Age, Z_{STAR}, sigma, dust continuum, outflows, SFHs...







➢ Star Forming galaxies:

From emission lines, continuum

→SFR, Z_{GAS}, dust , outflows, U, SFHs

Key instruments & surveys
italian/INAF involvement

➢ *Key Instruments (optical/near-IR) & spectroscopic surveys:*

[Italian /INAF PI/co-PI, italian partecipation]

lowR-MOS

- *VIMOS*: VVDS, zCOSMOS, VIPERS, VUDS, CLASH+VLT, ...
- *FORS2*: K20, GMASS, GOODs, ...

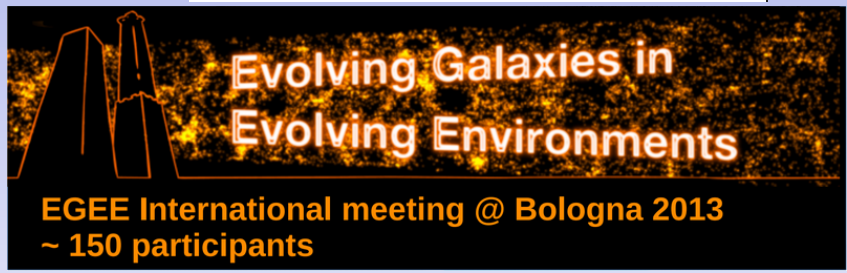
High-R

- *SINFONI*: zC_SINFONI, AMAZE, LSD , ...
- *MUSE*: GASP, CLASH+MUSE, ...
- *X-SHOOTER*: many proposal

\+ *SDSS*, CALIFA

High S/N

✓ Legacy-VIMOS: VANDELS, LEGA-C



➢ *New instruments (high-R &/or multiplexing &/or IFU:)*

- WHT+WEAVE, VISTA+ 4MOST, VLT+MOONS, E-ELT+HIRES
- JWST+NIRSPEC
- Euclid, WFIRST

WEAVE

A new wide-field multi-object spectrograph
for the William Herschel Telescope

Timeline: 2018 + 5 yrs **PI: D. Dalton, A. Vallenari INAF PI**

INAF ISTITUTO NAZIONALE DI ASTROFISICA
NATIONAL INSTITUTE FOR ASTROPHYSICS

Galaxy Teams:

Telescope, diameter	WHT, 4.2m
Field of view	2° ⌀
Number of fibers	960 (plate A)/940 (plate B)
Fiber size	1.3″
Number of small IFUs, size	20 x 11″x12″ (1.3″ spaxels)
LIFU size	1.3′x1.5′ (2.6″ spaxels)
Low-resolution mode resolution	5750 (3000–7500)
Low-resolution mode wavelength coverage (Å)	3660–9590
High-resolution mode resolution	21000 (13000–25000)
High-resolution mode wavelength coverage (Å)	4040–4650, 4730–5450 5950–6850

- **WEAVE-Clusters Science Team**
- **Galaxy Evolution Science Team (StePS, WEAVE-apertif)**
- **WEAVE-LOFAR Science Team**
- **WEAVE-QSO Science Team**

National Meeting
@ Rome
(30-31 May 2016)

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StePS

Timeline: 2018 + 5 yrs

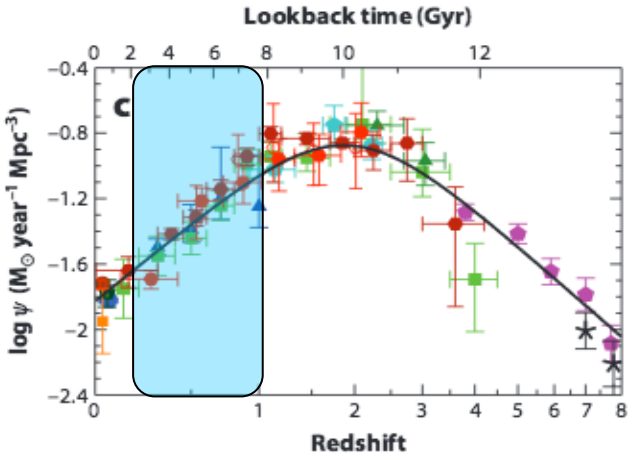
Stellar Populations at intermediate redshift Survey

On behalf of the StePS team*

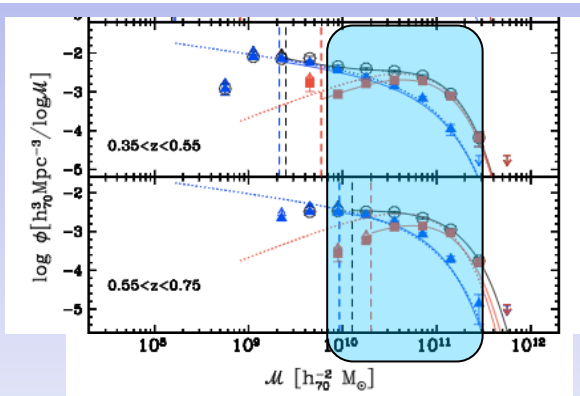
* B. Poggianti, A. Iovino (co-lead), L. Pozzetti, A. Mercurio, S. Zibetti, M. Bolzonella, A. Gallazzi, M. Longhetti, C. Haines , S. Trager, M. Balcells, I. Ferreras, J. Gallego, R. Garcia Benito, R. Gonzales-Delgado, J. Iglesia, J. Iglesias Paramo, J. Knapen, L. Morelli, A. Pizzella, S. McGee, P. Sanchez Blazquez, C. Weidner, P. Merluzzi, G. Busarello, E. Zucca, S. Bardelli, F. LaBarbera, ...

StePS

- ✓ ***survey of faint galaxies (I_{AB}<20.5)***
- ✓ ***wide area of ~25 deg2*** *(CFHTLS-W1-W4, COSMOS, ELAIS-N1)*
- ✓ ***at intermediate redshifts (0.3<z<0.8)*** *(log(M/Msun)>10.2,11.5 at z~0.3,0.8)*
- ✓ ***low resolution grism (R~5000, ~ 1Å resolution)***
- ✓ ***spectra with high S/N>15 (7-14h)***
- ✓ ***a total of ~30000 spectra***

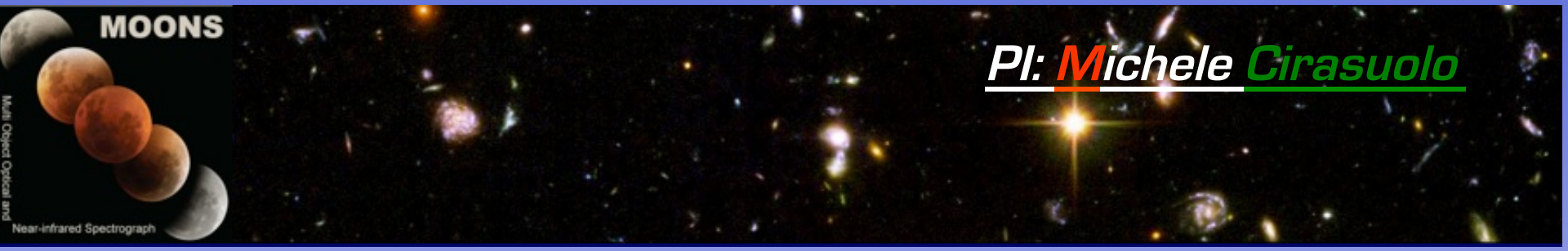


- ➢ All measures on single spectra
- ➢ archeological and lookback approaches



Goals:

- ➢ *analysis of the underlying stellar populations and the gas properties and their evolution at different masses and redshift (age, Z star and gas, dust, ..., U) + SFHs*
- ➢ *provide gas kinematics and stellar velocity dispersions, outflows, feedback*
- ➢ *relate their star formation histories to their local (eg. stellar mass, galaxy morphology) and global (eg. environment) properties;*



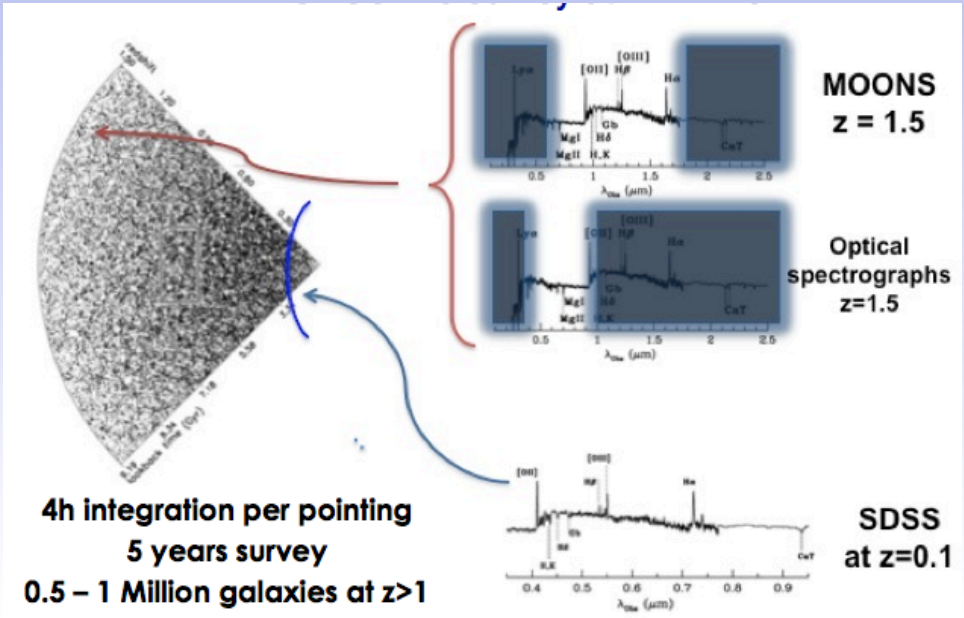
PI: Michele Cirasuolo

Multi Object Optical and Near-infrared Spectrograph for the VLT

The aim is to have **MOONS** operational by 2019.

- ✓ ~1000 fibers over a foV of ~500 square arcmin
- ✓ wavelength coverage is 0.6 μ m-1.8 μ m
- ✓ two resolution modes: medium (R~4,000-6,000) and high resolution (R~20,000)

- ➢ **An SDSS-like survey at z ≈ 1-1.5**



First MOONS Consortium Science Meeting
@ Edinburgh, Royal Observatory
(17 - 19 June 2015)