Unveiling the low-mass galaxy population at intermediate redshift with MUSE

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with (main) contributions from

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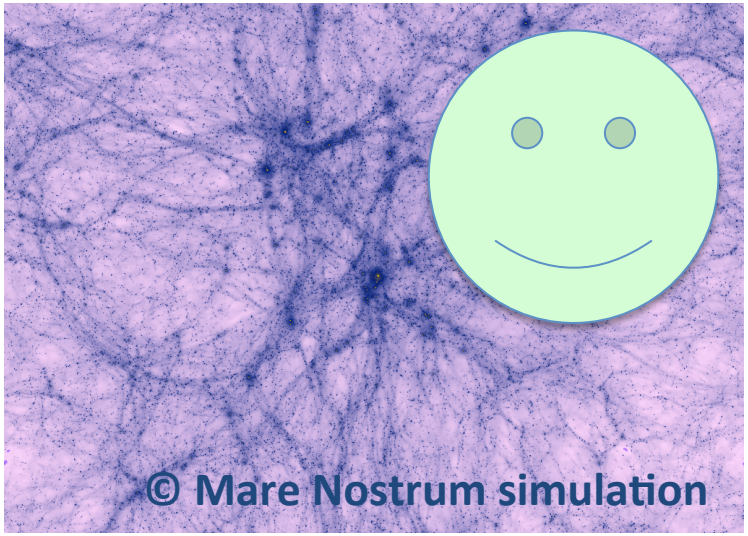
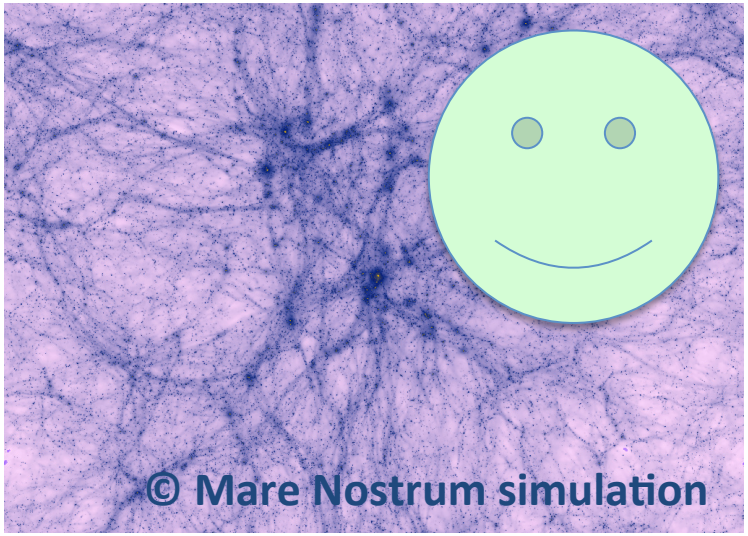
and the MUSE-GTO team

Context



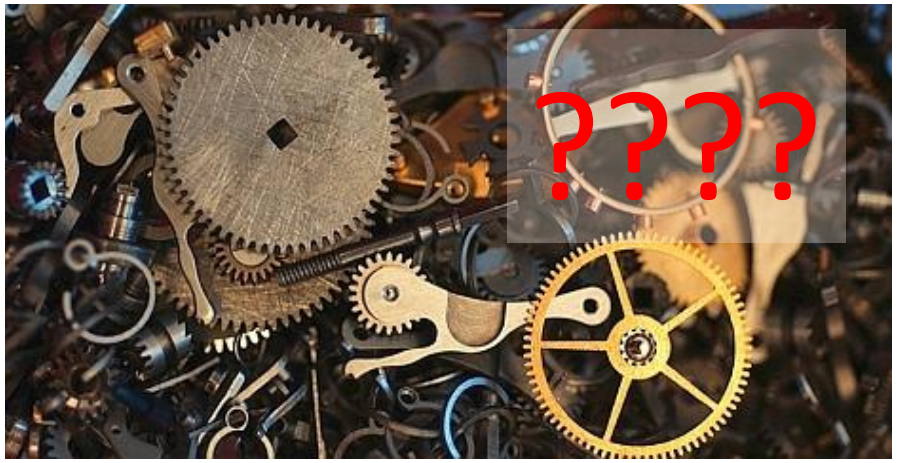
The **dark matter** skeleton of the universe is now quite **well reproduced** with simulations

Context

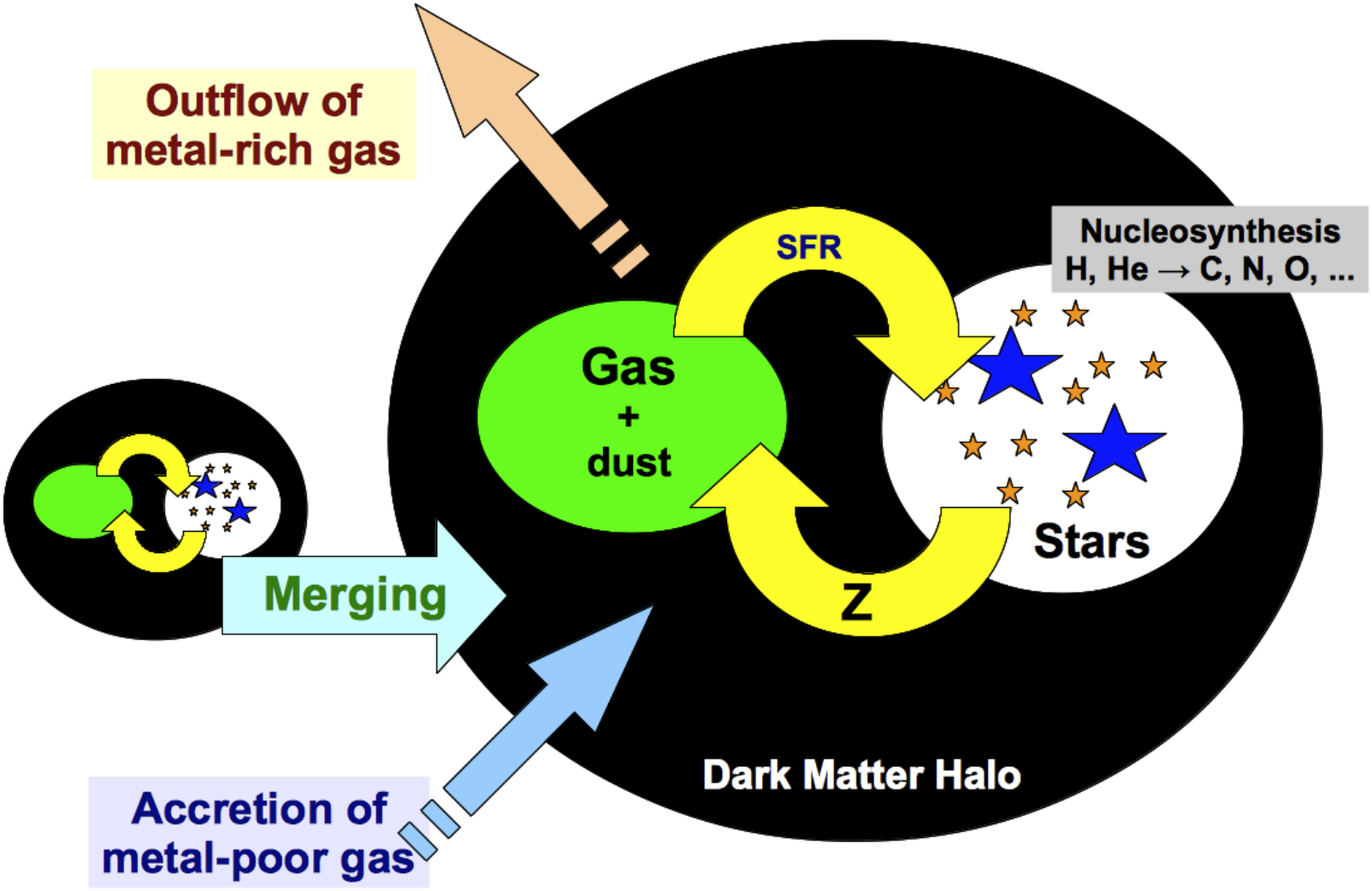


The **dark matter** skeleton of the universe is now quite **well reproduced** with simulations

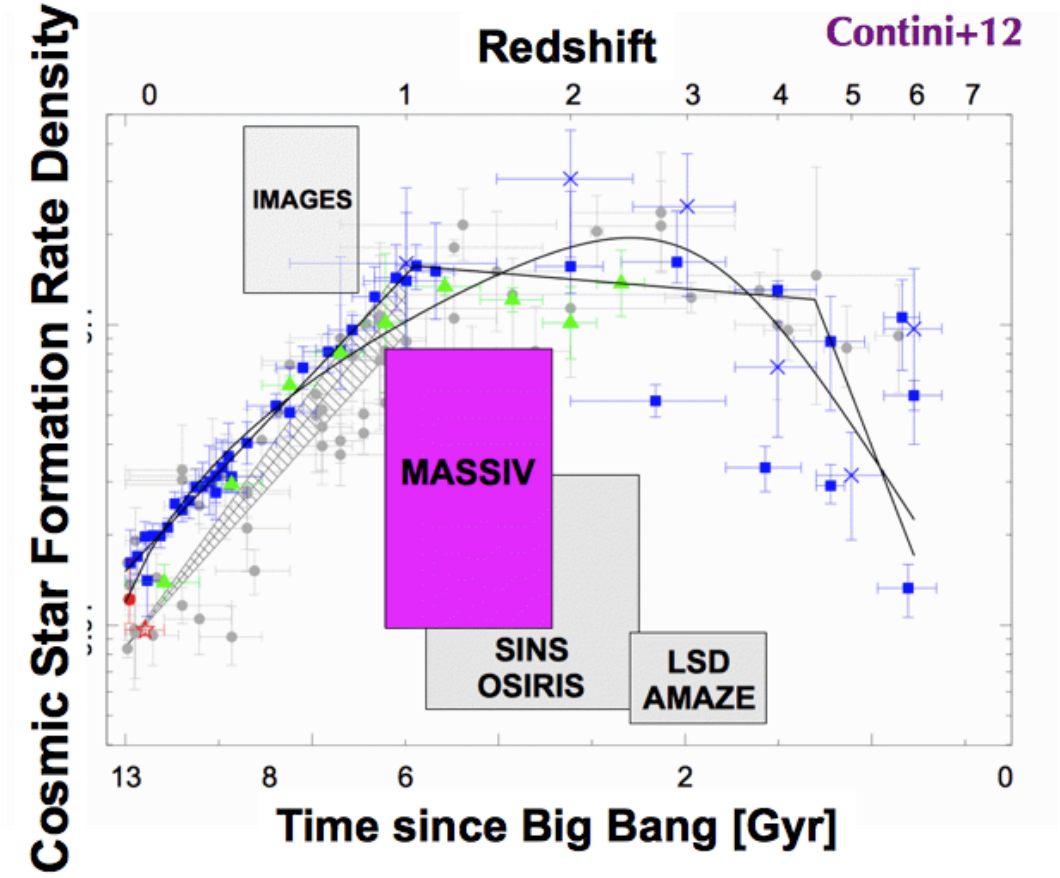
But how **baryons** cool down into DMH to **build galaxies** is still largely **unknown**

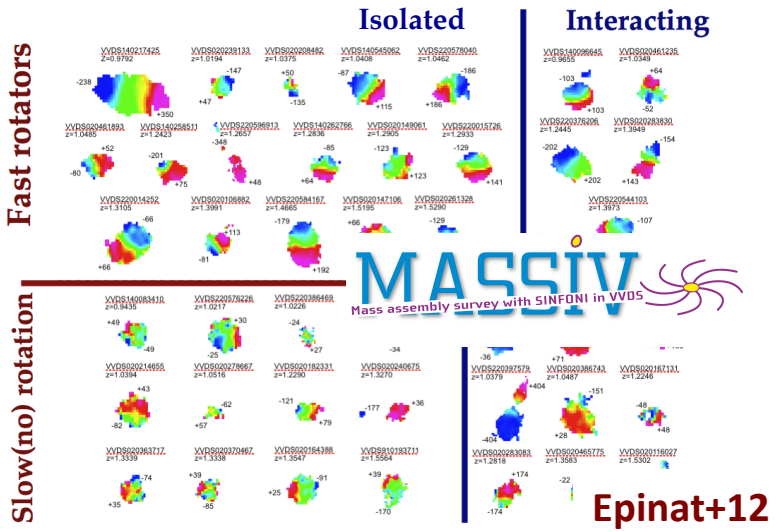


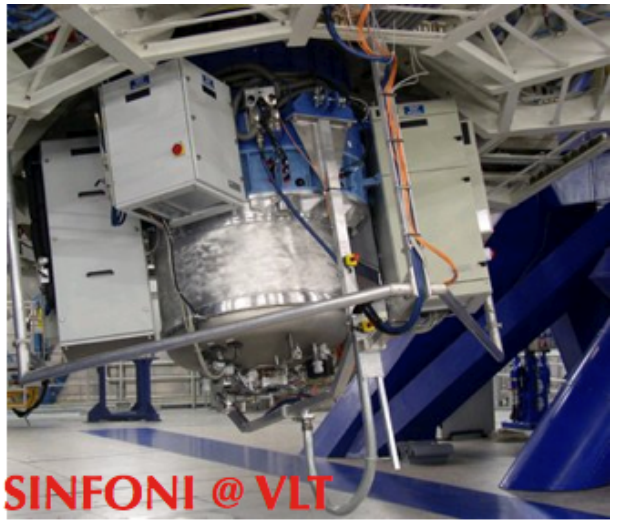
The machine « galaxy »



High-z galaxies under the microscope







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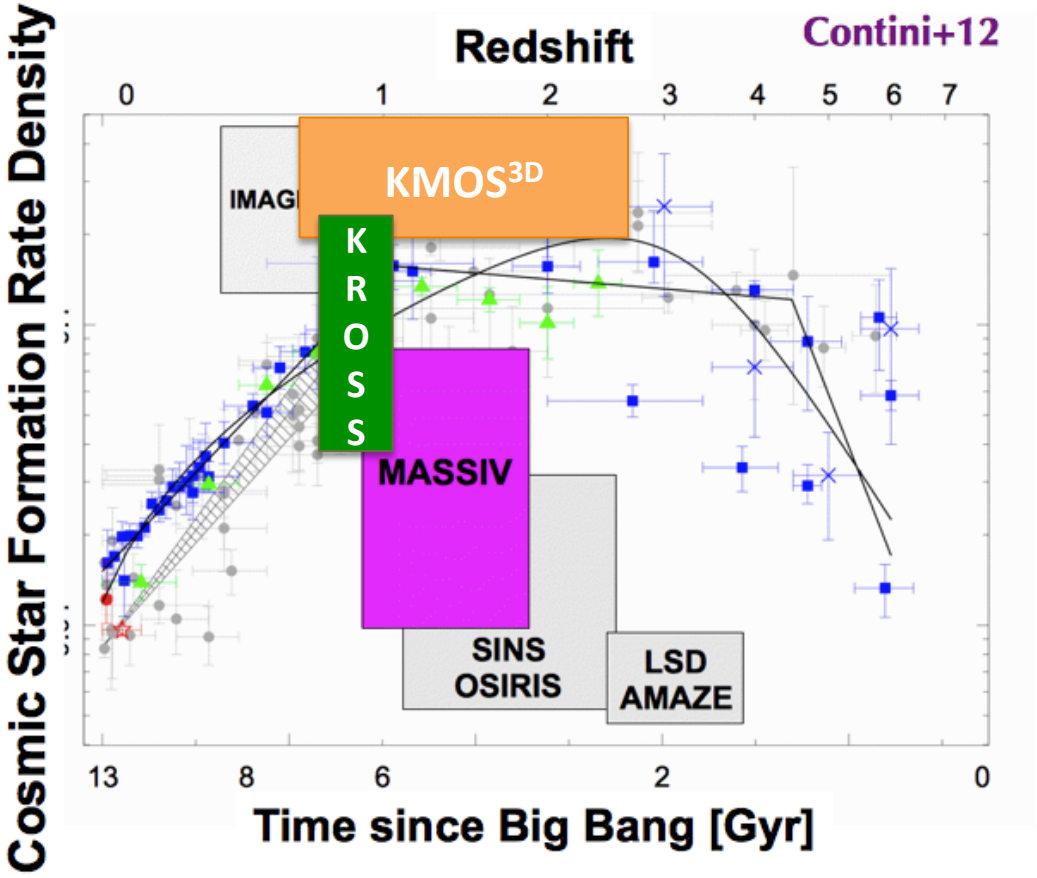
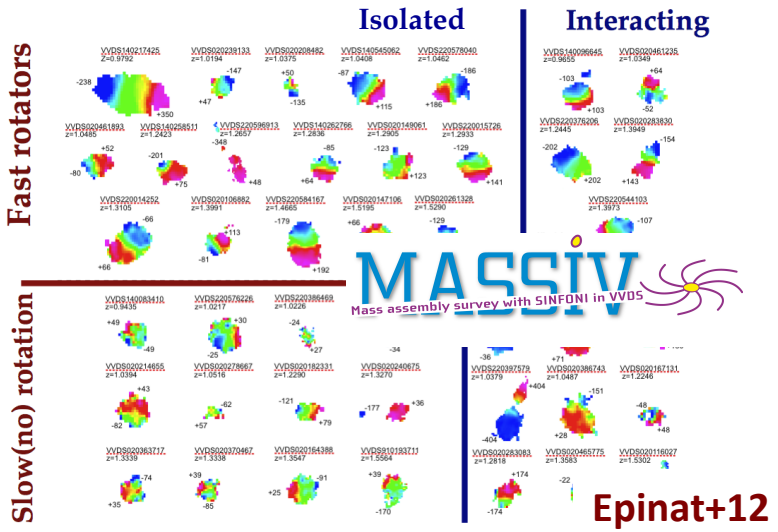
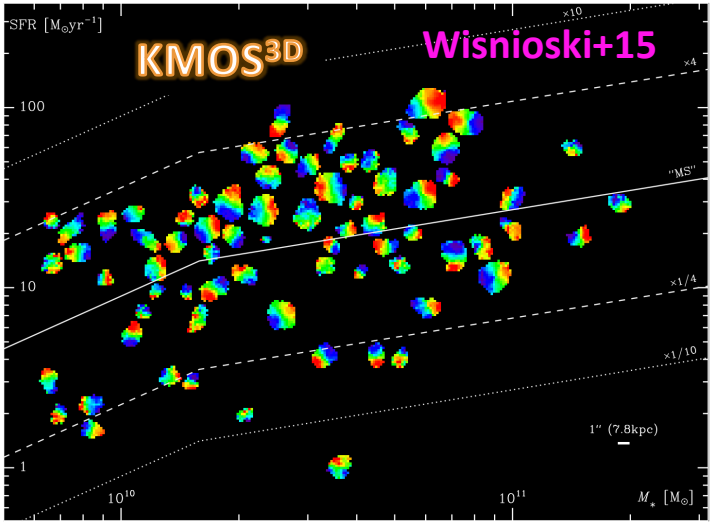
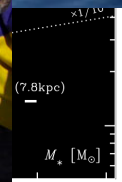






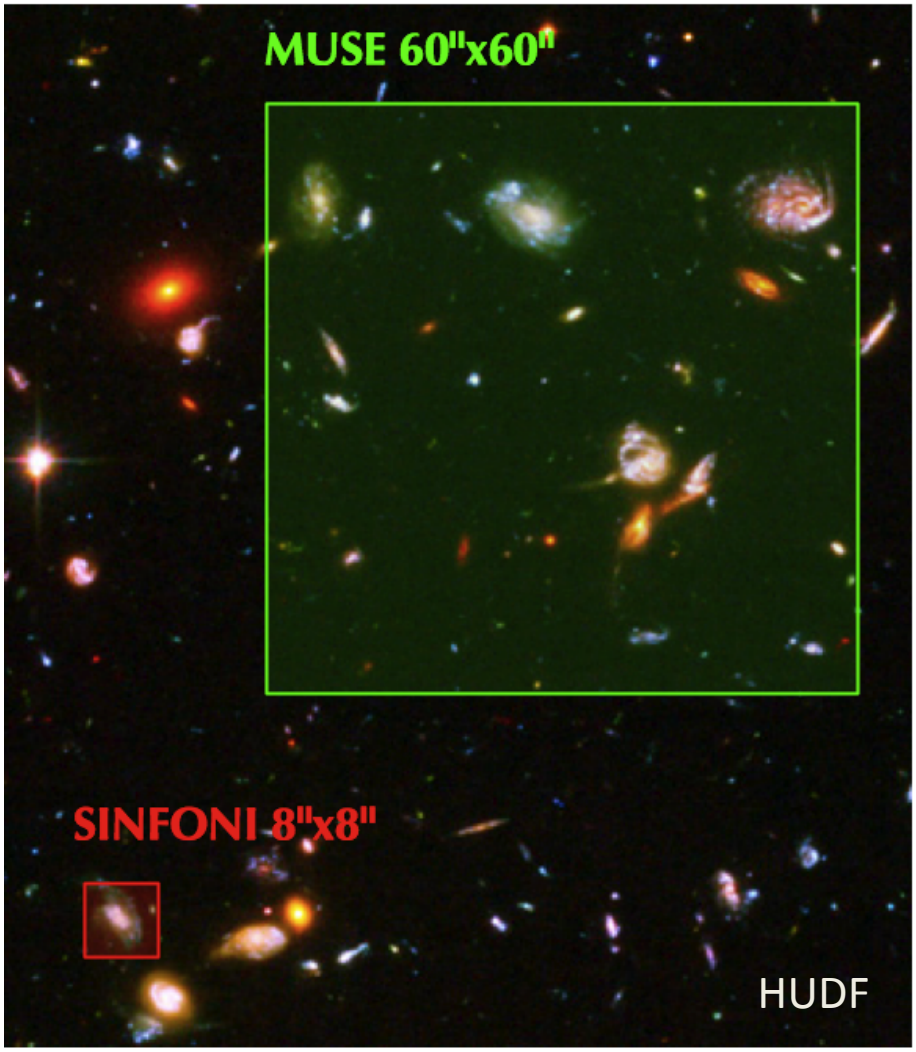
High-z galaxies under the microscope

But, **pre-selected** and **massive** (> 10^{10} M_{sun}) **galaxies only!**



A wide-field IFU for deep surveys

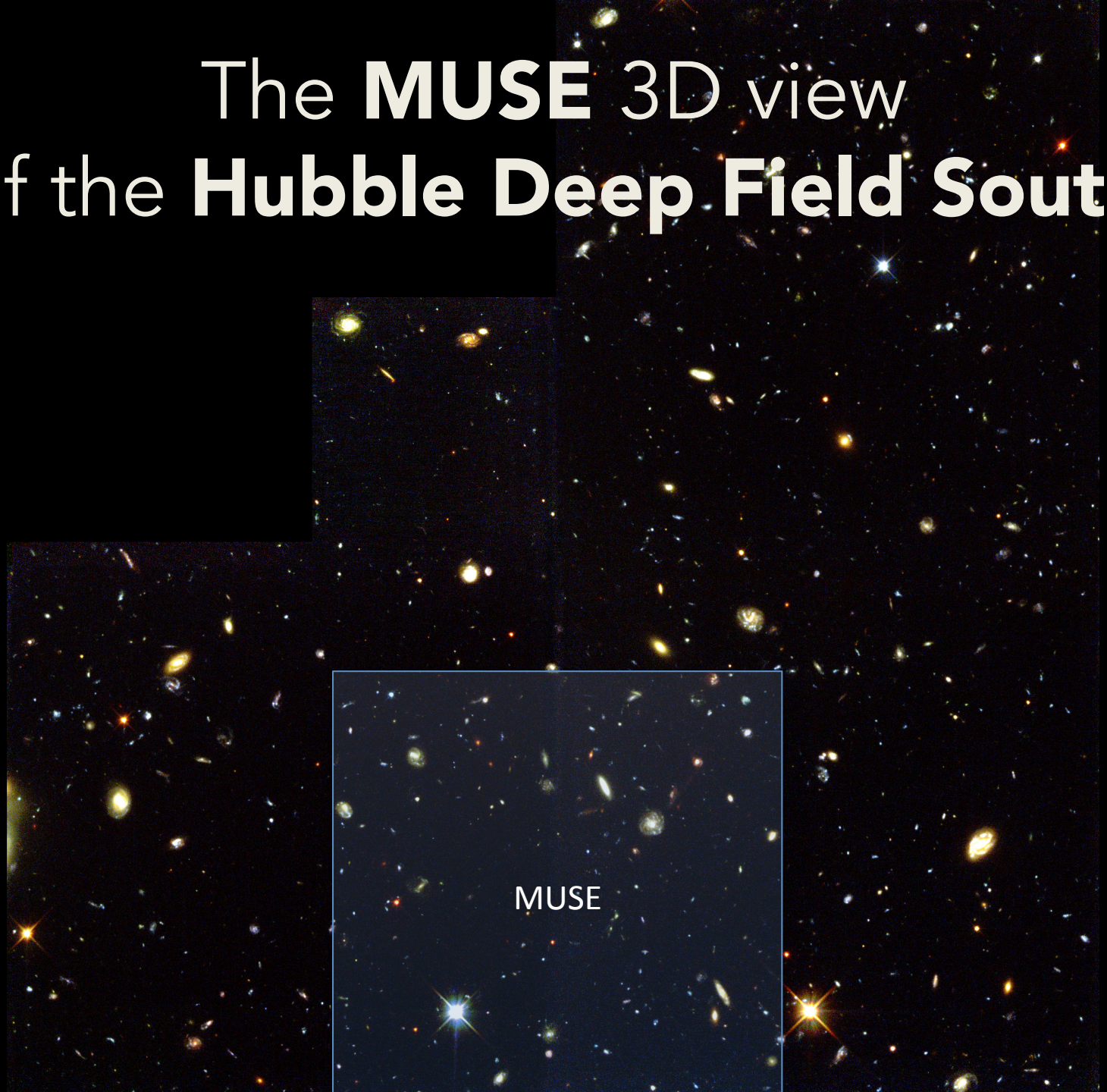
muse
multi unit spectroscopic explorer



Main advantages

- **No pre-selection**
  → blind surveys
  → high potential for discoveries
- **Broad spectral range @ high resolution**
  → physical properties
- **High throughput (~3 x 10^{-19} erg/s/cm^2 in 100h)**
  → cosmic web, faint/low-mass galaxies
- **Wide Field-of-View**
  → statistics, environment

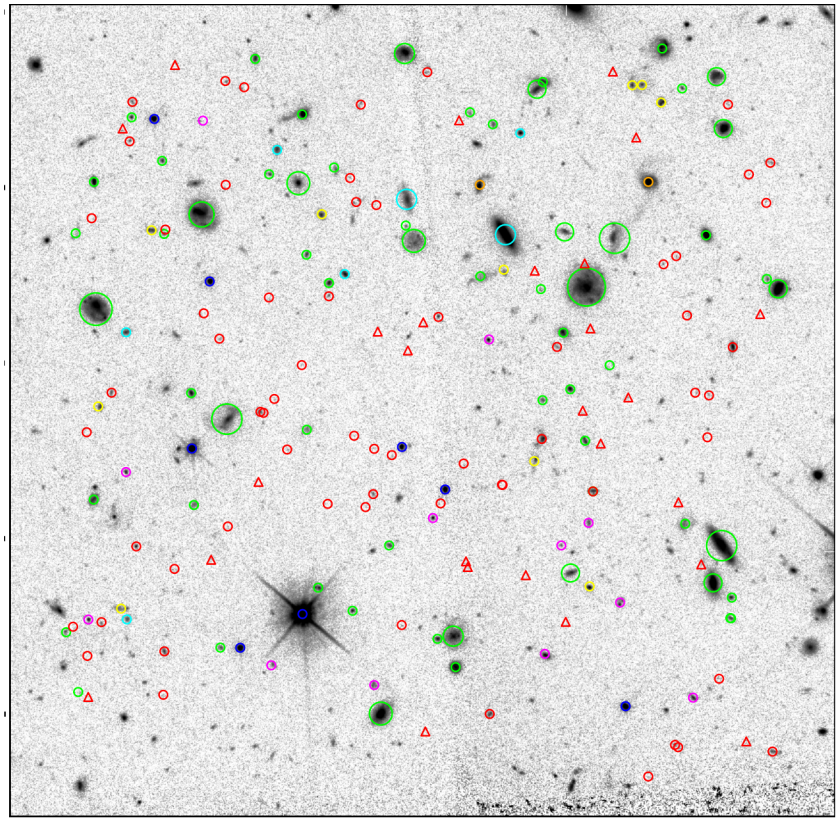
The **MUSE** 3D view of the **Hubble Deep Field South**



MUSE-HDFS: our 1st gold mine for galaxy evolution studies

MUSE – 27 hours

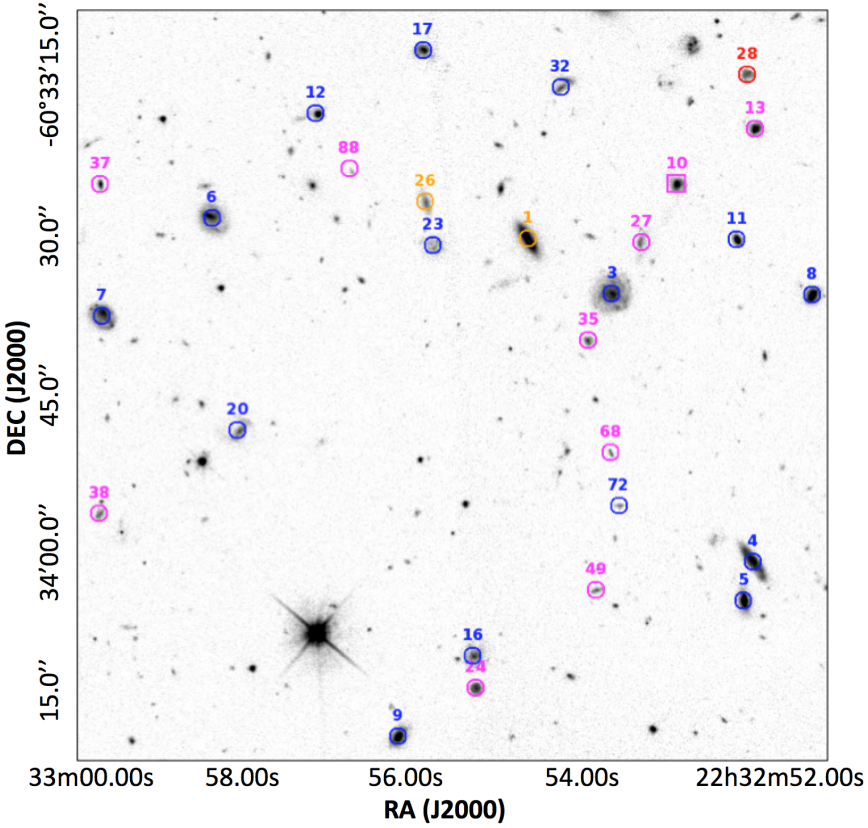
FWHM~**0.65”** – F_{lim}=**10^{-19}** $ergs^{-1}cm^{-2}arcsec^{-2}$



189 redshifts up to I_{AB}~**29.5**

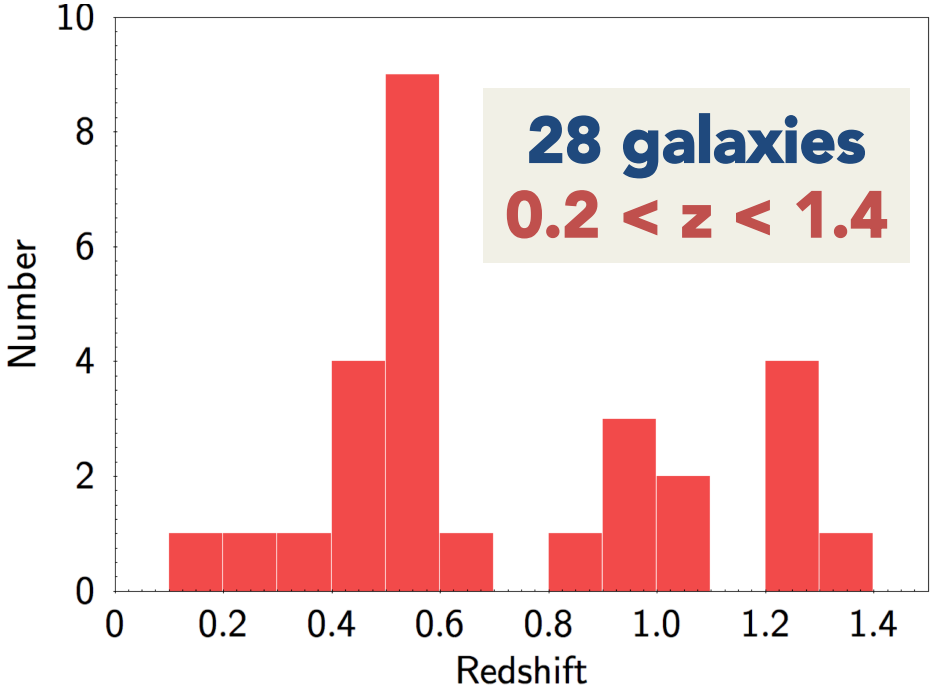
Bacon+15

Morpho-kinematics of galaxies in MUSE-HDFS



Spatially-resolved galaxies

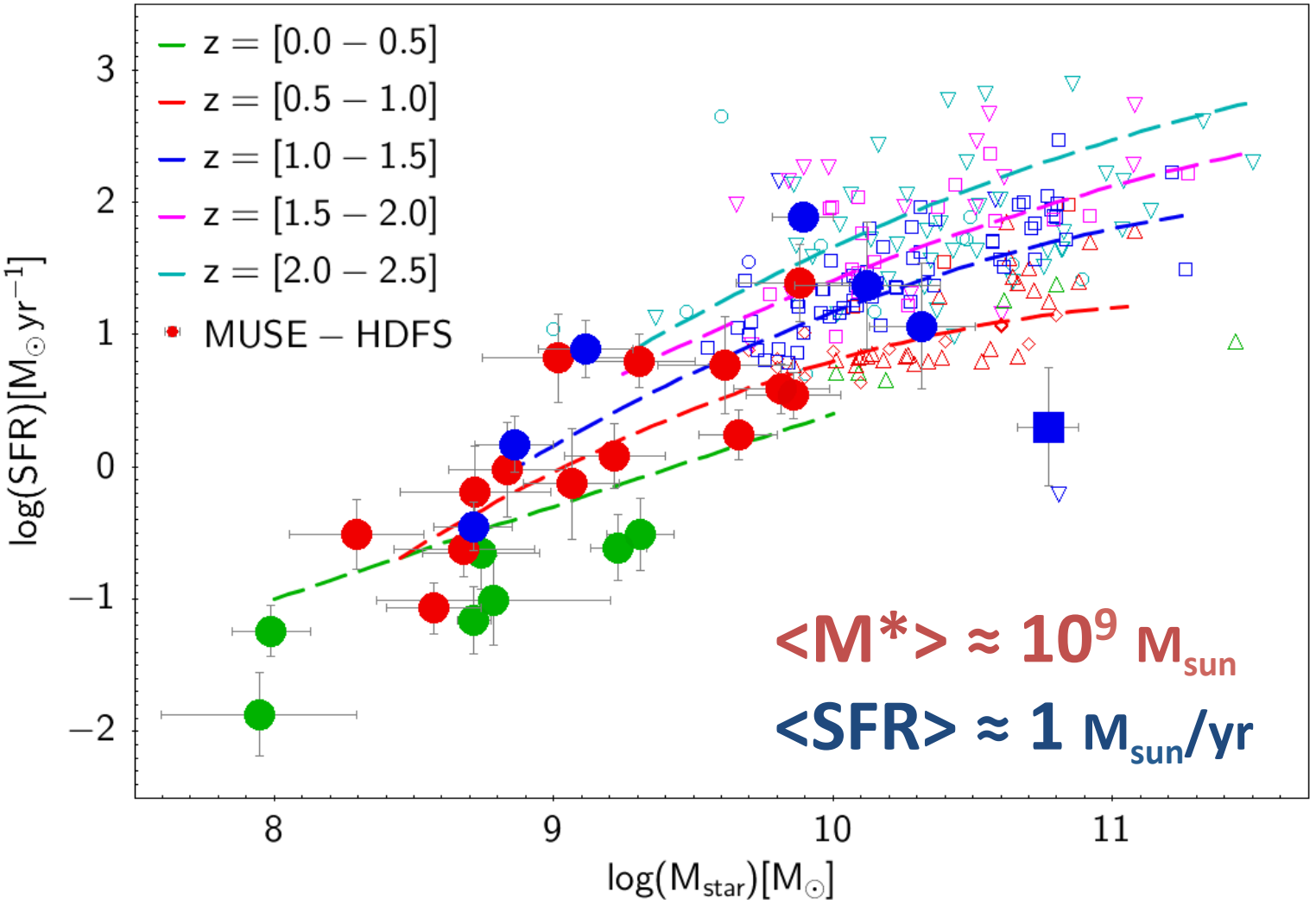
Galaxy size > 2 x PSF



Contini+16, A&A 591, A49

Probing distant & low-mass galaxies

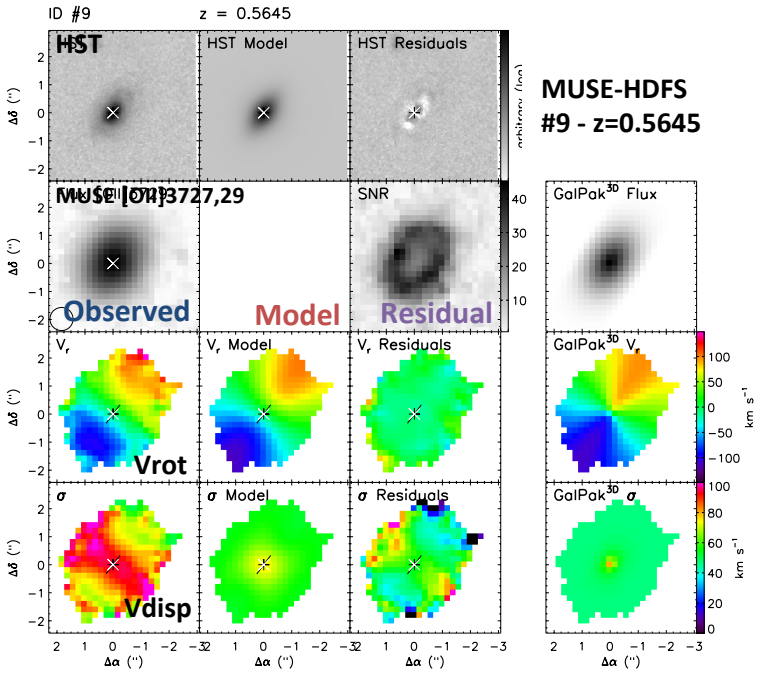
Contini+16, A&A 591, A49



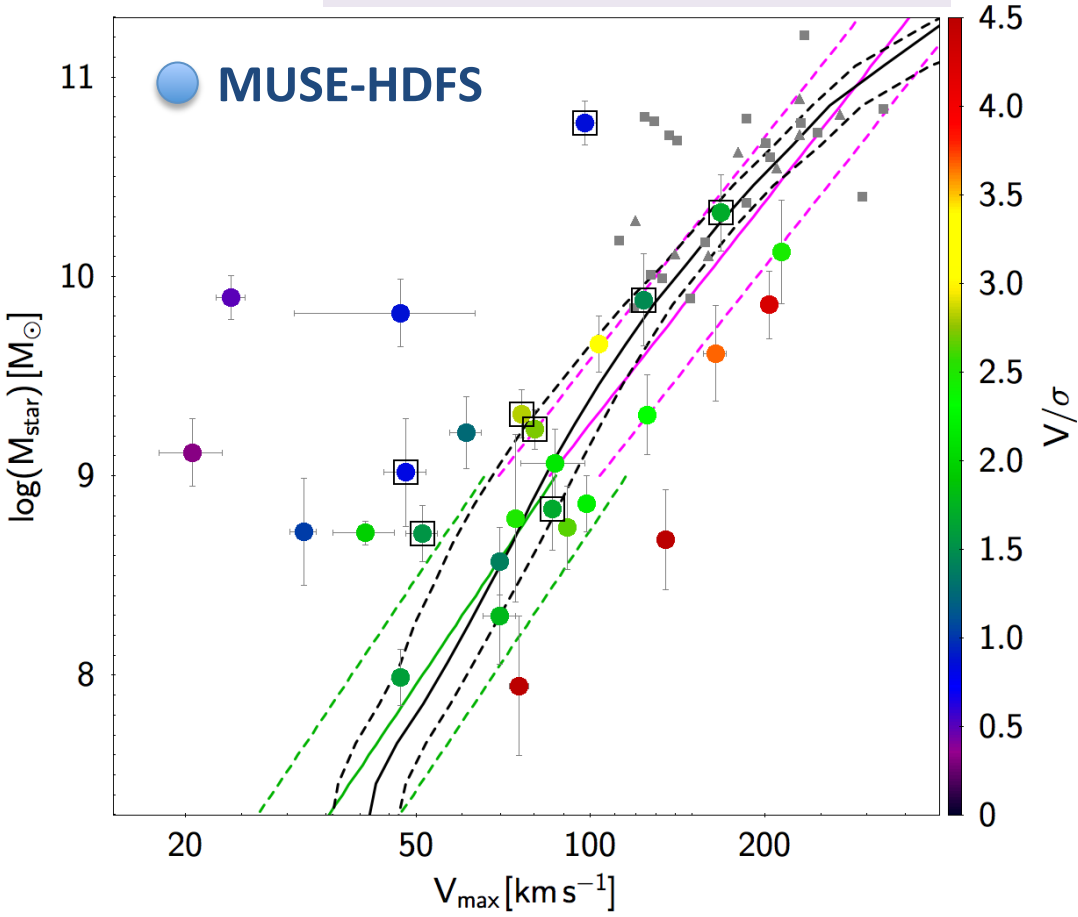
A sample of **lower-mass/SFR galaxies** compared with previous IFU surveys

Morpho-kinematics
Tully-Fisher relation

Morphology from **HST** using GALFIT
Gas kinematics from **strong emission lines** + 2D and GALPAK^{3D} **disk modeling**



Contini+16, A&A 591, A49

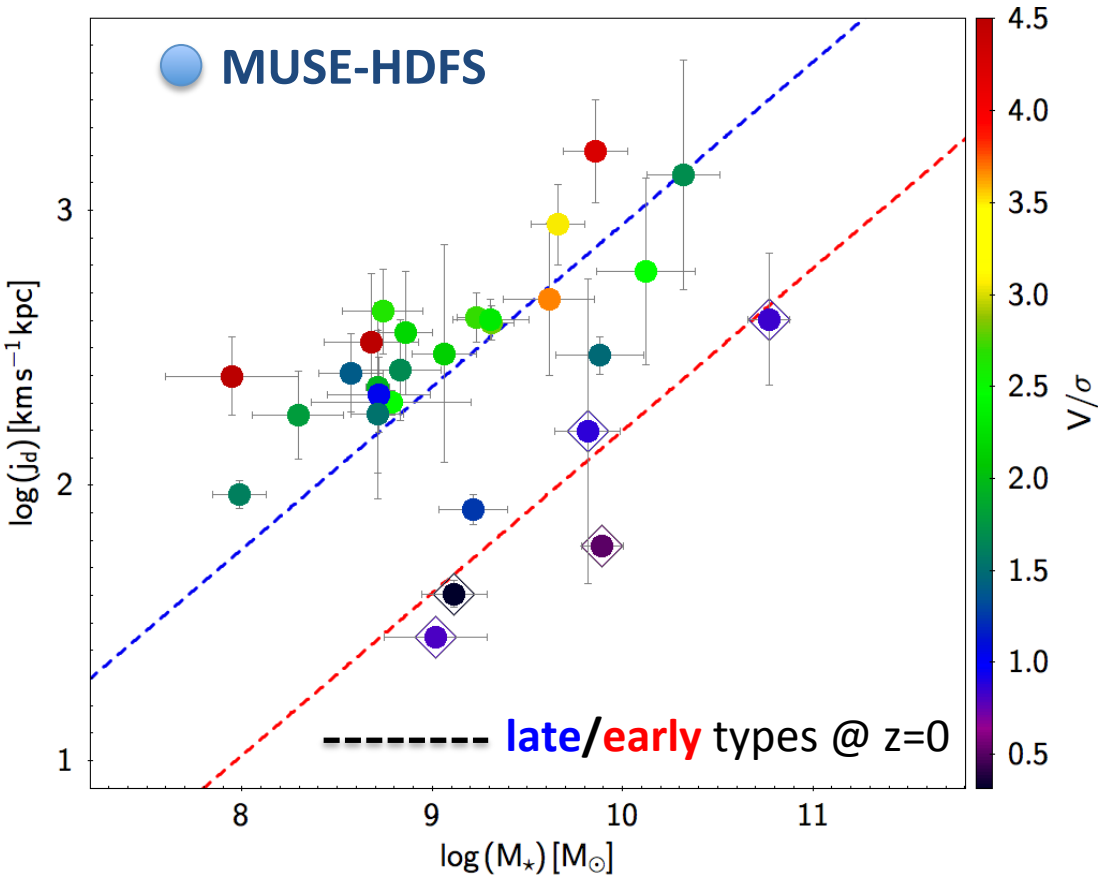


Most of **low-mass (< $10^{9.5}$ $M_\odot$) galaxies** follow the TFR, but higher dispersion

Morpho-kinematics
Angular momentum

$J^* = 2 \times R_d \times V_{max}$

Contini+16, A&A 591, A49



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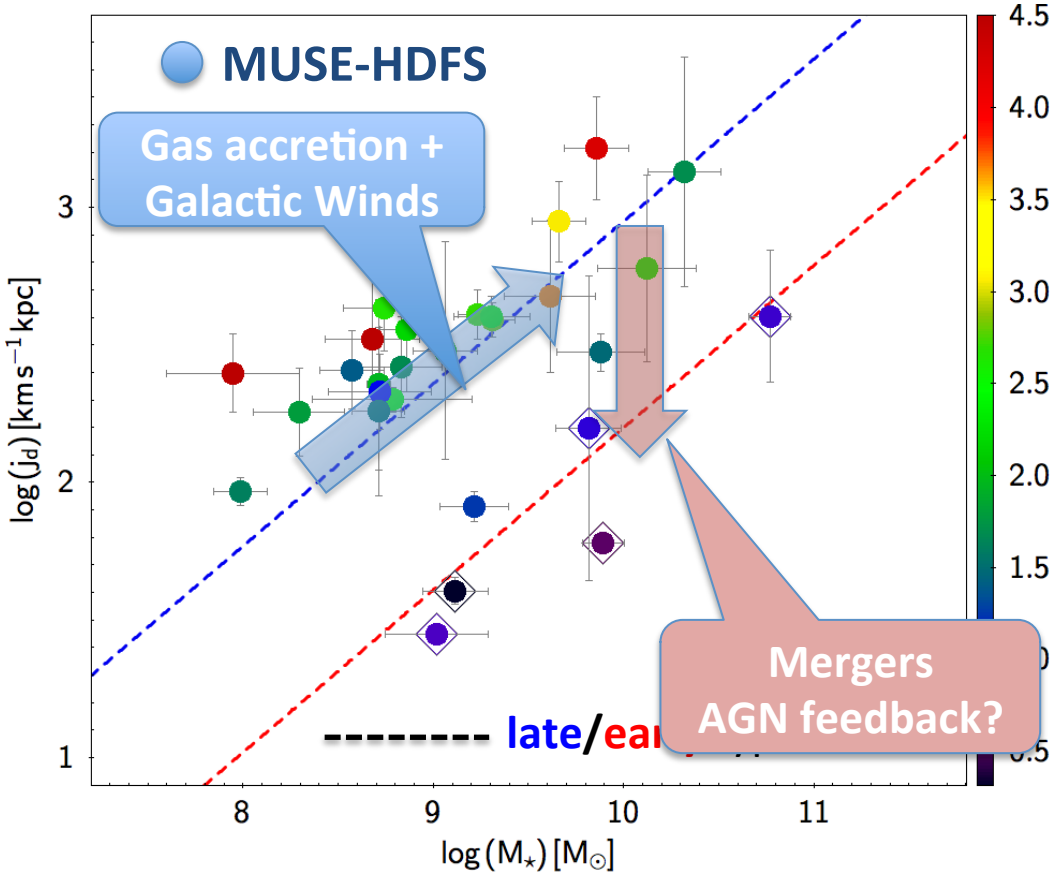
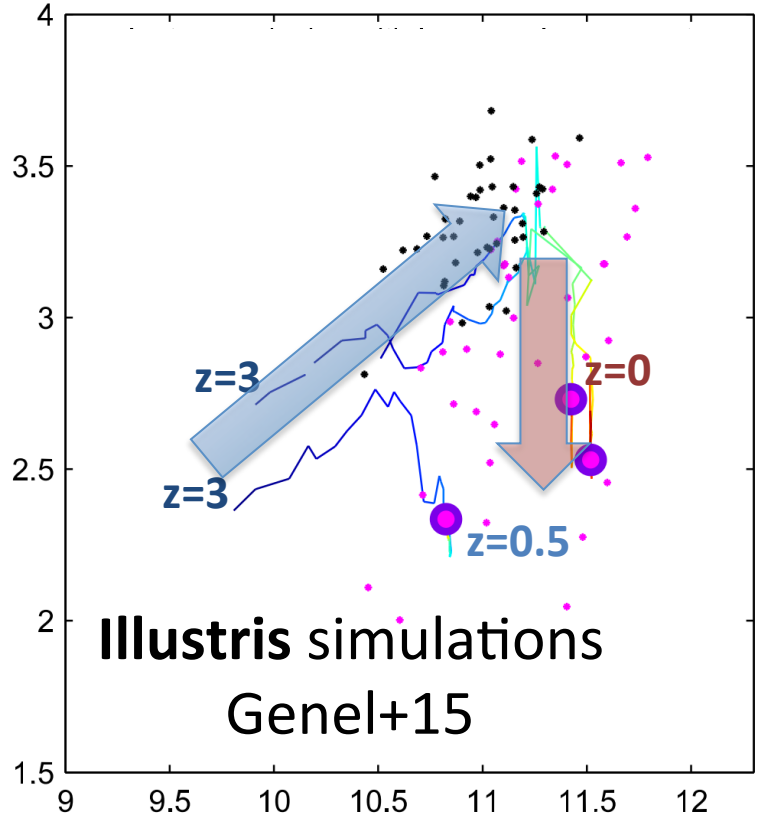
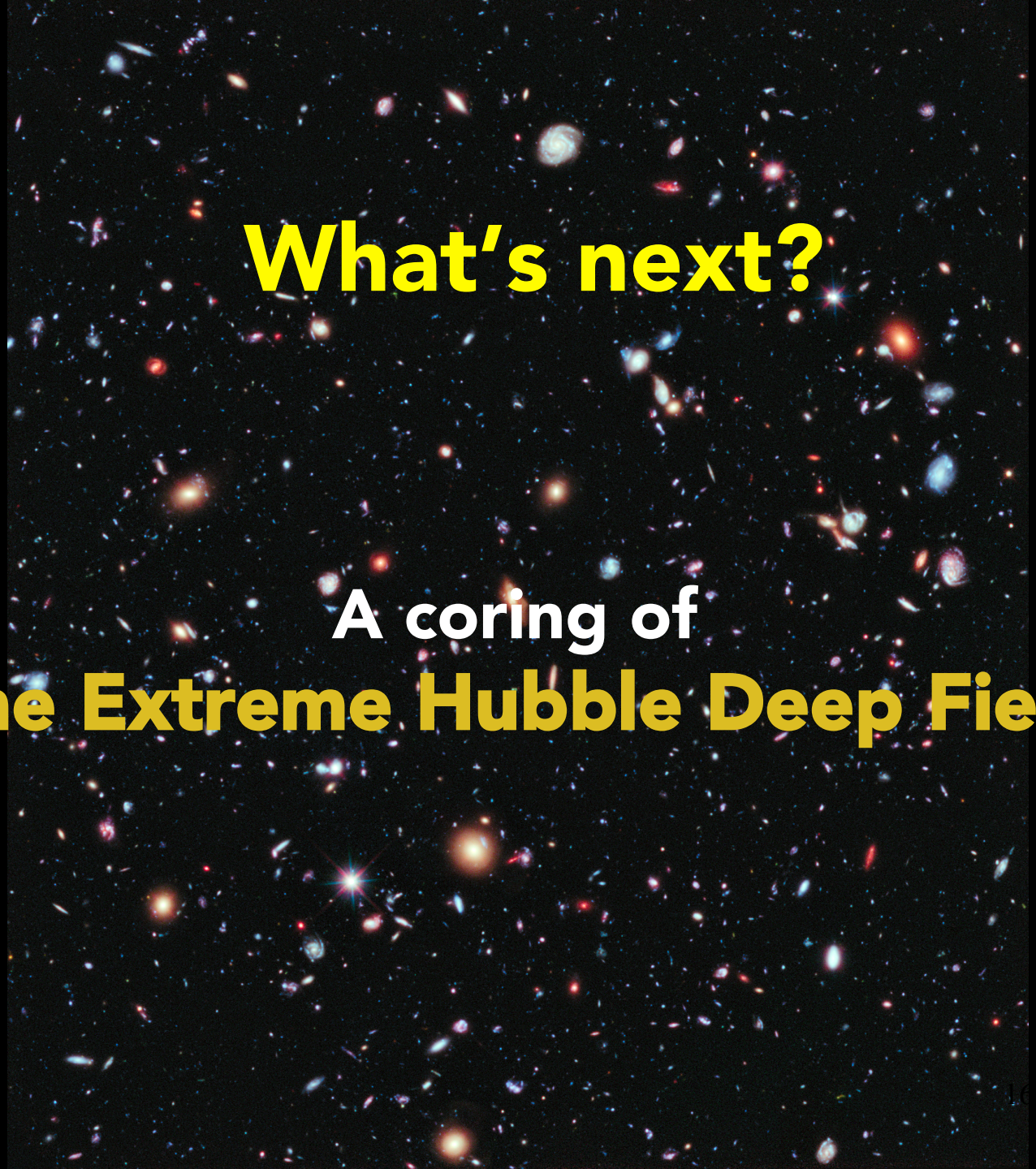
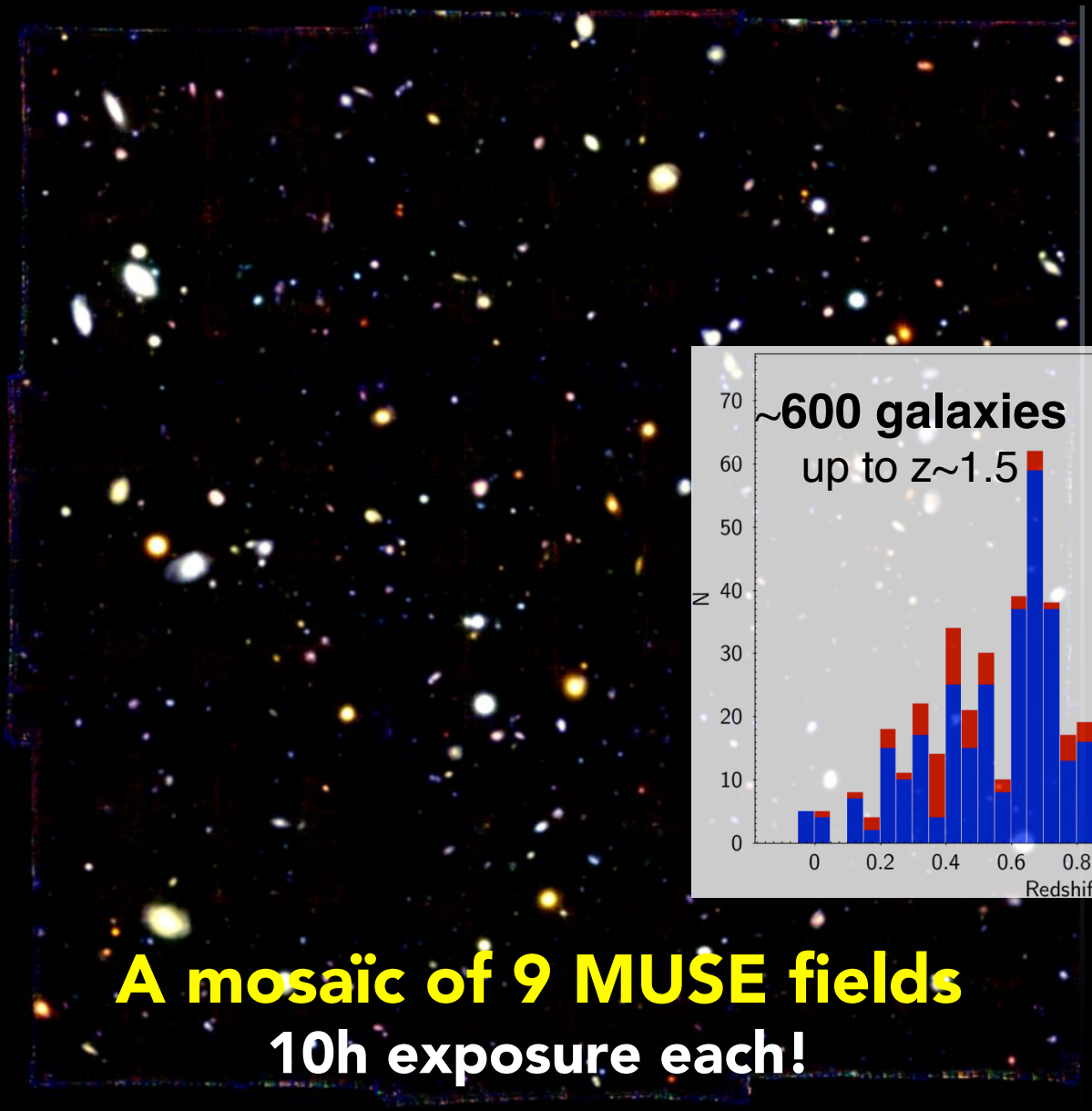




« **Grow-then-drop** » **scenario** for angular momentum evolution?


What's next?
A coring of
The Extreme Hubble Deep Field

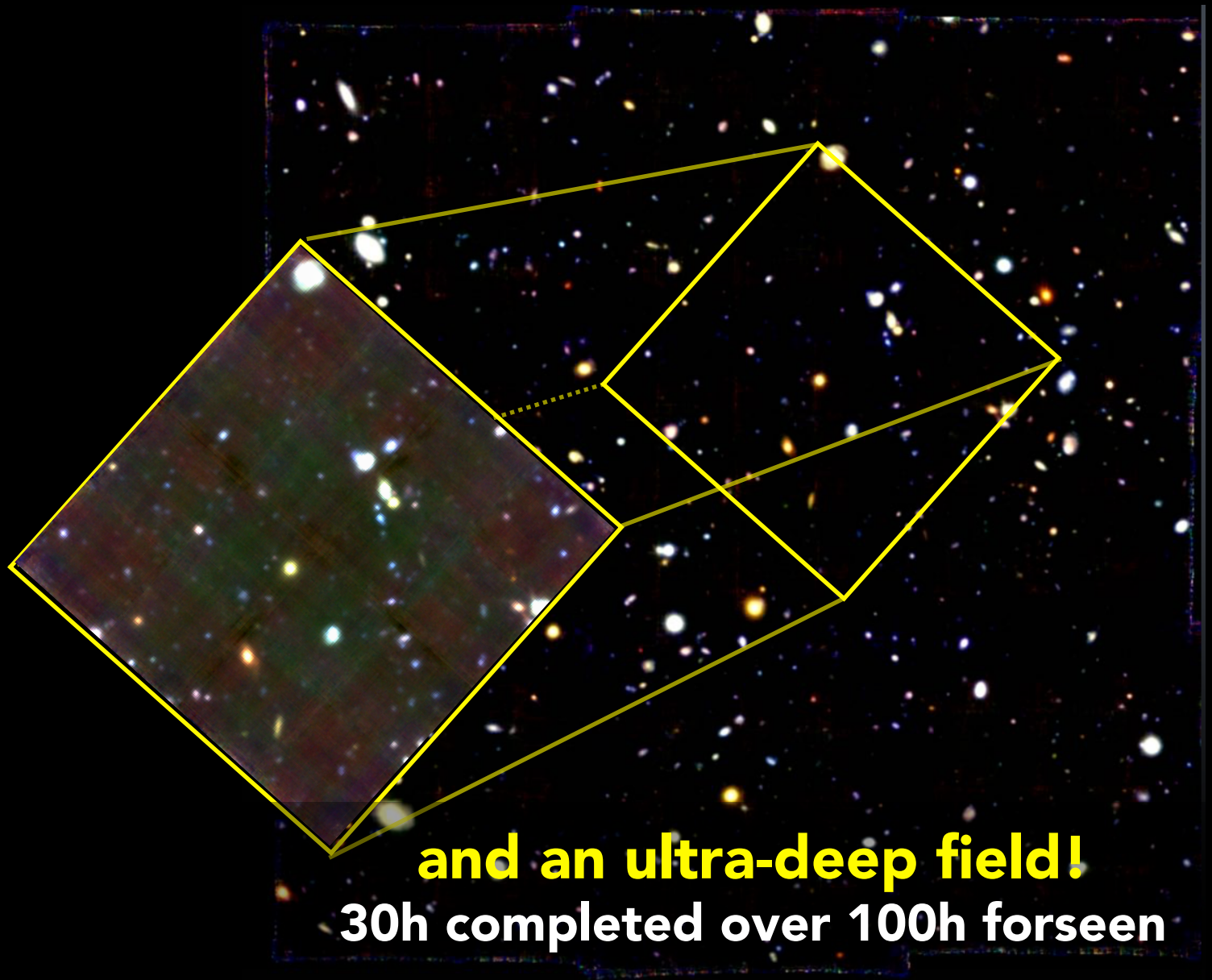
A coring which already started…



A mosaïc of 9 MUSE fields

10h exposure each!

A coring which already started…



and an ultra-deep field!

30h completed over 100h forseen

Conclusions

Galaxy Evolution with **MUSE Deep Surveys**

- **Added value** wrt **deep imaging** (eg. HST), **multi-slit spectroscopy** (eg. VIMOS, MOSFIRE), and/or **multi-IFU** (eg. KMOS)
- High sensitivity & no preselection → **low-mass galaxies**
- Efficient probe of the **close environment** of galaxies

What's next with MOONS?

Large multiplex + extended spectral range + NIR

- **Large samples** of low-mass galaxies **up to z~3**
- Census of **integrated physical properties** (SFR, metallicity, etc)
- Targets for **MOSAIC @ E-ELT → resolved properties**