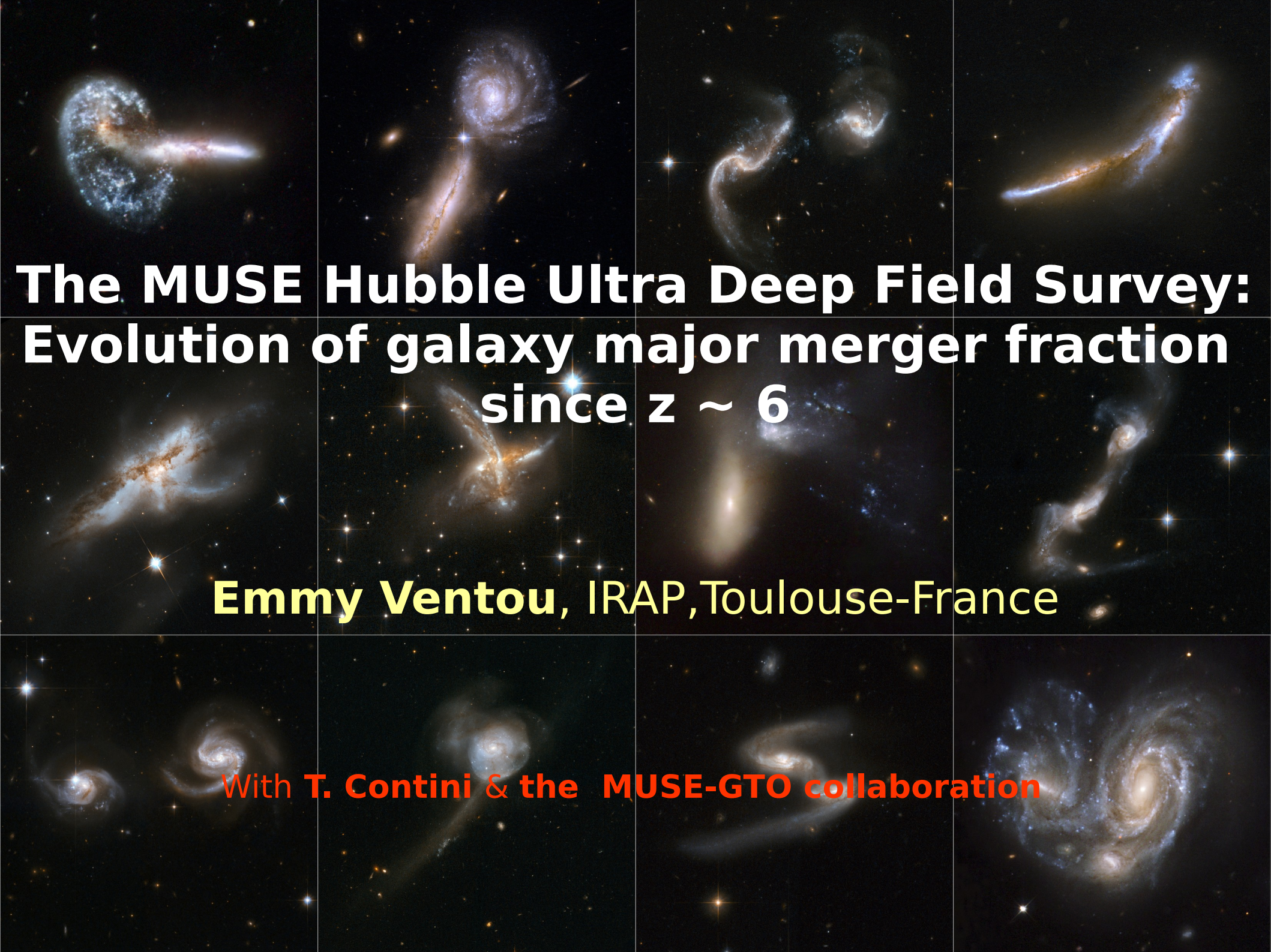


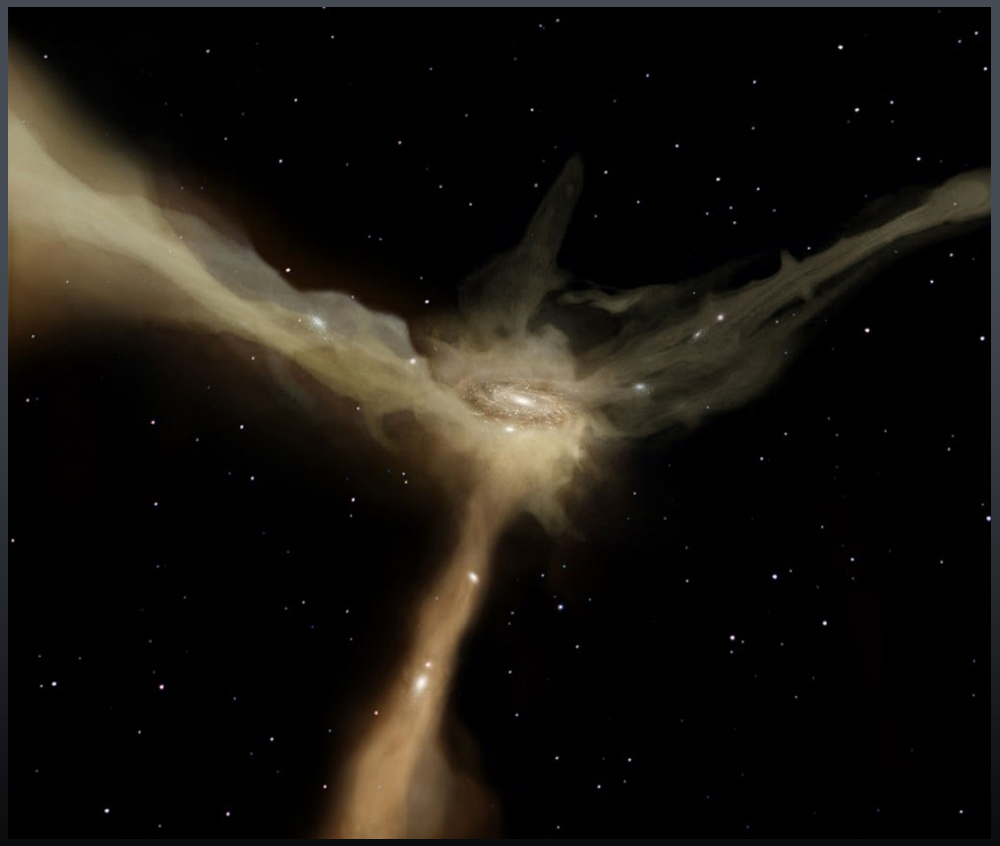
The MUSE Hubble Ultra Deep Field Survey: Evolution of galaxy major merger fraction since z ~ 6

Emmy Ventou, IRAP,Toulouse-France

With **T. Contini** & **the MUSE-GTO collaboration**

How do galaxies grow over cosmic time ?

Role of mergers vs gas accretion ?



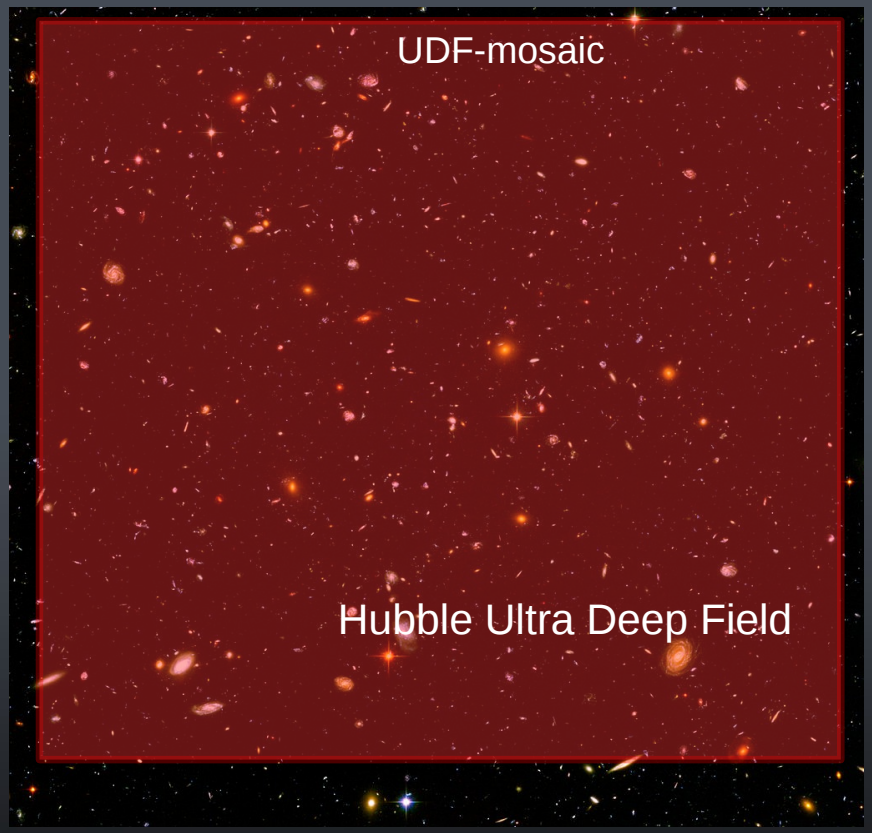
Cold gas accretion

Mergers

Context

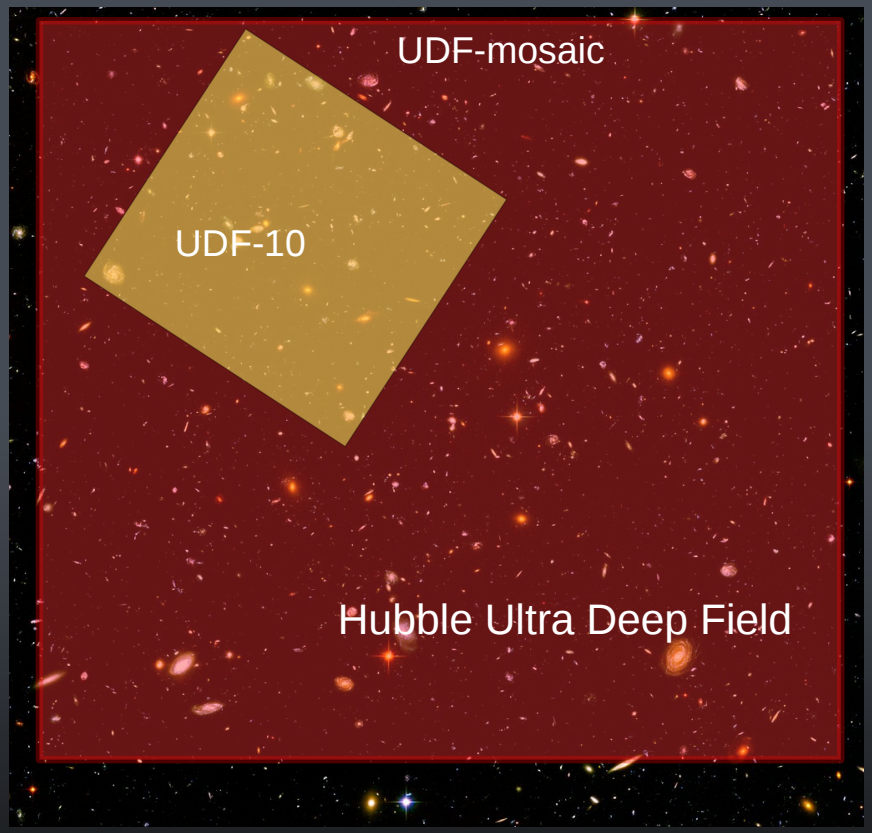
Role of mergers vs gas accretion ?

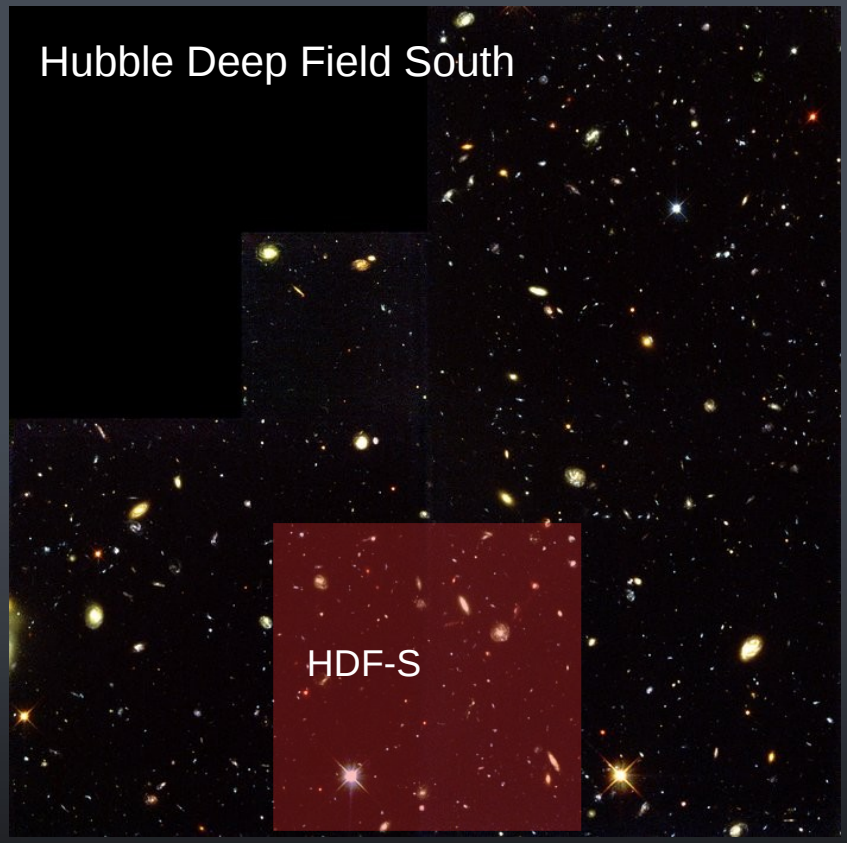
MUSE data set



- This analysis is based on MUSE observations over **one medium deep** (**10 hr**) mosaic covering the entire HUDF, ...

MUSE data set





- This analysis is based on MUSE observations over **one medium deep** (**10 hr**) mosaic covering the entire HUDF, and **two deep fields**, the UDF10 and HDF-S with an average in exposure time of **30hr**.
- Parent sample of **1801** galaxies with **spectroscopic redshift.**

Detection of close pairs in MUSE data cubes

- Close pair : $5 < r_p \leq 30\,kpc$ and $D_V \leq 500\,km\,s^{-1}$

Detection of close pairs in MUSE data cubes

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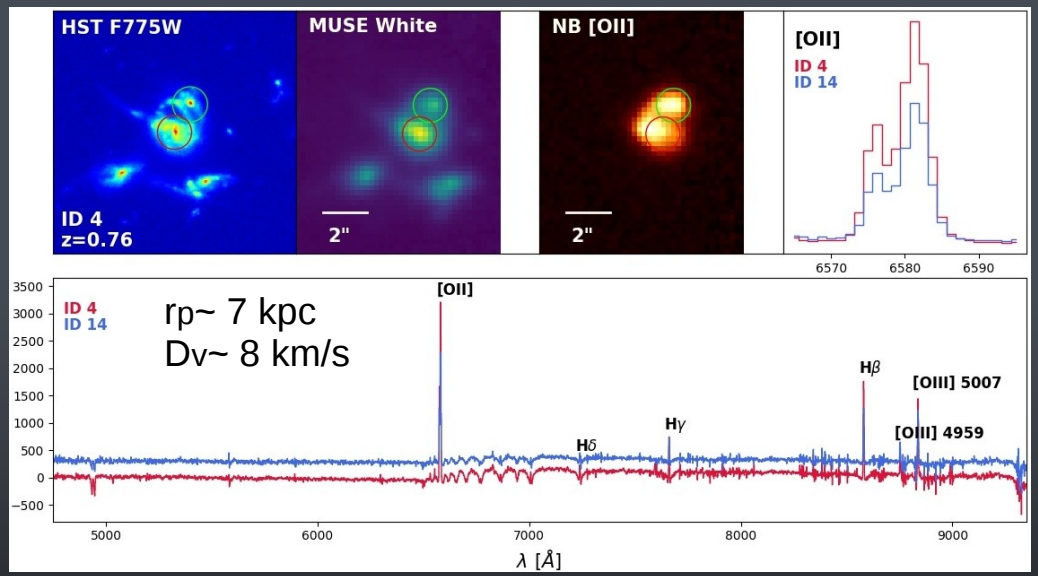

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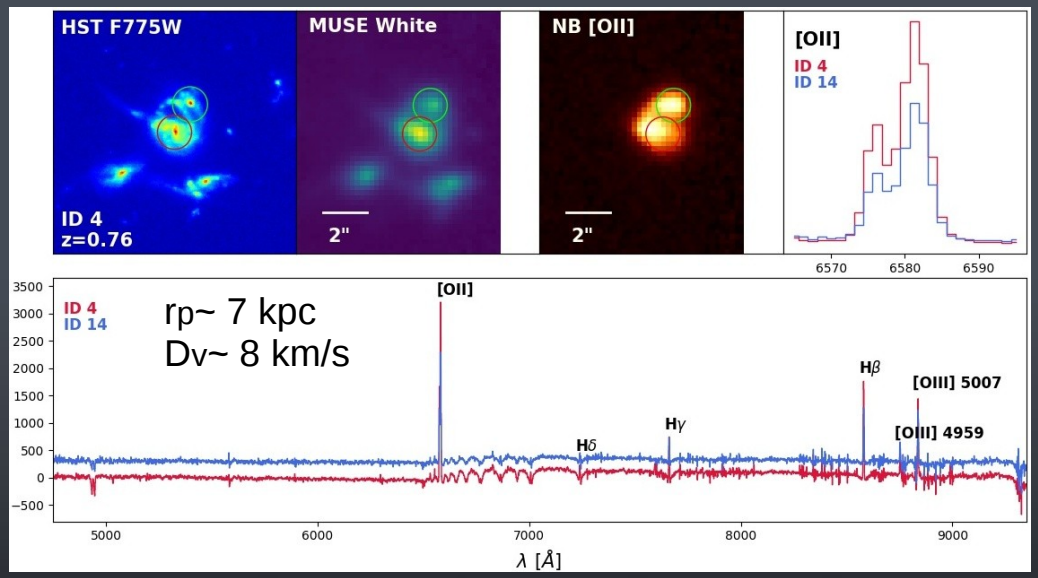

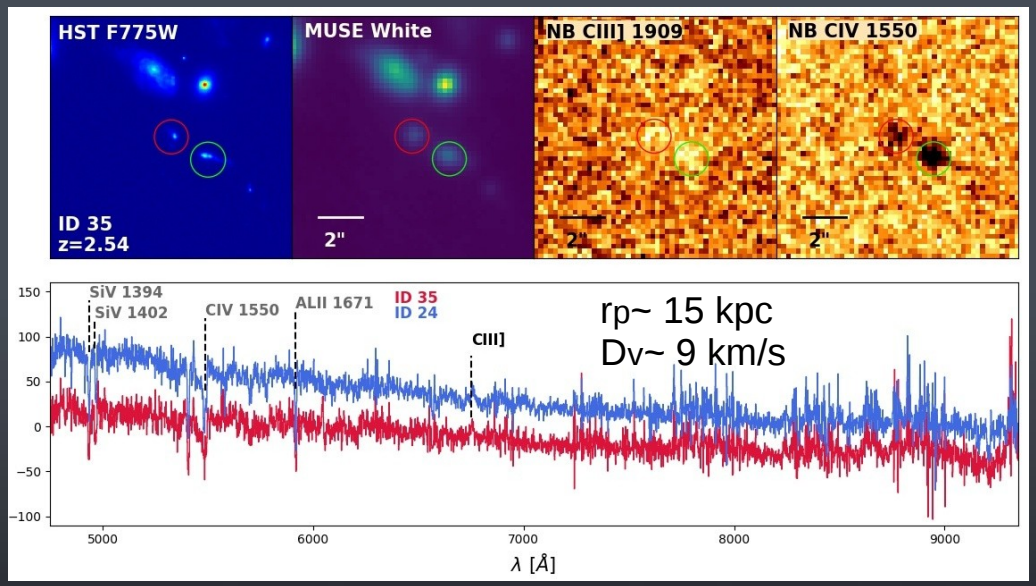

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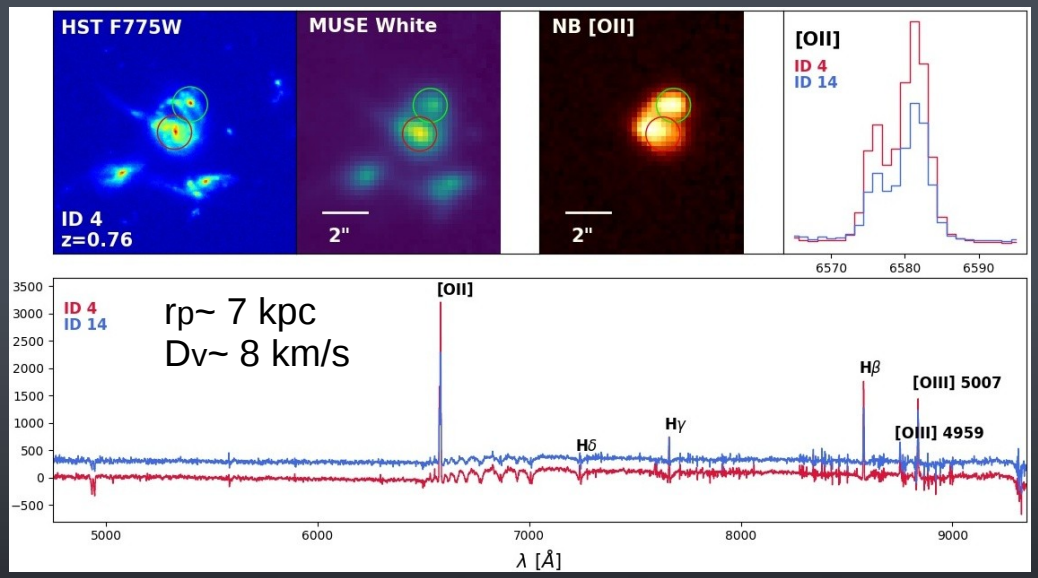
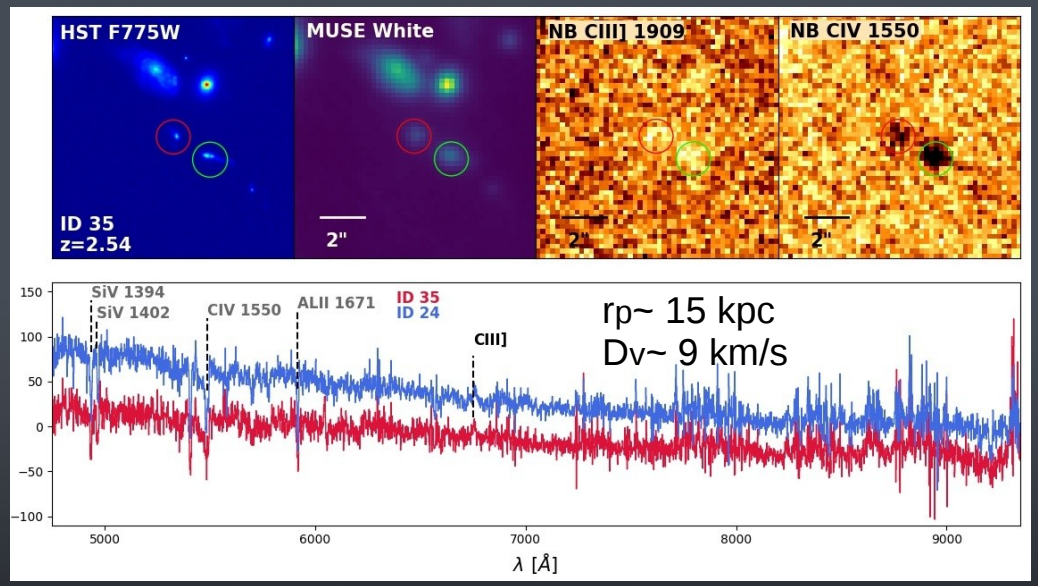
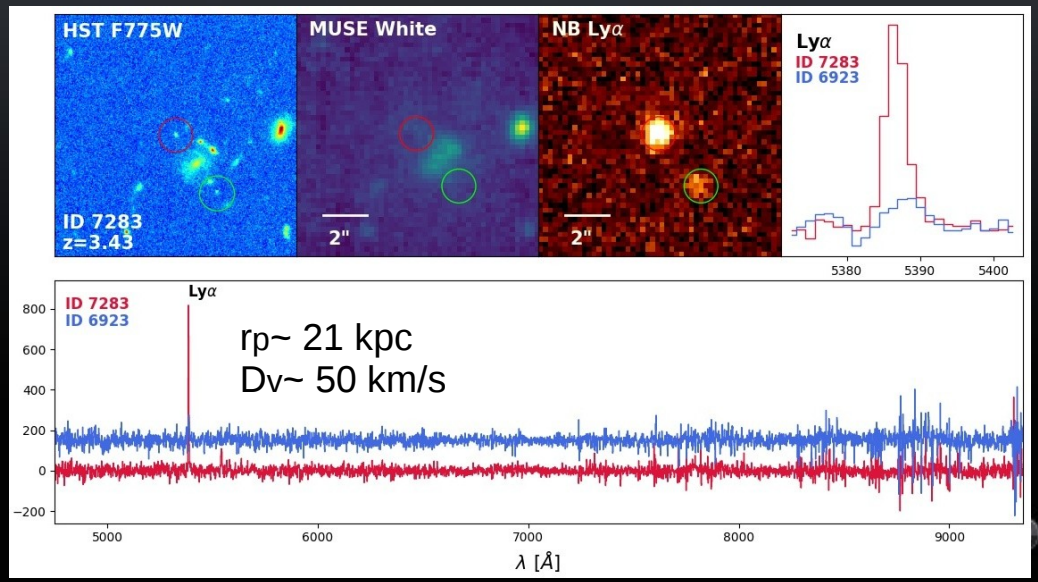
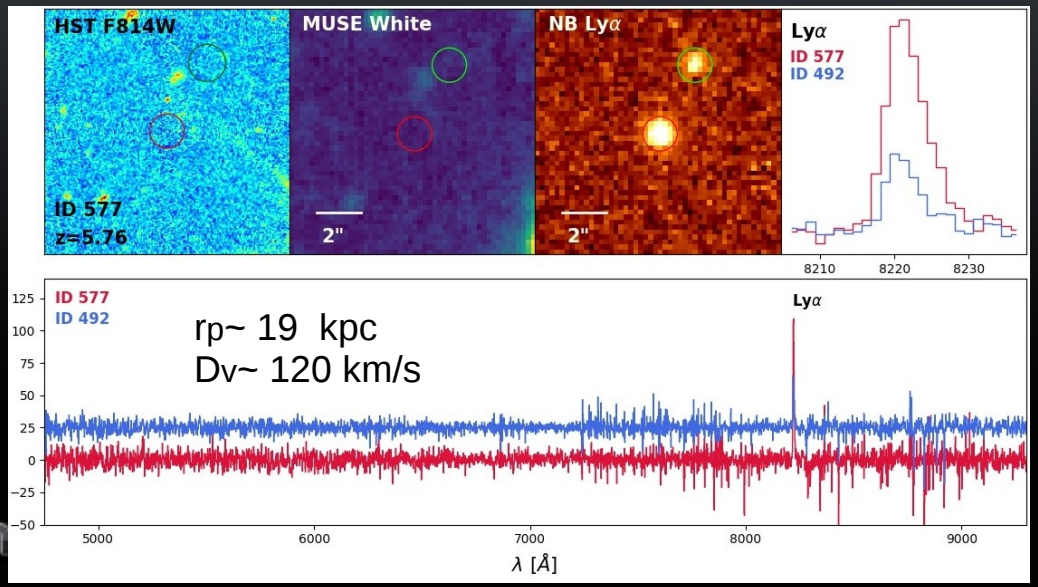
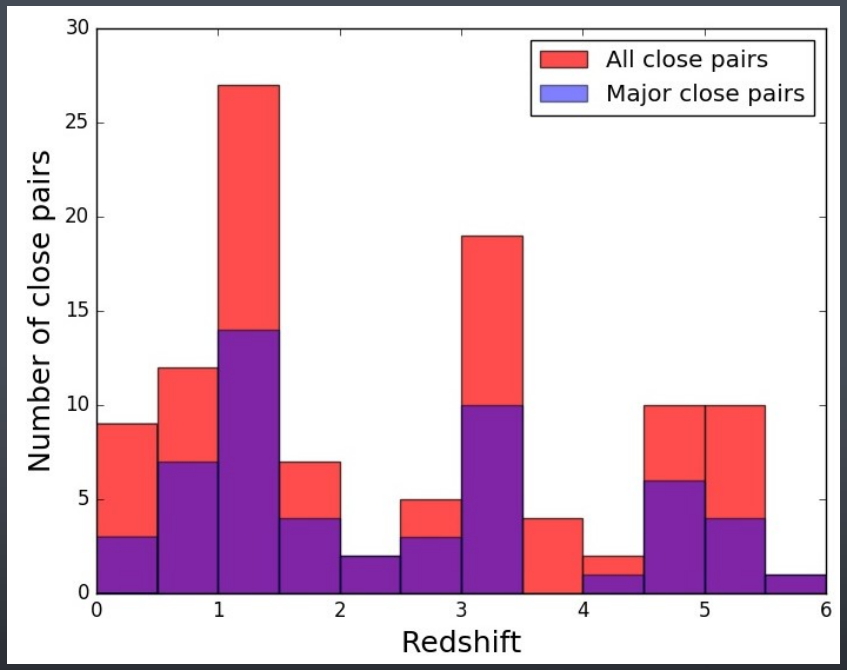


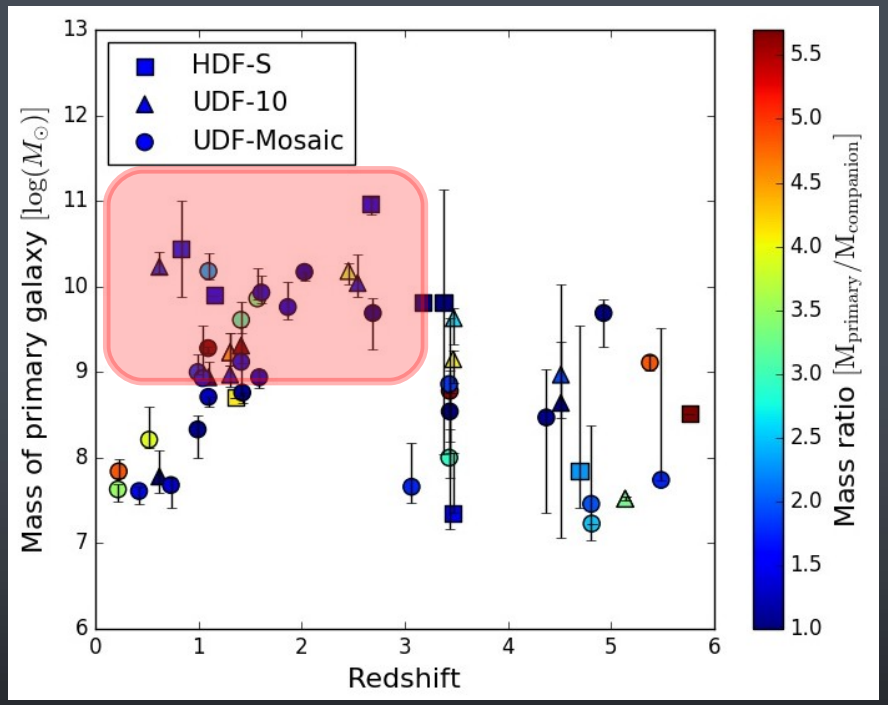






Results





- We identified **113 close pairs** of galaxies spread over **a large redshift range** (0.2<z<6) and **stellar masses** (10^{7}-10^{11} Msun).
- Defining **major mergers** as having a mass ratio of 1:1-1:6, we found **56 major close pairs**, among this sample, **23 pairs** are identified at high redshift (**z>3**).

Estimation of the major merger fraction

$$F_{MM} = \frac{N_p^{corr}}{N_g^{corr}} = C_1 * \frac{\sum_{k=1}^{N_p} \frac{W_c^{k_1}}{C_2} * \frac{W_c^{k_2}}{C_2} * W_A}{\sum_{i=1}^{N_g} \frac{W_c^{i}}{C_2} * W_A}$$

- Where Ng and Np is the number of galaxies in the parent sample and the number of major close pairs

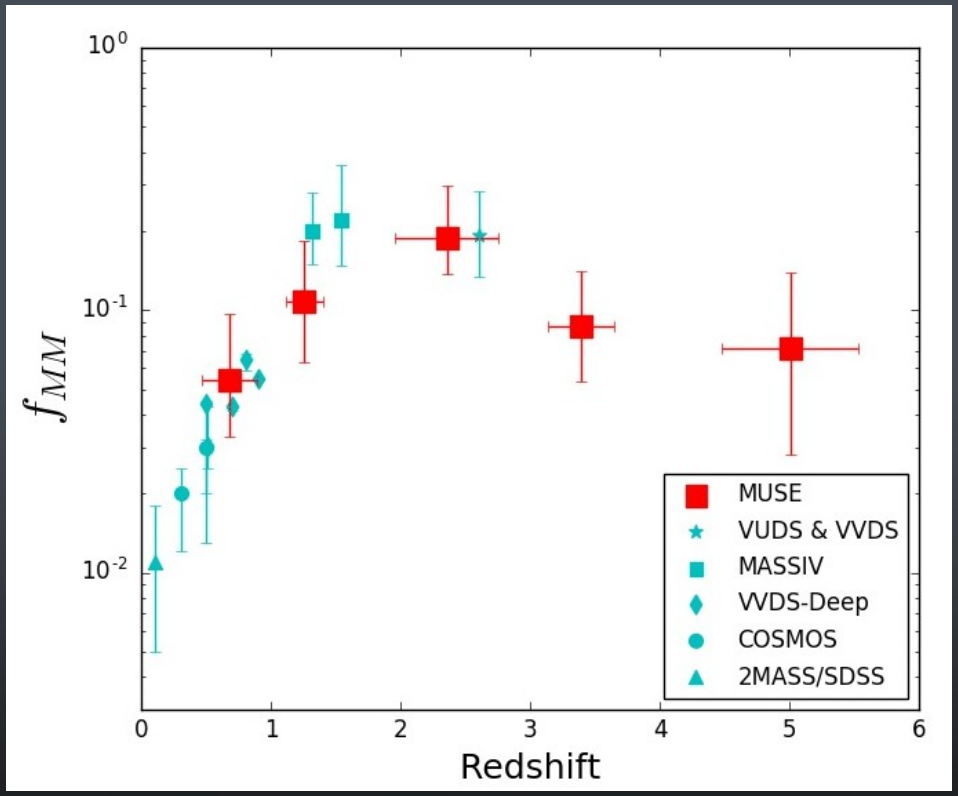
C_1 accounts for the **missing companions** due to our limit in spatial resolution,

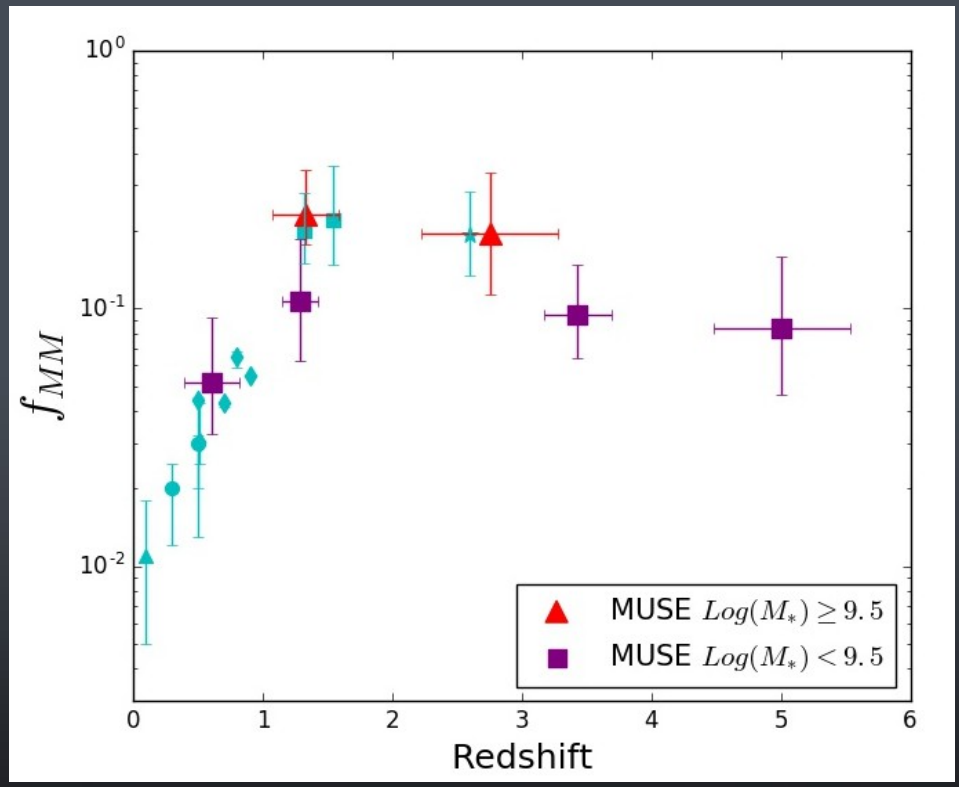
W_C takes into account the **confidence** in the **z measurement**,

W_A takes into account that some galaxies are located on the border of the MUSE field-of-view,

and finally **C_2** is a correction term for the **redshift incompleteness**.

Evolution of the galaxy major merger fraction up to z~6

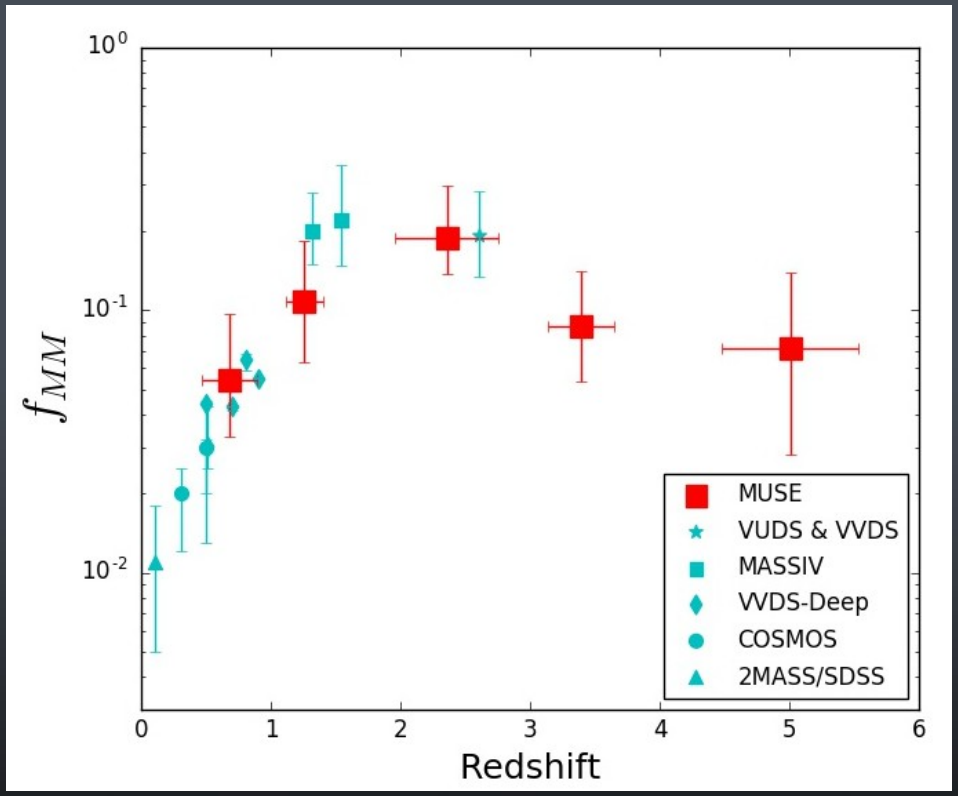


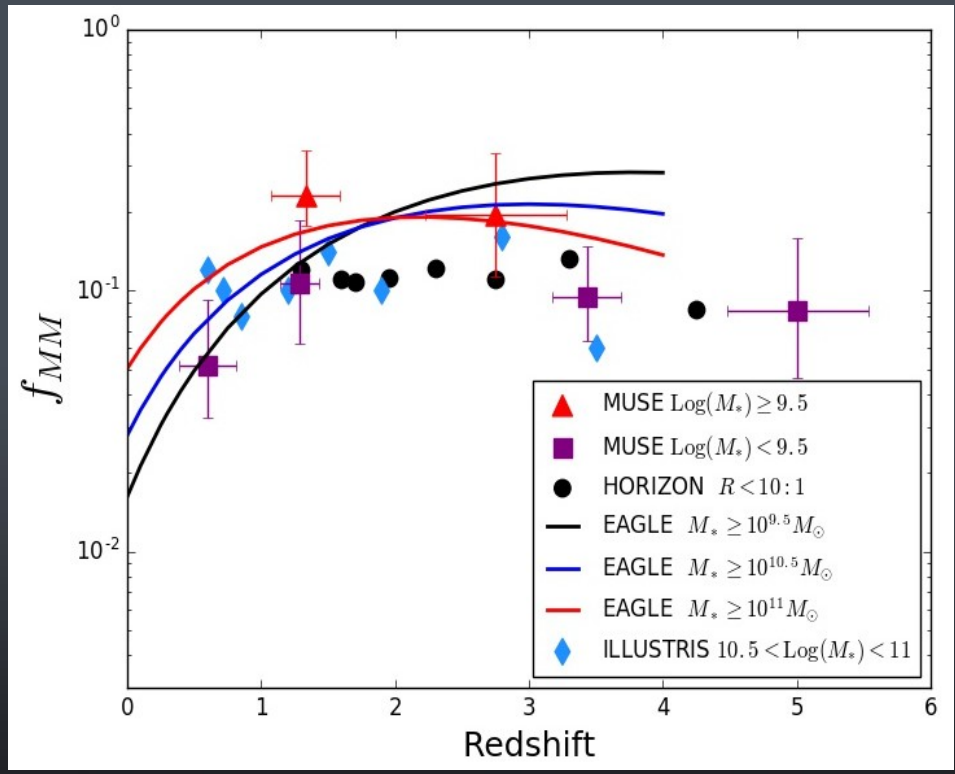


- The major merger fractions estimated in the MUSE fields are in good agreement with those derived from previous studies at similar redshifts, with a **constant increase** of the merger fraction with look-back time up to **z~2-3**.

- At higher redshift, we show **for the first time** that the fraction **slowly decreases or flattens** down to about 10% at z~6.

Evolution of the galaxy major merger fraction up to z~6



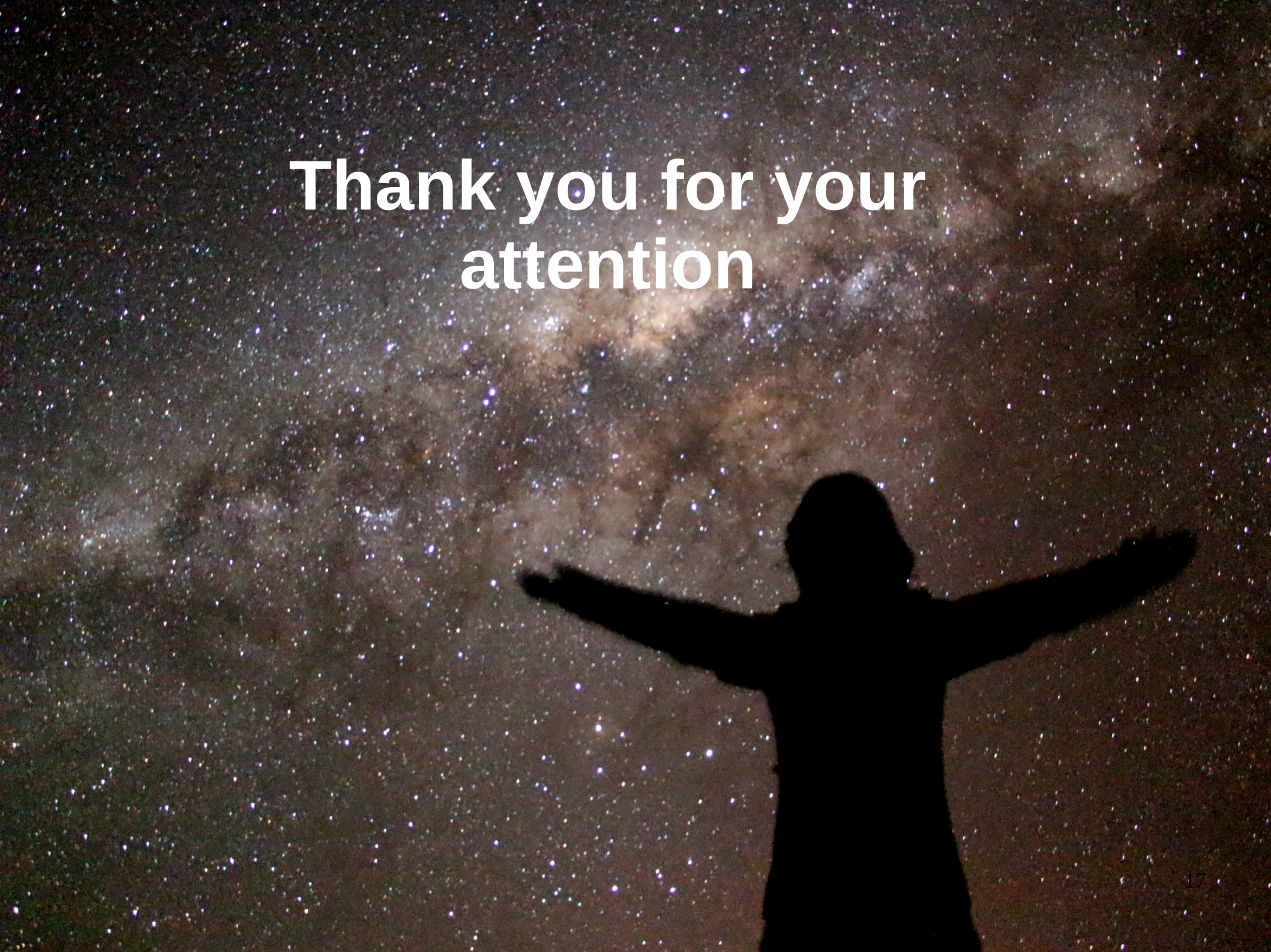


The **trend** of our major merger fraction evolution is **in agreement** with the trend of recent predictions from hydrodynamic **simulations** , HORIZON-AGN (Kaviraj et al. 2015), EAGLE (Qu et al. 2017) and ILLUSTRIS (Snyder et al. 2017), with a slow increase of the merger fraction up to z~3 and then a **decrease toward higher redshift.**

Next step

- **Extend** such analysis to other MUSE fields, to obtain even more statistically robust results and **decrease the cosmic variance effect**.

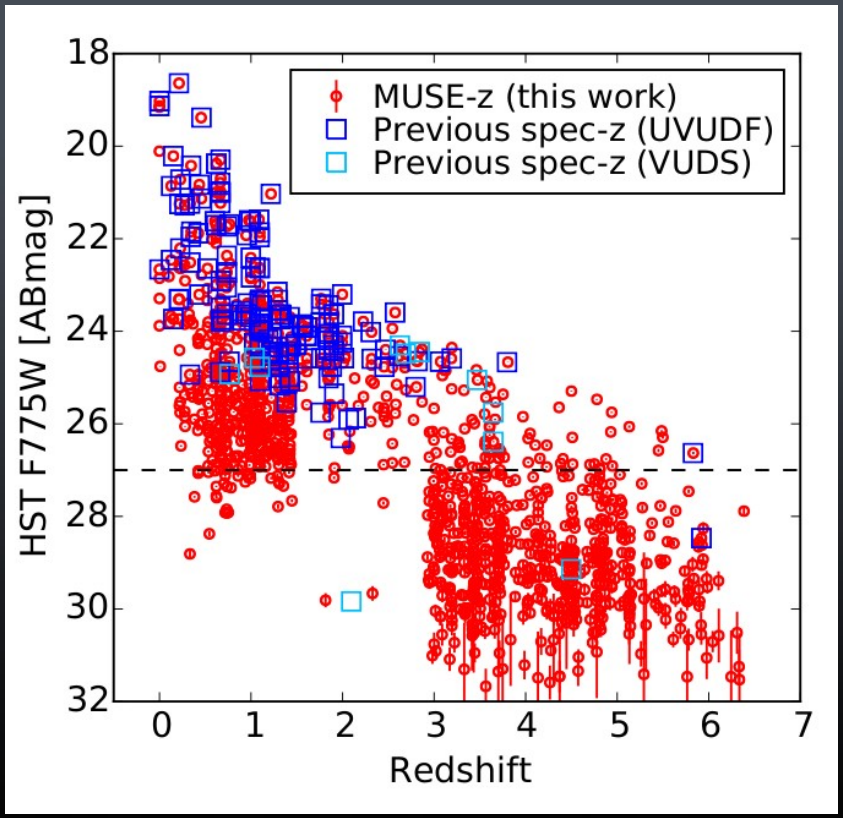
- Use **simulations** to **refined** the close pairs **criteria**.
  Convert the merger **fraction** into a merger **rate**.


Thank you for your attention

Estimation of the major merger fraction

C_2 is a correction term for the **redshift incompleteness,** defined in each fields and z bins as :

Number of spectroscopic z / Number of photometric z



0<z<1 and 1<z<1.5: HST *F775W* < 29

1.5<z<2.8 : HST *F775W* < 27

2.8<z<4 and 4<z<6 : No magnitude cut

From Inami +17

Next step

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