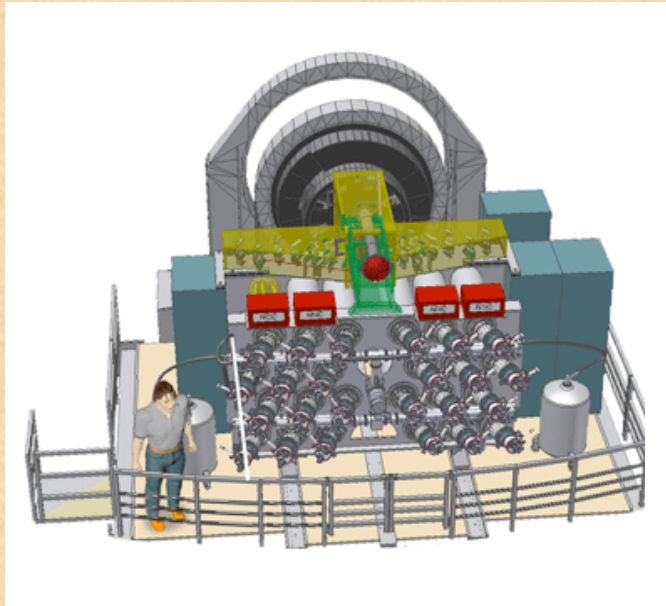


Star formation at $z \approx 1$ in nearby galaxies

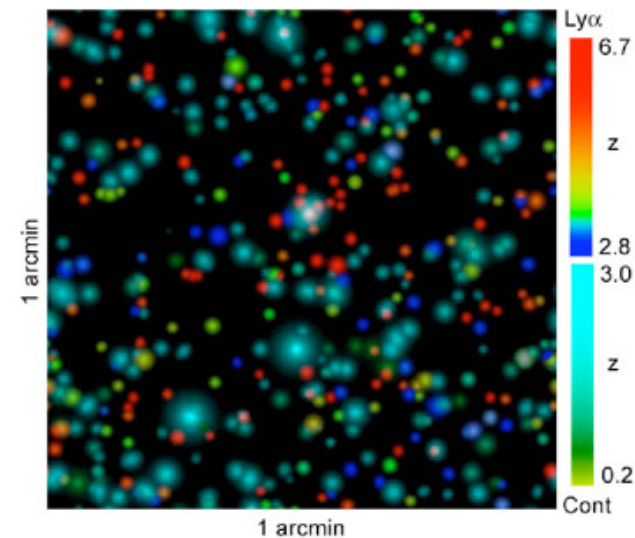
Philippe Prugniel, Observatoire de Lyon

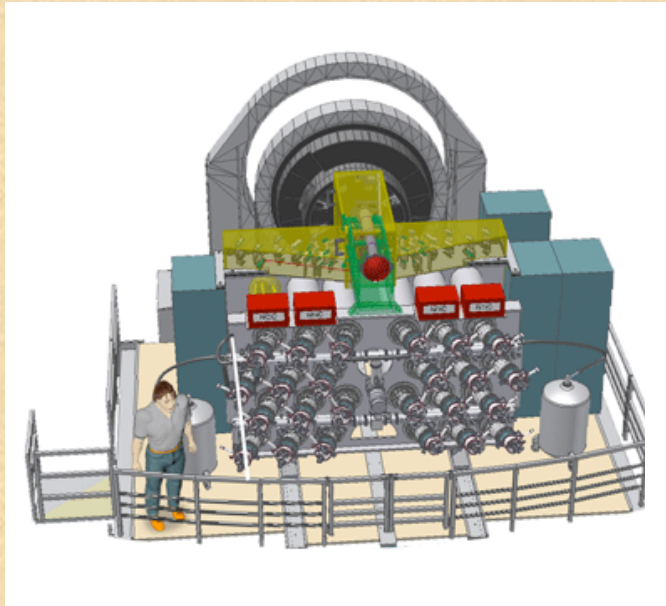
Mina Koleva, Institut de Astrofisica de Canarias

Connect the observations in the
nearby universe
with those (present and future) at
intermediate redshift ($z \approx 1$).



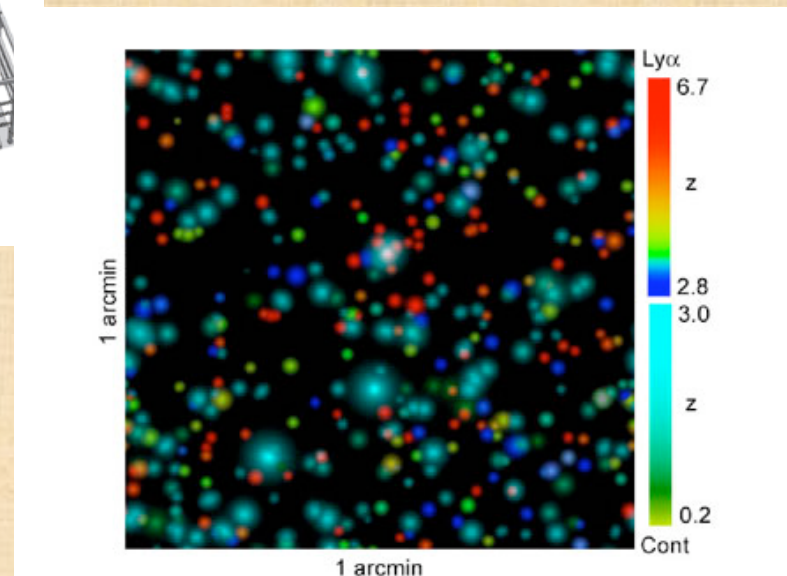
(Muse @ VLT)

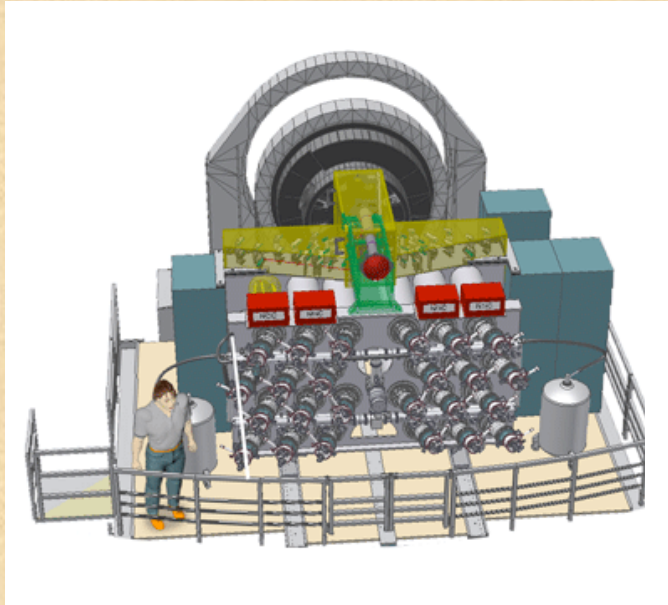




Passive evolution,
star formation,
morphological transformations

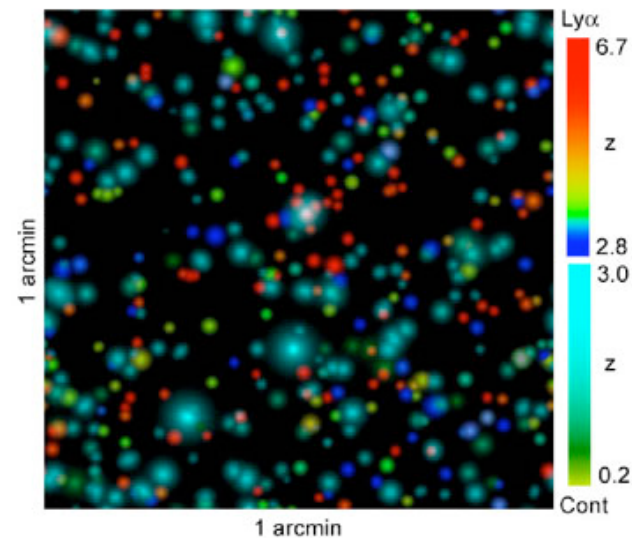
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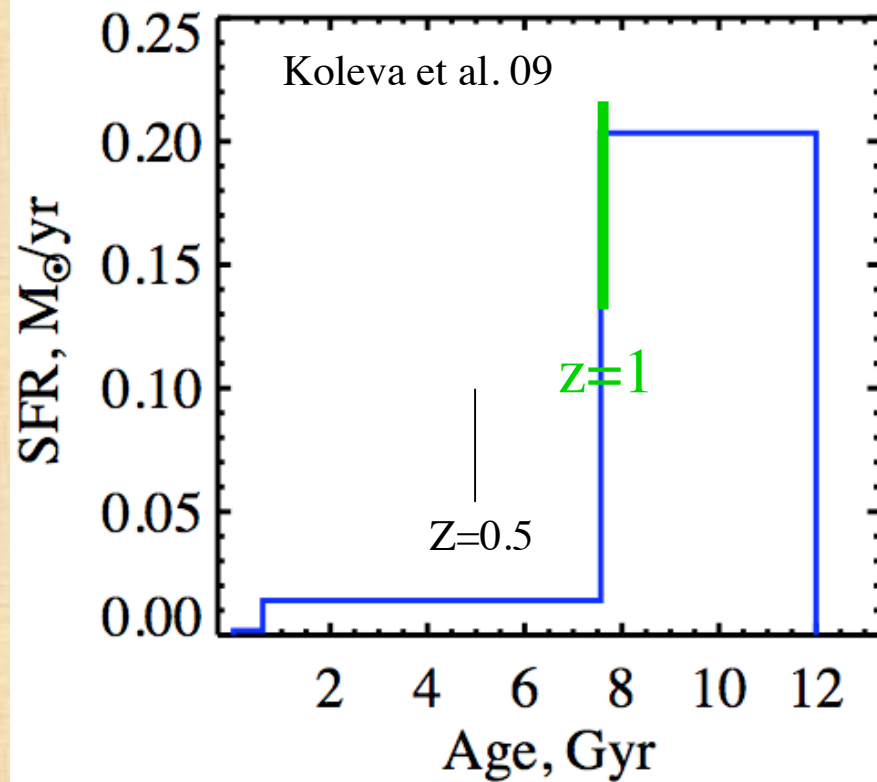




Passive evolution,
star formation,
morphological transformations
... no straightforward continuity

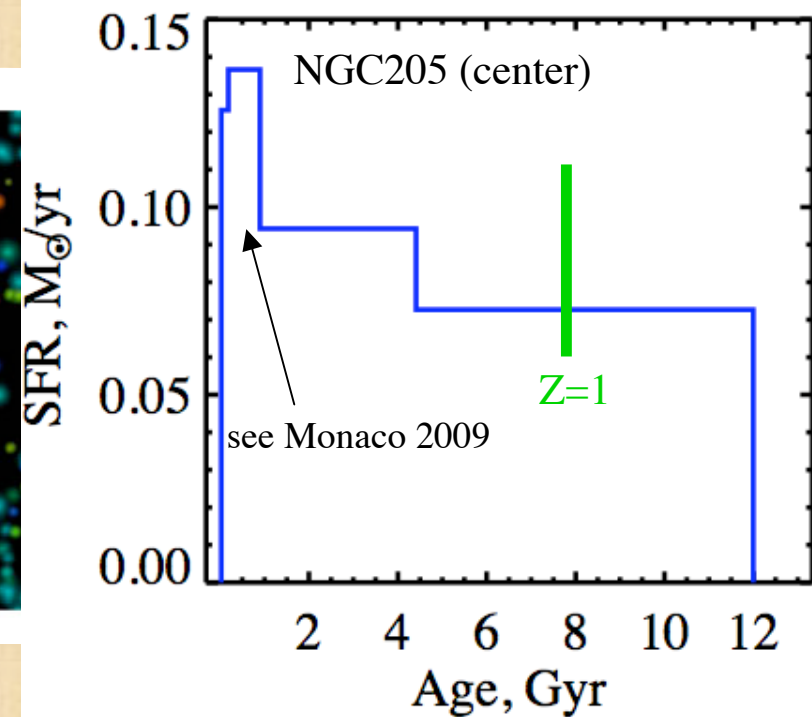
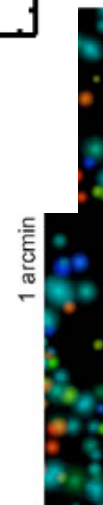
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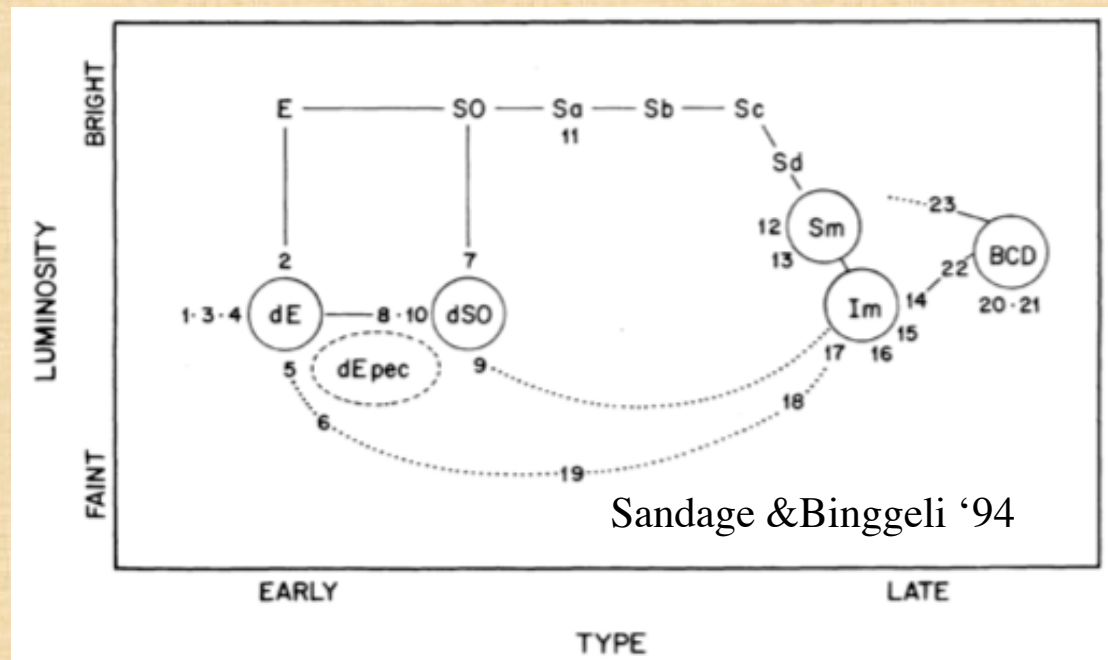


The manifold of dwarf galaxies

dE/dSph (dS0)

dIrr

BCD ...



The manifold of dwarf galaxies

dE/dSph (dS0)

Old, gas depleted

dIrr

Old, sustain a gentle SF

BCD ...

Young, vigorous SF

The manifold of dwarf galaxies

dE/dSph (dS0)

Old, gas depleted

a very extended luminosity/mass range

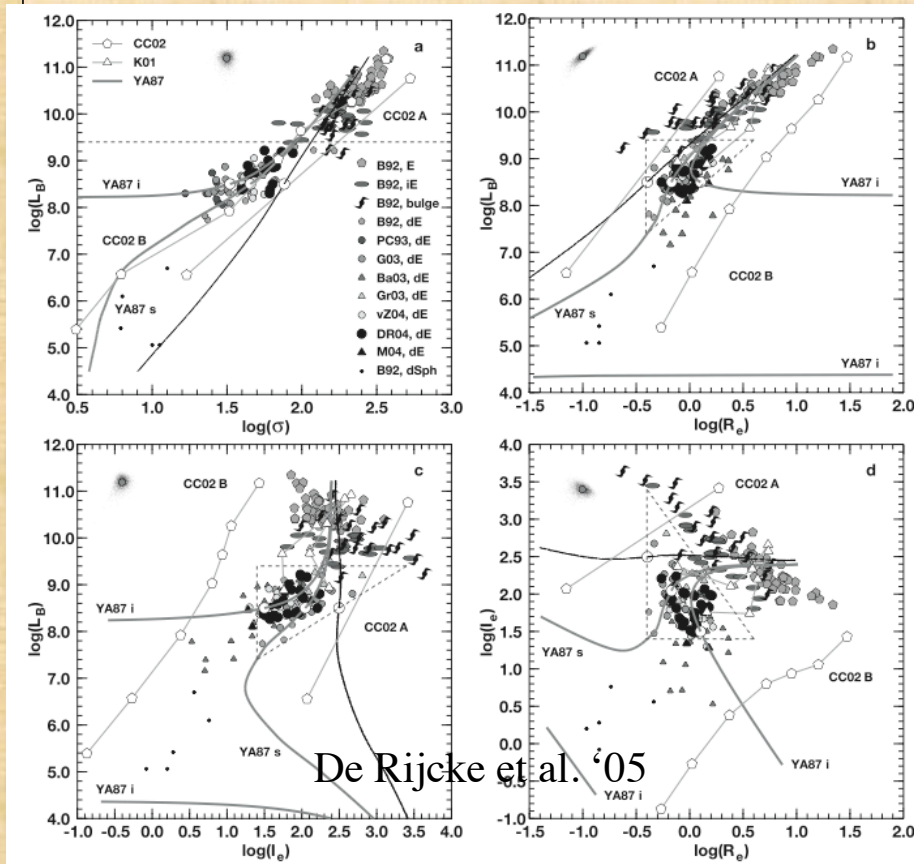
dIrr

Old, sustain a gentle SF

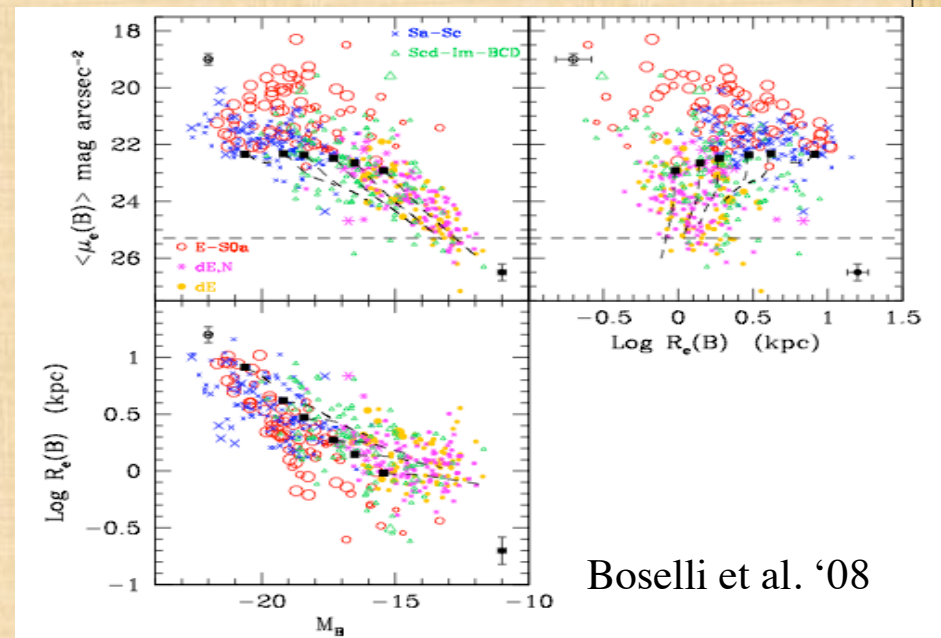
BCD ...

Young, vigorous SF

The scaling relations of early-type dwarfs



De Rijcke et al. '05



Boselli et al. '08

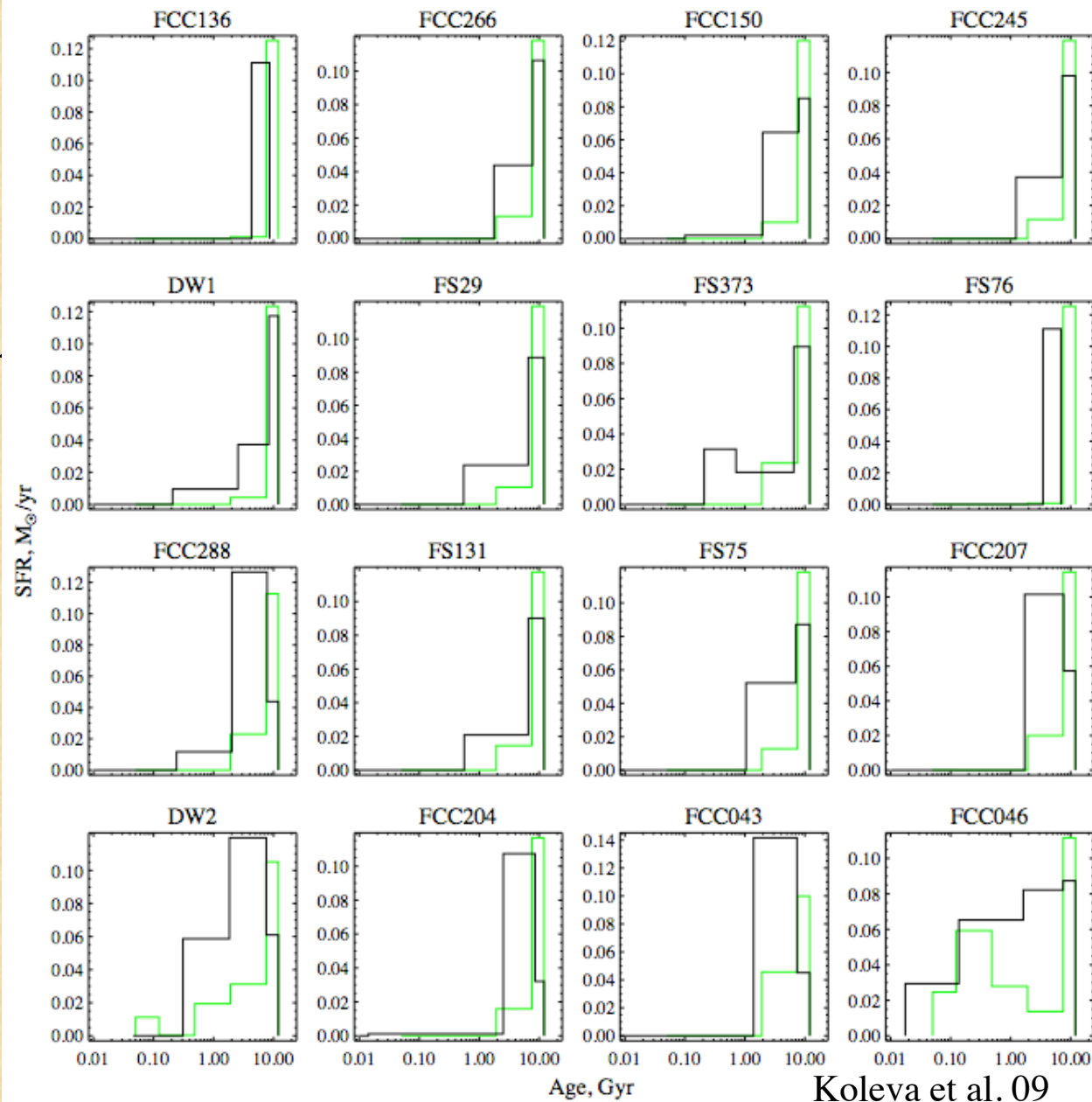
The scaling relations of early-type dwarfs

- Reflect equilibrium relations
 - Mass, angular momentum
 - Stellar population, dissipation
- Highly degenerated with respect to the nature of the progenitor and to the evolution
- Not a single class of progenitors (Lisker et al. 06, two types of dEs: dE(di), with disks, related to S; dE related to E/S0)

The SFH of dEs

- Lets look directly of what happened near $z=1$
 - Concentrate on the massive dEs, like NGC205, $2 \times 10^9 M_{\odot}$
 - Suppose that there were no major transformation (like merging)

• Le
—
—



like

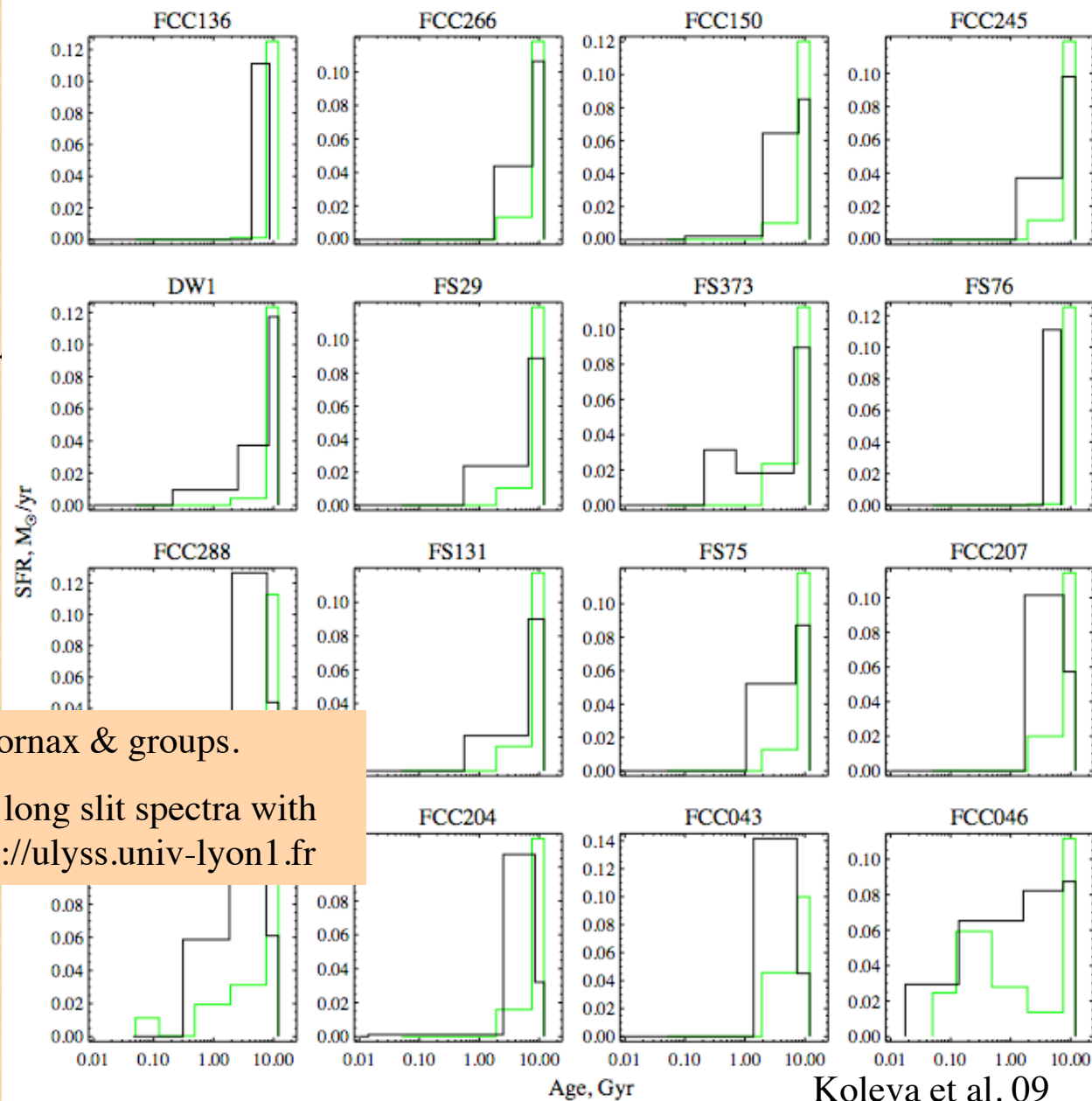
Koleva et al. 09

• Le

—
—

16 dEs in Fornax & groups.

Analysis of long slit spectra with
ULySS <http://ulyss.univ-lyon1.fr>

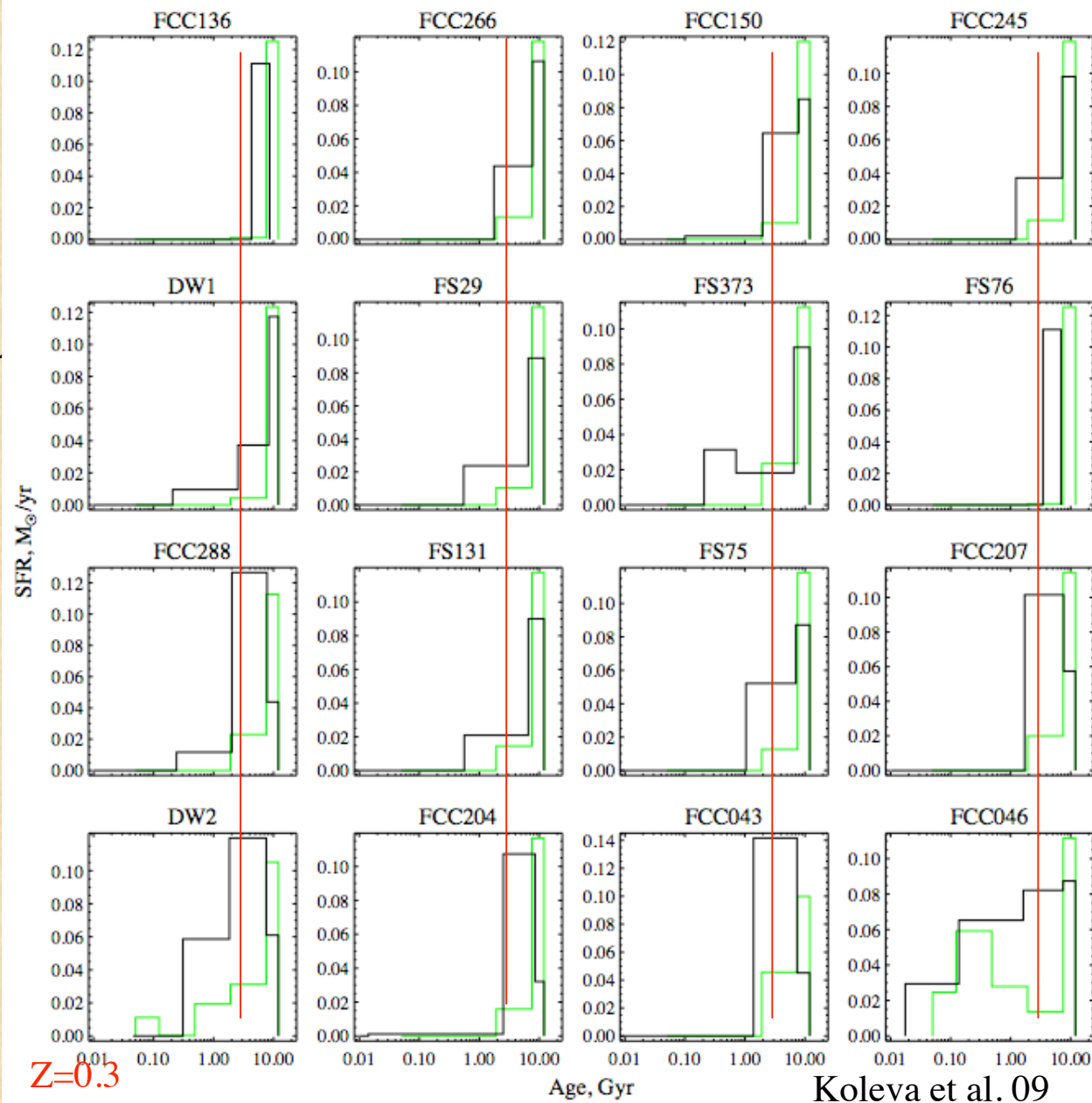


like

Koleva et al. 09

• Le

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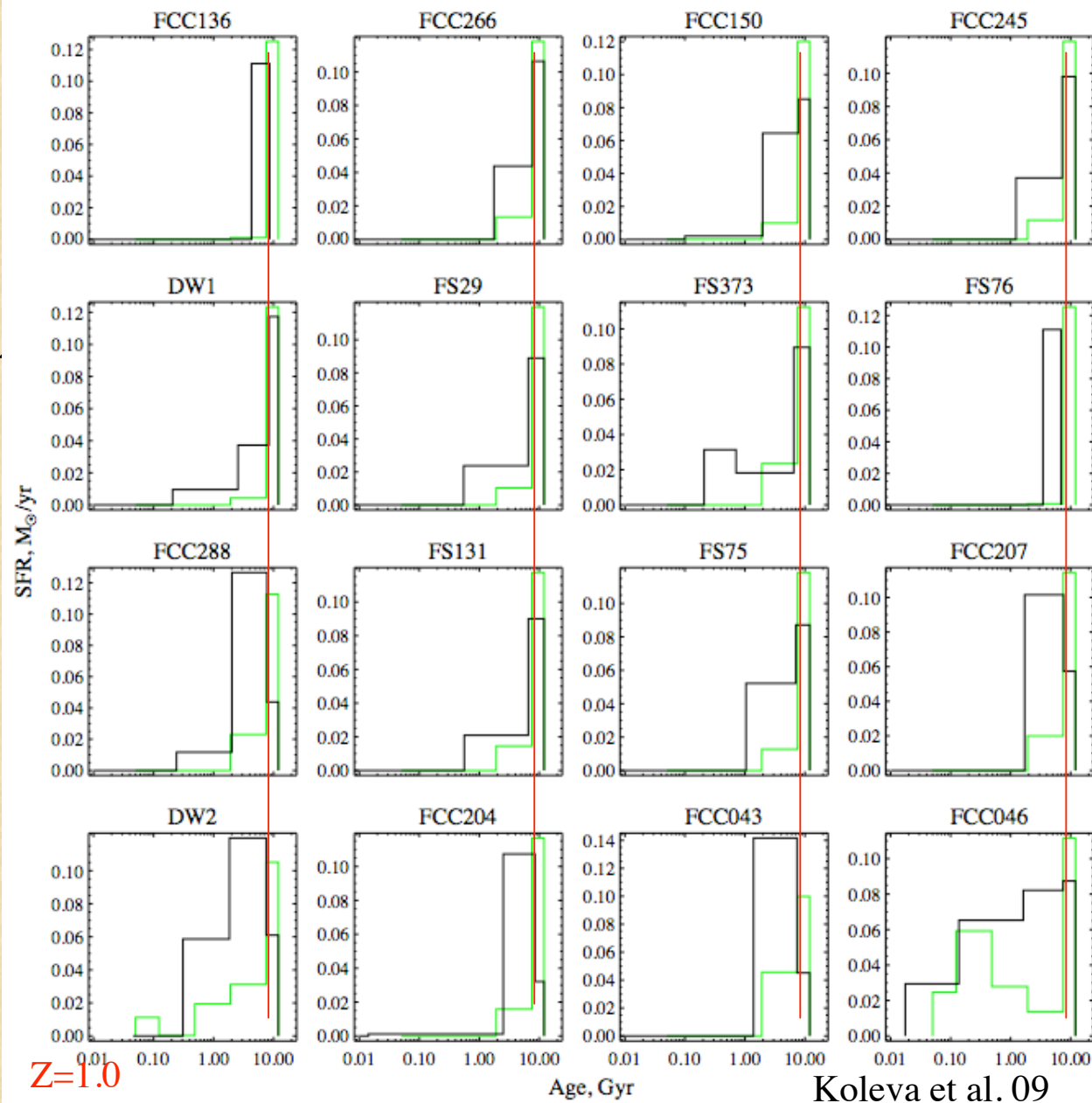


like

Koleva et al. 09

• Le

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like

Koleva et al. 09

The SFH of dEs

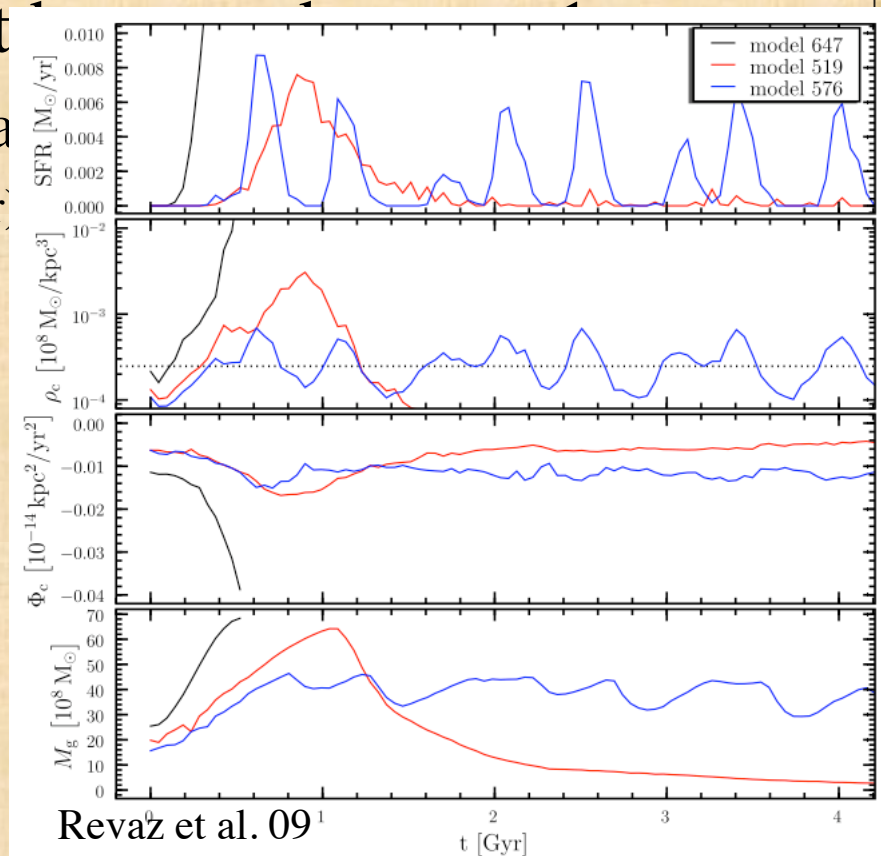
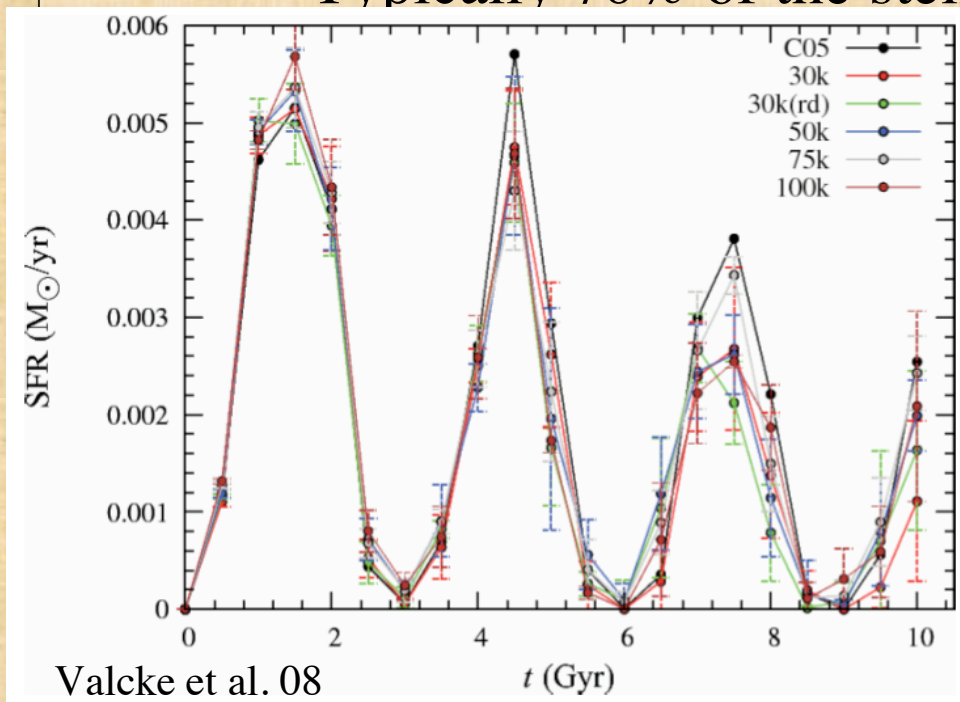
- Lets look directly of what happened near $z=1$
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(mean SFR $\sim 0.1 - 0.2 M_{\odot}/\text{yr}$)

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The SFH of dEs

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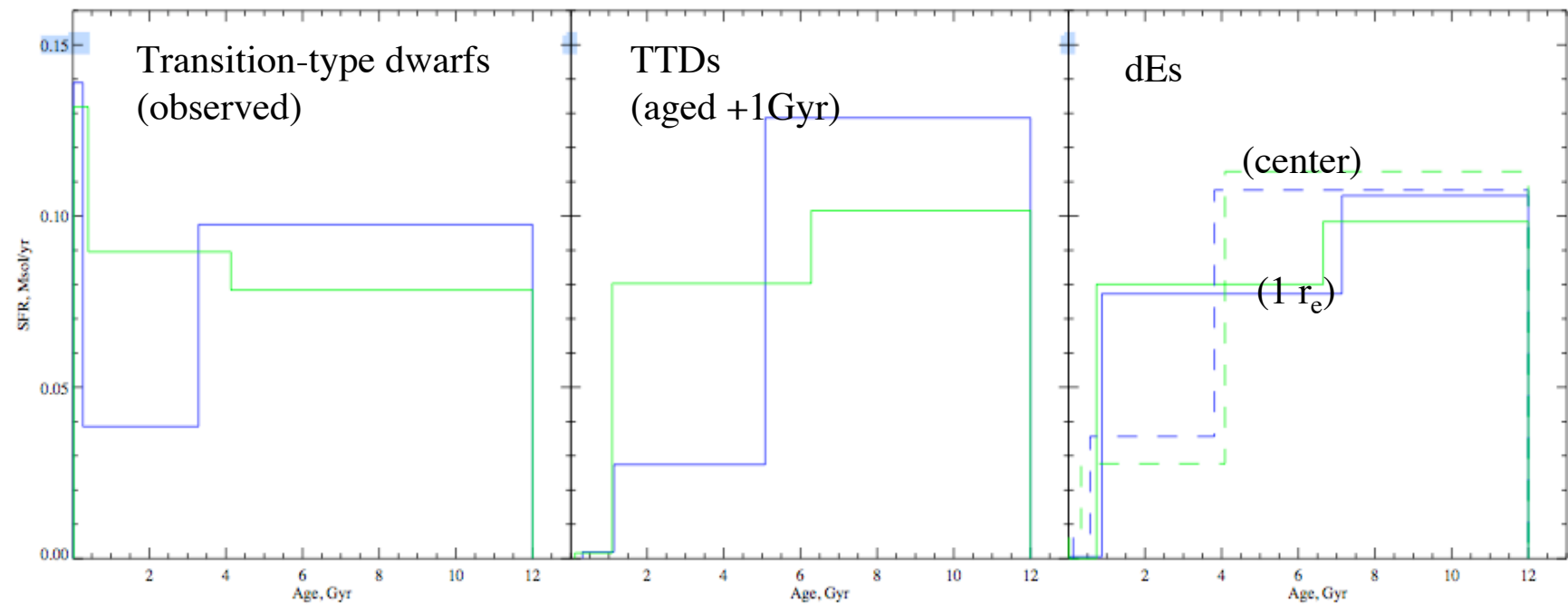
The SFH of dEs

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\Rightarrow At $z=1$ may look as:

- dE (quiescent phase)
- dIrr (if continuous SF)
- BCD (during a burst)

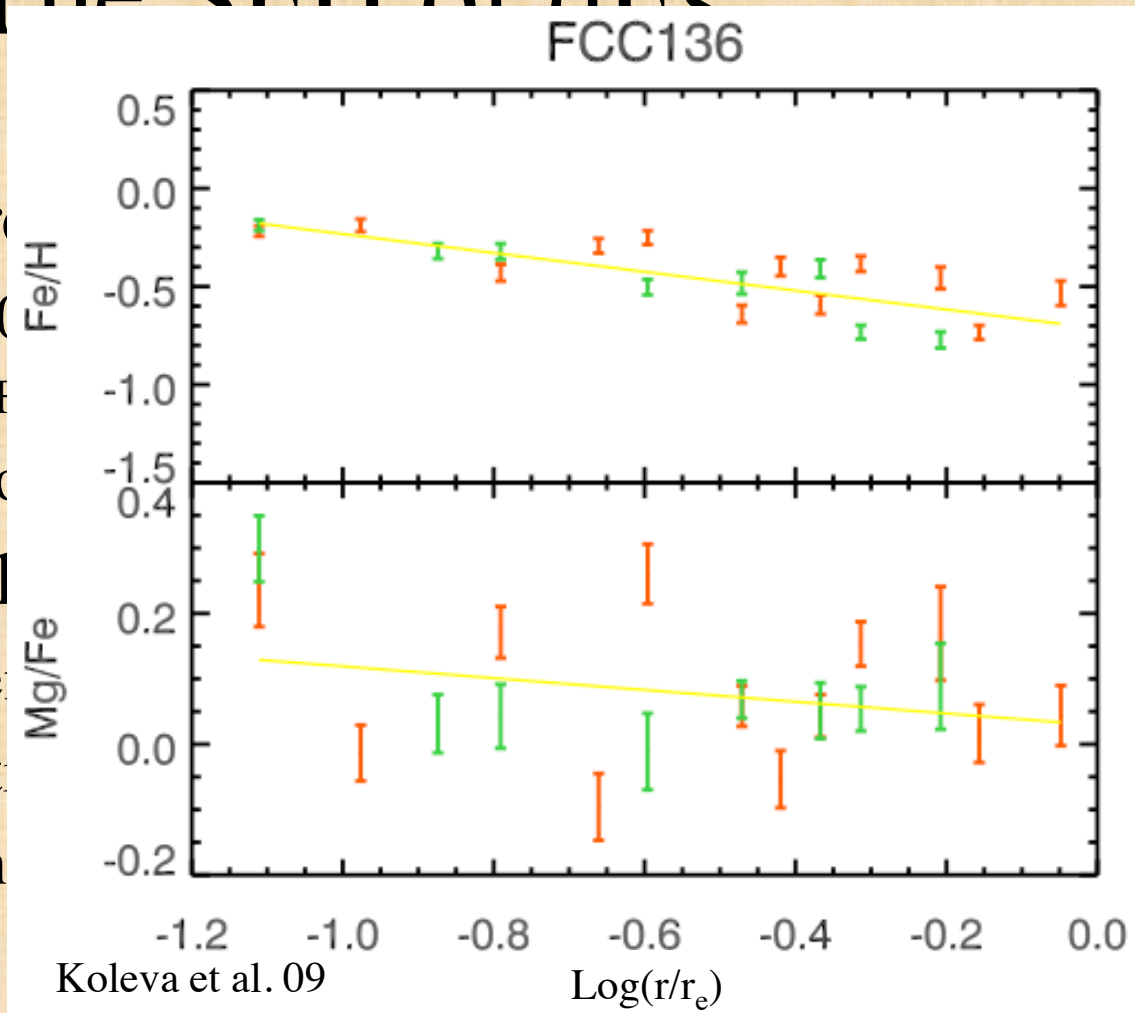
The SFH of dEs



- BCD (during a burst)

The SEH of dEs

- Lets look directly at the SEH
 - Typically 70% of the stars are resolved (mean SEH)
 - in a period of 10 years
- Full spectrum fitting, models Resolved in [Mg/Fe]
- dE (quiescent)
- dIrr (if confirmed)
- BCD (during outburst)



The SFH of dEs

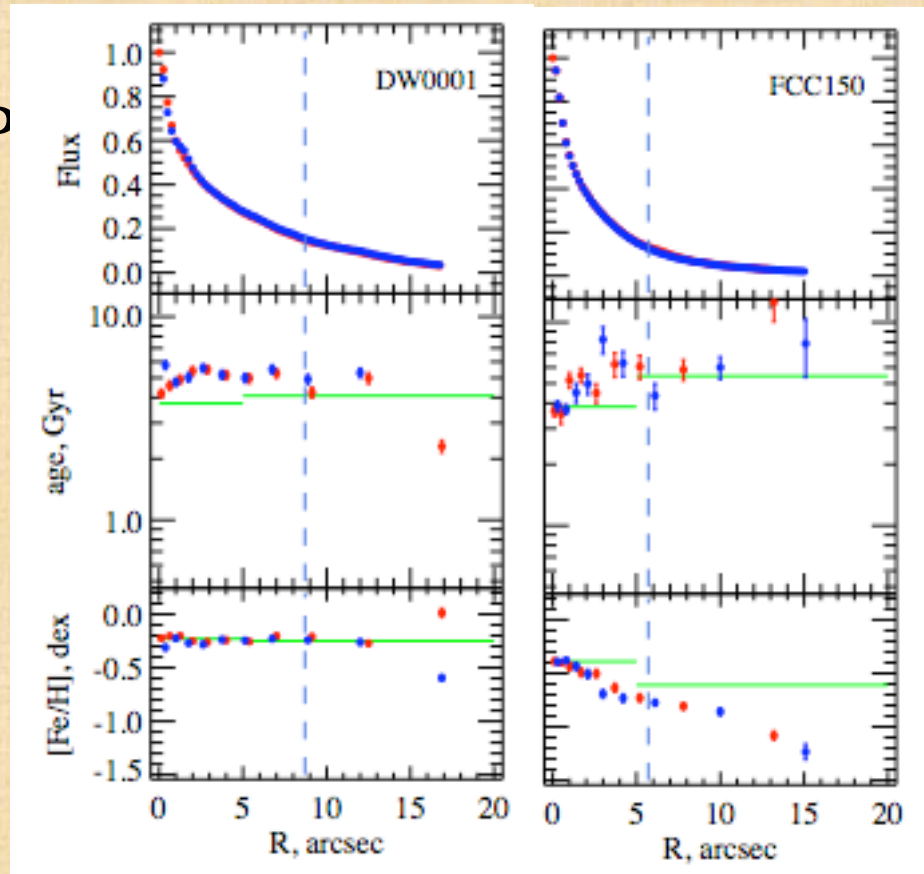
- Lets look directly of what happened near $z=1$
 - Typically 70% of the stellar mass formed before $z=1$
(mean SFR $\sim 0.1 - 0.2 M_{\odot}/\text{yr}$)
 - ... in a period of ~ 4 Gyr
- $[\text{Mg}/\text{Fe}] \sim 0.1$
 - 40% of the stellar mass formed in < 1 Gyr
(mean SFR $\sim 1 M_{\odot}/\text{yr}$)

Two classes of massive dEs?

- Proposition by Lisker et al. 06 (disky dEs)

Two classes of massive dEs?

- P



(discy dEs)

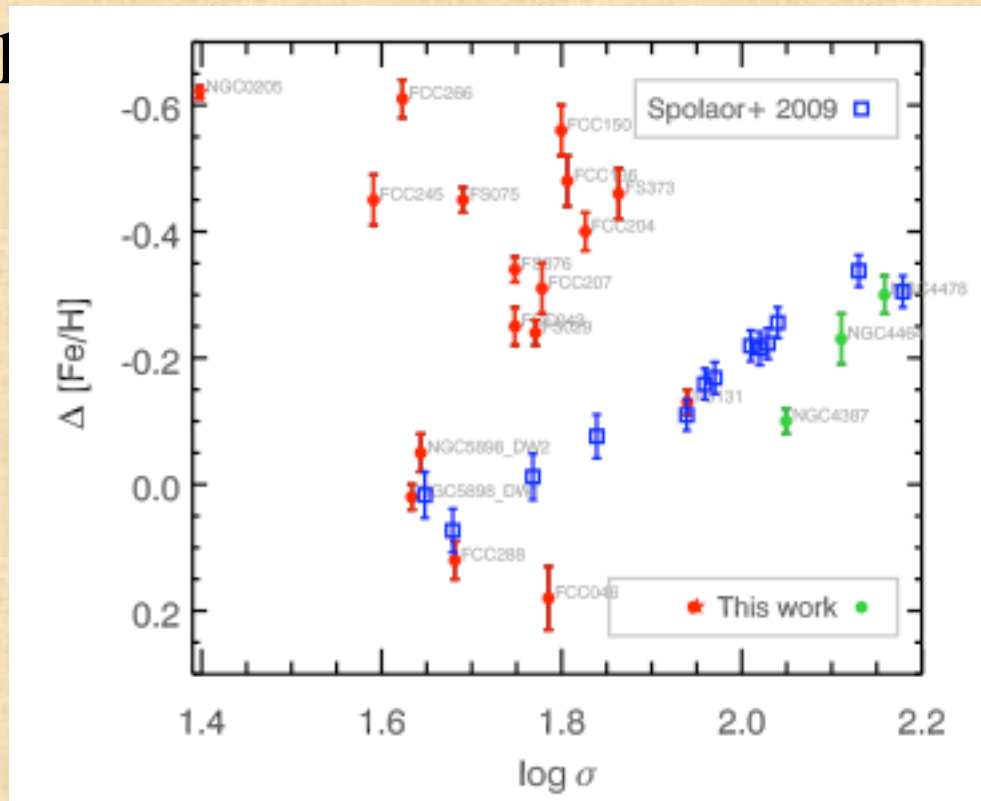
The flat or rotating dEs
have flat $[Fe/H]$ profiles

The steep gradients
already exist at $z=1$

See also other gradient measurements by Chilingarian

Two classes of massive dEs?

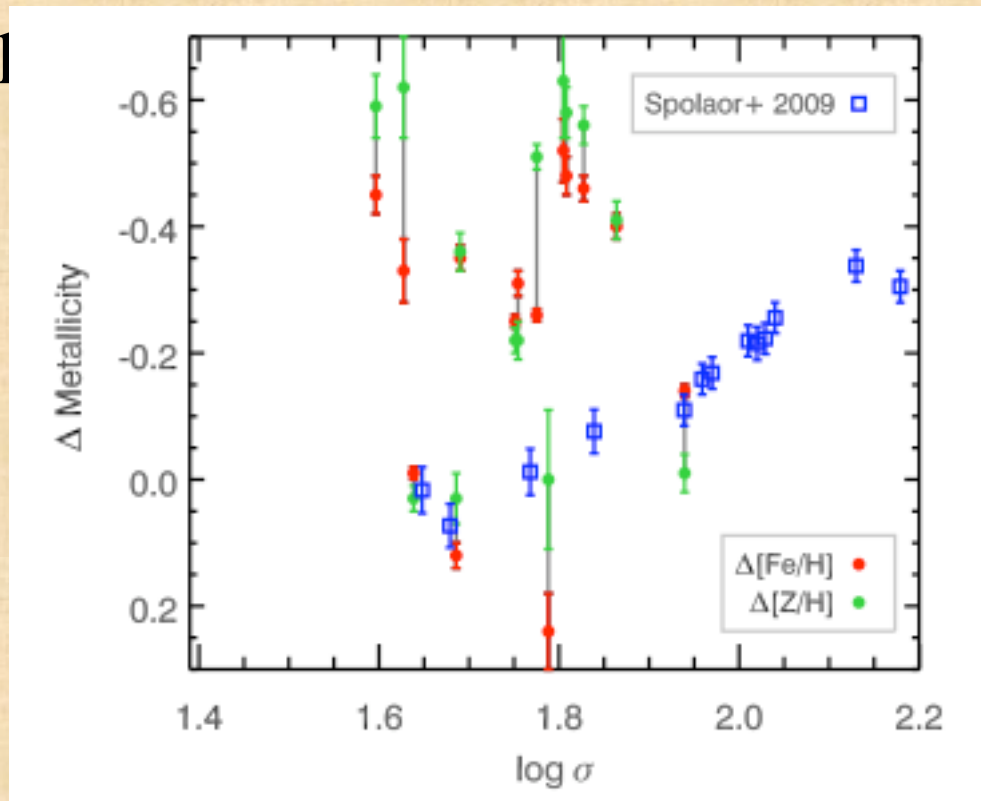
- Prop (by dEs)



But Spolaor et al 09
do not find steep
gradients of $[Z/H]$

Two classes of massive dEs?

- Prop



y dEs)

It is not because we compare $[\text{Fe}/\text{H}]$ and $[\text{Z}/\text{H}]$...

Open issue.

Summary

- dEs are the final product of the evolution, any type of (gas rich) low mass galaxies will end on this sequence, and only tiny differences distinguish the progenitors of individual dEs... These signatures still need to be identified in more details.
- Most of the stars (70%) in the local galaxies formed before $z=1$ during a period of 4 Gyr
- A large fraction of these stars formed during the first Gyr of the evolution. The mean SFR during the first Gyr, for a NGC205 type object, is $\sim 1M_{\odot}/\text{yr}$.