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The fundamental plane of EDisCS galaxies

The effect of size evolution

(Corrigendum)

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ABSTRACT

We discovered a mistake in Eqs. (7) and (10) of Saglia et al. (2010, A&A, 524, A6), which propagates to Tables 8 and 9 and Fig. 25. We revise the tables, the figure and the affected statements in the paper. As a result, the reduction in the luminosity evolution due to the effects of the size and velocity dispersion evolution is smaller than claimed in Saglia et al. (2010).

Key words. galaxies: elliptical and lenticular, cD – galaxies: evolution – galaxies: formation – galaxies: fundamental parameters – errata, addenda

The paper "The fundamental plane of EDisCS galaxies. The effect of size evolution" was published in A&A, 524, A6. We discovered a mistake in Eqs. (7) and (10), the corrected version of which read:

$$\Delta\log L = \frac{10\beta_0 - 2}{5\beta_0}\Delta\log R_\mathrm{e} + \frac{2\alpha_0}{5\beta_0}\Delta\log\sigma - \frac{2\Delta ZP}{5\beta_0}, \tag{7}$$

and

$$\Delta\log L = \left(\frac{10\beta_0 - 2}{5\beta_0}\nu + \frac{2\alpha_0}{5\beta_0}\mu - \frac{2}{5\beta_0}\kappa\right)\log(1+z) + \phi z, \tag{10}$$

while Saglia et al. (2010) had $\frac{10\beta_0-1}{5\beta_0}$ instead of $\frac{10\beta_0-2}{5\beta_0}$ of. The mistake propagates to the 6th, 7th and 8th column of Table 8, to the 4th column of Table 9 and to the triangles pointing upwards in Fig. 25. Also, in these tables and figure the value $\beta_0 = 0.3$ was used, instead of the correct $\beta_0 = 0.33$.

Here we provide a revised version of Tables 8, 9 and Fig. 25. As a result, the reduction in the luminosity evolution due to the effects of the size and velocity dispersion evolution is smaller than claimed in Saglia et al. (2010). The statements that need revision are the following.

In the Abstract, the statement:

For stellar masses, the luminosity evolution is reduced to $L_B \propto (1+z)^{1.35}$ *for cluster galaxies and* $L_B \propto (1+z)^{1.98}$ *for field galaxies.*

Table 8. Ages derived from the evolution of the FP ZP, averaged for $M_{\rm dyn} < 10^{11}\ M_\odot$ and $M_{\rm dyn} > 10^{11}\ M_\odot$.

Type	HST	VLT	Morph	Mass	Age (Gyr) $z < 0.5$	$0.5 < z < 0.7$	$z > 0.7$
Cluster	Yes	Yes	10	<	$4.7^{+2.3}_{-1.2}$	$2.4^{+1.1}_{0.4}$	$1.8^{+0.8}_{-0.3}$
Cluster	Yes	Yes	10	>	$8.6^{+0}_{-0.3}$	$5.7^{+2.0}_{-1.7}$	$6.3^{+0.5}_{-0.3}$
Cluster	Yes	No	0	<	$7.2^{+0.3}_{-0.1}$	$3.2^{+1.6}_{-0.7}$	$1.8^{+0.7}_{-0.3}$
Cluster	Yes	No	0	>	$8.5^{+0.2}_{-1.0}$	$4.4^{+2.3}_{-1.1}$	$4.6^{+2.1}_{-1.3}$
Field	Yes	Yes	10	<	$3.9^{+2.0}_{-0.8}$	$1.7^{+0.64}_{-0.3}$	$1.4^{+0.5}_{-0.2}$
Field	Yes	Yes	10	>	$6.7^{+1.7}_{2.0}$	$3.8^{+2.3}_{-0.9}$	$3.6^{+1.4}_{-1.0}$
Field	Yes	No	0	<	$3.4^{+2.8}_{-0.7}$	$2.2^{+2.3}_{-0.4}$	$1.4^{+1.1}_{-0.3}$
Field	Yes	No	0	>	$3.3^{+1.3}_{-0.4}$	$2.1^{+0.9}_{-0.3}$	$2.4^{+1.6}_{-0.6}$

Notes. The variations for the case of maximal evolution and the progenitor bias of van Dokkum & Franx (2001) are also given.

should read:

For stellar masses, the maximum reduction of the inferred luminosity evolution is by −0.38 units, from $L_B \propto (1+z)^{1.61}$ to $L_B \propto (1+z)^{1.23}$ for cluster galaxies, and from $L_B \propto (1+z)^{2.27}$ to $L_B \propto (1+z)^{1.89}$ for field galaxies.

Moreover, the final statement:

Taking into account the size and velocity dispersion evolution quoted above pushes all formation ages upwards by 1 to 4 Gyr.

should read:

Taking into account the size and velocity dispersion evolution quoted above pushes all formation ages upwards by up to 2 Gyr.

In Sect. 4.1, the statement:

Using $\nu = -0.5$, $\mu = +0.1$, the change in the slope $\Delta\tau = \frac{10\beta_0-1}{5\beta_0}\nu + \frac{2\alpha_0}{5\beta_0}\mu$ of the luminosity evolution $\Delta\log L = \tau\log(1+z)$ (see Eq. (7)) is ≈−0.5 units.

should read:

Using $\nu = -0.5$, $\mu = +0.1$, the change in the slope $\Delta\tau = \frac{10\beta_0-2}{5\beta_0}\nu + \frac{2\alpha_0}{5\beta_0}\mu$ of the luminosity evolution $\Delta\log L = \tau\log(1+z)$ (see Eq. (7)) is ≈−0.25 units.

In Sect. 4.2, the statement:

Table 9 lists the changes in the slope $\Delta\tau = \frac{10\beta_0-1}{5\beta_0}\nu + \frac{2\alpha_0}{5\beta_0}\mu$

should read:

Table 9 lists the changes in the slope $\Delta\tau = \frac{10\beta_0-2}{5\beta_0}\nu + \frac{2\alpha_0}{5\beta_0}\mu$

In the same section the statement:

obtaining $\Delta\tau = -0.39$. This implies that the luminosity evolution inferred from the ZP evolution of the EDisCS clusters without selection weighting ($L \sim (1+z)^{1.61}$, see Table 5) would reduce to $L \sim (1+z)^{1.22}$.

should read:

obtaining $\Delta\tau = +0.07$. This implies that the luminosity evolution inferred from the ZP evolution of the EDisCS clusters without selection weighting ($L \sim (1+z)^{1.61}$, see Table 5) becomes $L \sim (1+z)^{1.68}$.

Table 9. Change in slope $\Delta\tau = \frac{10\beta_0-2}{5\beta_0}\nu + \frac{2\alpha_0}{5\beta_0}\mu$ of the luminosity evolution $\Delta\log L = \tau\log(1+z)$ (see Eq. (7)) derived from the measured variation in the FP ZP caused by the size and velocity dispersion evolution for the different cases listed in Table 7.

Case	ν	μ	$\Delta\tau$
Hopkins et al. (2009)	−0.5	+0.1	−0.25
1+9 $M_{\rm dyn}$	−1.0	+0.59	0.07 ± 0.28
1+9 M_*	−1.0	+0.34	−0.29 ± 0.52
2+10 $M_{\rm dyn}$	−1.3	+0.68	−0.03 ± 0.40
2+10 M_*	−1.2	+0.39	−0.38 ± 0.66
5+11 $M_{\rm dyn}$	−0.46	+0.41	+0.23 ± 0.20
5+11 M_*	−0.68	+0.19	−0.26 ± 0.36
6+12 $M_{\rm dyn}$	−0.67	+0.49	+0.18 ± 0.28
6+12 M_*	−0.84	+0.27	−0.27 ± 0.39

The final statement of the section:

... reduce the predicted luminosity evolution with redshift drastically. In contrast, by taking into account the progenitor bias (rows six to nine of Table 9), the correction $\Delta\tau$ to the redshift slope of the luminosity evolution inferred from the FP is far smaller.

should read:

... change the predicted luminosity evolution samewhat. The same applies by taking into account the progenitor bias (rows six to nine of Table 9).

In Sect. 4.4, the statement:

(1) minimal evolution, using $\Delta\tau = -0.7$ (M_*, case 6+12, of Table 7) and $\phi = 0$;

should read:

(1) minimal luminosity evolution, using $\Delta\tau = -0.38$ (M_*, case 2+10, of Tables 7 and 9) and $\phi = 0$;

Moreover, the statement:

Taking into account the size and velocity dispersion evolution considered above in the case 6+12 pushes all formation ages upwards by 1 to 4 Gyr.

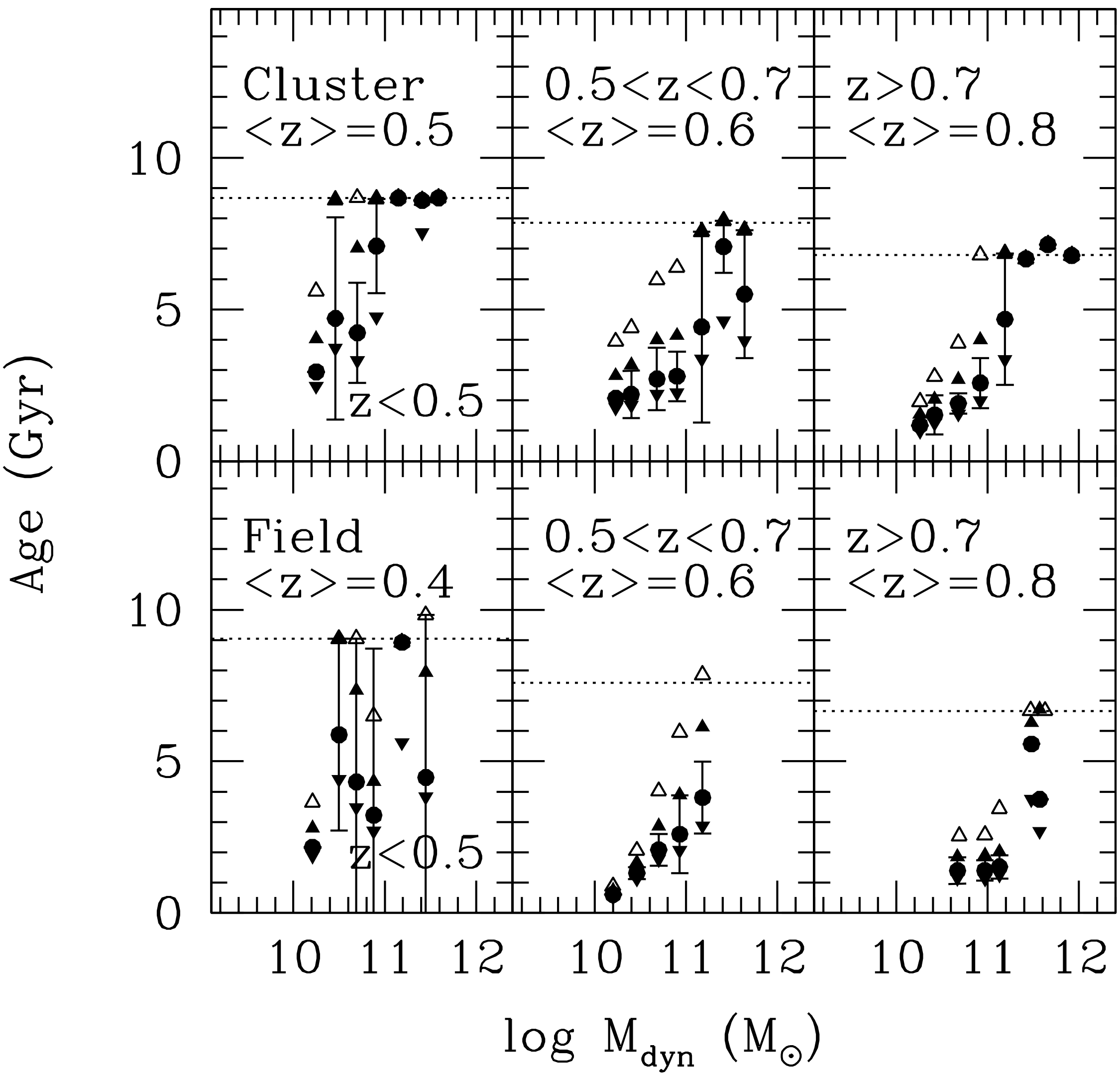

Fig. 25. Ages of cluster (*top*) and field (*bottom*) galaxies at low ($z < 0.5$, *left*), medium ($0.5 < z < 0.7$, *middle*), and high ($z > 0.7$, *right*) redshifts as a function of dynamical mass. The circles show the ages as derived from the bare FP zero point evolution. The filled triangles pointing upwards take into account size evolution at constant M_*, case 2+10 (see Table 9); the open triangles pointing upwards show the (wrong) values presented in Fig. 25 of Saglia et al. (2010) for comparison. The triangles pointing downwards take into account the progenitor bias of van Dokkum & Franx (2001). The median redshifts are given and the corresponding ages of the Universe are shown by the dotted lines.

should read:

Taking into account the size and velocity dispersion evolution considered above in the case M_*, 2+10 of Tables 7 and 9 pushes all formation ages upwards by up to 2 Gyr.

In the conclusions the statement:

The corrections computed at constant dynamical masses with a progenitor bias correction almost cancel out

should read:

The corrections computed at constant dynamical masses without a progenitor bias correction almost cancel out

The statement:

at constant stellar masses they reduce the slope of the $(1 + z)$ *dependence of luminosity by* -0.6 *units (case 5+11 of Table 7).*

should read:

at constant stellar masses they reduce the slope of the $(1 + z)$ dependence of luminosity by -0.38 units (case 2+10 of Table 7).

Finally, the statement:

Fitting directly the luminosity-mass relation, we derived a luminosity evolution that agrees with the one derived from the FP analysis and does not allow for large size and velocity dispersion corrections such as those derived without taking into account the progenitor bias, where a reduction of the slope of the $(1 + z)$ *dependence of luminosity by* -0.8 *is derived at constant* M_* *(case 1+9 of Table 7).*

should read:

Fitting directly the luminosity-mass relation, we derived a luminosity evolution that agrees with the one derived from the FP analysis and does not allow for large size and velocity dispersion corrections, as indeed it is always the case.

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