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Erratum: GASP. IX. Jellyfish galaxies in phase-space: an orbital study of intense ram-pressure stripping in clusters

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After the publication of the paper 'GASP IX. Jellyfish galaxies in phase-space: an orbital study of intense ram-pressure stripping in clusters' (2018, MNRAS, 476, 4753) we found bugs (related to units) in the procedure we used to model ram-pressure stripping. While the results and main conclusions shown in the paper are unaffected (in fact the conclusions are strengthened), there are moderate changes in the numerical values of some of the parameters used to model the intensity of ram-pressure stripping, presented mainly for reference. Figures, and values referenced in the text should be updated as follows:

Figs 1 (right panel), 3, 4, 5, 6, 8 of the original paper should be replaced by Figs 1, 2, 3, 4, 5, and 6 respectively, and the last 2 columns of Table 2 in the original paper should be replaced by the values listed in Table 1.

The changes are in the values of the stellar disk scale lengths (R_d), the associated anchoring force of the galaxies ($\Pi_{\rm gal}$), and the ram pressure of the intra-cluster medium ($P_{\rm ram}$). The changes in R_d and $\Pi_{\rm gal}$ (Figs 1, 3, 4 and Table 1) are small compared with the associated scatter at fixed stellar mass. A more significant change is in the value of $P_{\rm ram}$ towards large clustercentric distances (at $2 \times R_{200}$ the difference is of an order of magnitude; see Fig. 2).

The most important consequence of the abovementioned numerical changes (which triggered this erratum) lies in the prediction of ram-pressure stripping intensity in phase-space, which was previously underestimated. This is shown by the (now broader) shaded coloured regions in Figs 5 and 6, which represent the incremental effect of ram-pressure, starting at a truncation radius $r_t = 4 \times Rd$ (∼30 per cent of the total gas mass stripped) and reaching $r_t = 0$ (total stripping, solid lines)[1]

Section 3.1: The quoted ρ_0 in Table 1 in the original paper are in units of kg m$^{-3}\mu$, where μ is the mean molecular weight of the plasma. In our analysis, we adopted $\mu = 0.6$.

Section 4.1: If we group all stripping cases together ('Extreme stripping', 'Stripping' and 'Post-stripping'), the vast majority are now inside or near the intense ram-pressure stripping regions (Fig. 6), which strengthens our conclusions that jellyfish galaxies formed via incremental ram-pressure stripping during first infall into the cluster.

For convenience, the numerical changes to figures and tables are summarized in Table 2.

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[1]We characterize the stage of stripping with r_t (rather than fraction of total gas mass loss) as this quantity is less dependent on the assumed gas content and distribution prior to stripping. Note that $r_t = 3 \times Rd$ (50 per cent of the total gas mass stripped) corresponds to the threshold typically used to separate HI-rich galaxies from HI-deficient ones (Haynes & Giovanelli 1984). Also note that below $r_t = 4 \times Rd$ the contribution of a typical halo to Π_{gal} is expected to be lower than that the contribution of the disk.

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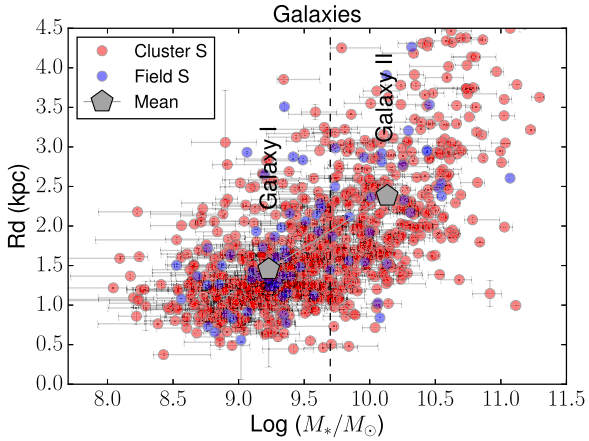

Figure 1. Replaces the right panel of Fig. 1 in the original paper (almost identical). The stellar mass ($M\star$) versus stellar disk scale length (R_d) of all the cluster and field spirals (S) from the WINGS/OmegaWINGS samples with a redshift. The pentagons indicate the properties of the model galaxies I and II.

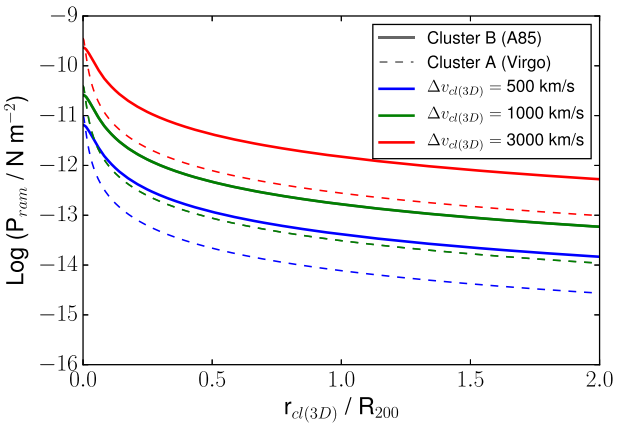

Figure 2. Replaces Fig. 3 in the original paper (curves moved up by an order of magnitude at $r_{\rm cl(3D)} \sim R_{200}$). The ram-pressure intensity profile for the model clusters A (solid lines) and B (dashed lines) for three different differential velocities ($\Delta v_{\rm cl(3D)}$) of an infalling galaxy.

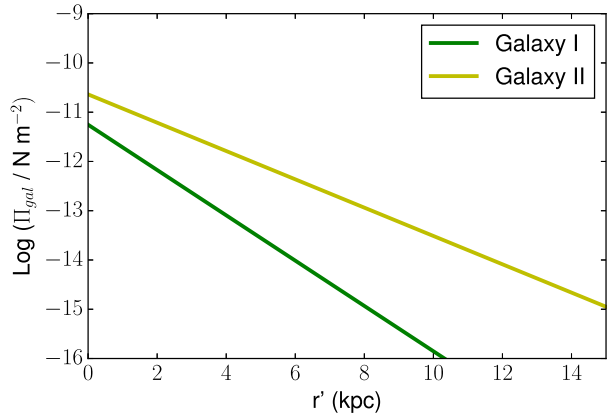

Figure 3. Replaces Fig. 4 in the original paper (both lines shifted). The anchoring force as a function of radial distance from the galaxy centre for two model galaxies (I and II, as indicated).

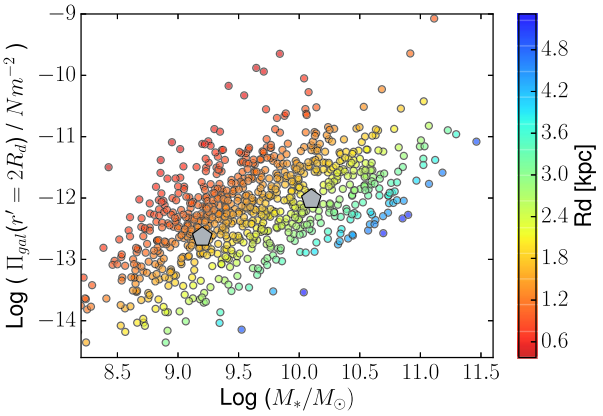

Figure 4. Replaces Fig. 5 in the original paper (almost identical). The anchoring force at $r^{'} = 2 \times R_d$ as a function of stellar mass for all spiral galaxies in our (cluster plus field) sample, colour-coded by R_d. The pentagons correspond to the model galaxies I and II.

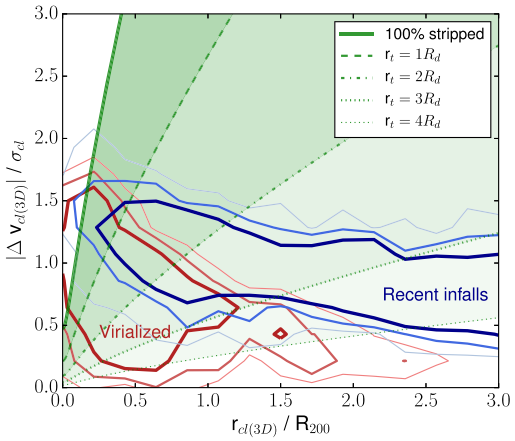

Figure 5. Replaces Fig. 6 of the original paper (green area broadened towards the right of the plot). Position versus velocity phase-space diagram of 15 simulated group and cluster galaxies (mass range from 0.5×10^{13} to 1×10^{15} $M_\odot$) from Rhee et al. (2017, private communication; using the YZICS simulations by Choi & Yi (2017)), considering multiple lines of sight, separated into 'virialized' (entered the cluster >4 Gyr ago; red con tours) and 'Recent infalls' (falling towards the cluster for the first time or recently entered the cluster <2 Gyr; blue con tours). A galaxy is considered to enter the cluster when it has crossed R_{200} for the first time. The con tours enclose 1000, 2500, and 5000 particles from lighter to darker colours respectively. The axes have been normalized by cluster size (R_{200}) and cluster velocity dispersion (σ_{cl}) to allow the stacking of different clusters. The green area indicates the increasing effect of ram-pressure stripping by the ICM in the case of a low-mass galaxy (model galaxy I) falling in a massive cluster (model cluster B). The green lines correspond to different truncation radius (r_t) in units of stellar disk scale length (R_d). For details see Section 3, and Tables 1 and 2 of the original paper.

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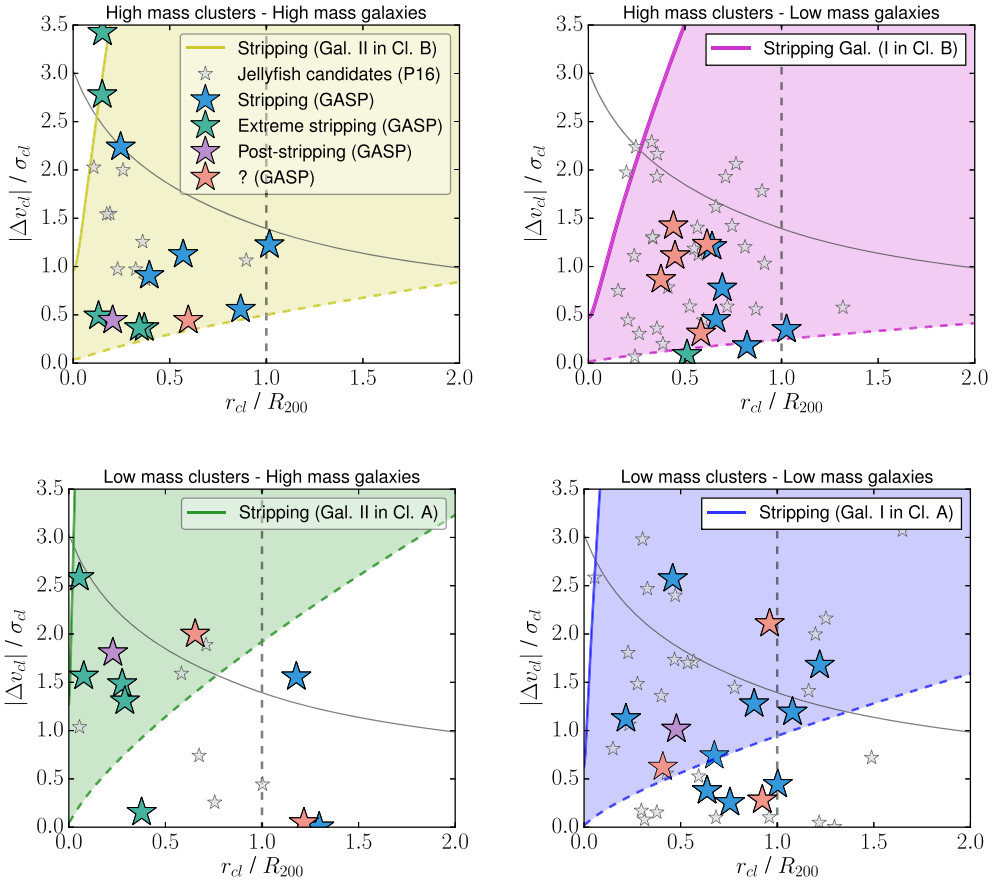

Figure 6. Replaces Fig. 8 of the original paper (coloured areas broadened towards the right of each plot). The location in position versus velocity phase-space of jellyfish galaxies in high mass clusters (top panels; $\sigma_{cl} > 750 km/s$) and low mass clusters (bottom panels; $\sigma_{cl} < 750 km/s$) separated in two bins of stellar mass: $>5 \times 10^9$ $M_\odot$ (left panels) and $<5 \times 10^9$ $M_\odot$ (right panels). Grey stars correspond to the jellyfish sample of P16 while the bigger stars are the confirmed jellyfish galaxies from GASP. Lines of different intensities of ram-pressure are indicated in each case: the dashed coloured lines indicate mild stripping of the gas ($t_r = 4 \times R_d$), while the solid line corresponds to total (100 per cent) stripping. The grey curve corresponds to the escape velocity in a NFW halo. The vertical dashed line indicates $r = R_{200}$, which is roughly the extent to which all clusters used have a high spectroscopic completeness.

Table 1. Replaces the last 2 columns of Table 2 in the original paper (small changes in R_d, and changes of a factor of ∼2–4 in $\Pi_{gal(r=0)}$). Properties of the model galaxies: low-mass galaxy (I), and high-mass galaxy (II). Columns listed are: Mean disk scale length of the OmegaWINGS galaxies in the low- and high-mass bins shown in the right-hand panel of Fig. 1), and the resulting central anchoring force, computed from equation 3 in the original paper.

Model name	R_d (kpc)	$\Pi_{gal(r=0)}$ (Nm^{-2})
Galaxy I	1.5	5.57×10^{-12}
Galaxy II	2.4	2.30×10^{-11}

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Table 2. Summary of the changes to figures and tables.

Figure in original paper	Figure in this Erratum	Changes
1 (right panel)	1	Almost identical
3	2	Curves moved up at increasing clustercentric radius by up to an order of magnitude at $r_{\rm cl(3D)} \sim R_{200}$
4	3	For Galaxy I the change is mild, while for Galaxy II the values changed by up to an order of magnitude
5	4	Almost identical
6	5	The green area broadened towards the right of the plot (the rest is identical)
8	6	The coloured areas broadened towards the right of the plot (the rest is identical)
Table in original paper	**Table in this Erratum**	**Changes / Notes**
1	-	Note: ρ_0 is in units of kg m$^{-3}\mu$. We used $\mu = 0.6$ in the analysis
2 (last 2 columns)	1	While the changes in R_d are very small, Π_{gal} reduced by a factor of ∼2-4 (Galaxy I and II respectively)

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REFERENCES

Haynes M., Giovanelli R., 1984, AJ, 89, 758
Rhee J., Smith R., Choi H., Yi S. K., Jaffé Y. L., Candlish G. N., Sanchez-Janssen R., 2017, ApJ, 843, 128
Choi H., Yi S. K., 2017, ApJ, 837, 68

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