

Minor corrections

Rebecca Smethurst DPhil thesis viva : Minor Corrections

The influence of morphology, AGN and environment on the quenching histories of galaxies.

Preamble: Statement of Originality.

Please indicate a rough percentage contribution to each published work in the declaration.

Percentage contribution added to statement of originality.

Introduction : Page 6. and elsewhere

`This transition was theorised to occur.....' please re-word without the use of `was theorised`
e.g. `It has been proposed that this transition

See also 1.1 ; 1.1.1.3.

p.6 : Statement reworded

p. 7 : "There are many theorised mechanisms which can cause quenching" -> reworded to -
> "There are many mechanisms proposed to cause quenching."

p.10: "The former is theorised" -> reworded to -> "The former is thought" and "The latter mechanism is theorised" -> reworded to "The latter mechanism is thought"

Page 7. `accreton disk of cold material'-> `accreton disk of hot material'

p.7 : wording changed

Page 15. Indicate that aperture bias is (is not) an issue for the thesis, supported by an appropriate calculation of the physical scale at the low and highest z range probed by the sample.

p. 15: A sentence has been added discussing the physical scale across the redshift ranged probed by the sample as justification for using the Petrosian magnitudes used in this study.

Page 16. The outer portions (beyond 1.1deg from the axis) of GALEX observations have poor astrometry and FWHM of the PSF (e.g., Morrissey et al. 2007; Drinkwater et al. 2010). Please indicate if these regions have been used in the work, or if the latest GALEX data release does not include these poor astrometry regions. Spell out clearly the source of the GALEX data (which data release, and how the data was accessed – presumably from the public web site?). If these regions have been included to match to SDSS photometry, the galaxies will need to be removed from the subsequent analysis, as the NUV-optical colours will likely be wrong.

p. 16 : The source of the GALEX data was the Bianchi et al. (2011) DR5 catalog accessed using the VO through the TOPCAT application. This data release does not contain the poor astrometry data. A sanity check on the cross matched sources was performed to ensure that the radius in the field of view, $R_{\text{fov}} < 0.6\text{deg}$ as stated in Morrissey et al. (2007) as providing an accurate cross match to SDSS data with search radius $< 3''$. Indeed all the sources of the GZ2-GALEX catalog have $R_{\text{fov}} < 0.5\text{deg}$. This has been stated in Section 1.3.2.

Add a caveat to allow for the possibility that the NUV flux could come from horizontal branch stars, as opposed to young star (O and B class) and therefore would not be due to star formation (i.e. the "UV upturn" phenomenon).

p.22 : A paragraph discussing this caveat and the UV upturn has been added to Section 1.3.4

Page 21 & Throughout ensure that the contour levels given on all contour plots.

Contour levels have been included on all plots where appropriate, or the levels have been specified in the caption of the figure (to avoid crowding).

Page 21. Give the uncertainty on the colours for the galaxies (especially u-r).

p.21 : Median uncertainties on both u-r and NUV-u colours have been stated to 2sf.

Chapter 2.

Early in the chapter, make it clear what the inputs and outputs to starpy are used (e.g., u-r and its uncertainty, NUV-u and its uncertainty and redshift and its uncertainty plus age result in t and Tau outputs).

p.34 : This has been stated at the end of section 2.2.2

Section 2.2.1

In this section (and unlike the rest of the thesis), the phrasing changes to say “allows you”; “represents your”; etc. Please remove the word “you” and “your” wherever possible here and replace with more appropriate wording.

All wording changed to be passive, “you” and “your” removed in all cases throughout section 2.2.1

Page 40. Are there any galaxies that might plausibly be systematically discarded? In particular, comment about the location of post star bursts / E+As in the figure caption.

p. 39 : A paragraph has been added to Section 2.5 discussing the possibility that galaxies may be systematically discarded, referring particularly to PSB galaxies.

p.40 : A sentence has been added to the caption of Figure 2.7 referring to the locations of E+A galaxies.

Page 43. Definition of “Inactive” is required in the figure caption.

p.43 : Definition of INACTIVE sample added to caption of Figure 2.8

p.44 : Definition of INACTIVE sample added to caption of Figure 2.9

Chapter 3

Page 48. “For a more complete sample” – quantify completeness here.

p.48 : Wording changed to a “complete sample” and completeness now quantified later in the same sentence.

Page 51. Fourth line of Table 3.1. The $p_S \geq 0.8$ is incorrect.

p.51 : Table 3.1 changed from “Late-type ($p_s \geq 0.8$)” to “Late-type ($p_d \geq 0.8$)”

Section 3.2.1 Cite Jacob Crossett’s work that complements the present arguments.

p. 56 : A sentence discussing the agreement with Crossett et al. (2014) has been added to Section 3.2.1

Page 57. Comment on the “unusual” shapes of the upper curves – are they real or artifacts of the particular model chosen?

p.56-58 : A discussion has been added to Section 3.2.2 about the shape of the upper curves. The captions of Figures 3.4, 3.5, 3.7 have also been updated to state the normalisation of the upper histograms is between 0 and 1.

Page 59. Is there a slow channel and a fast channel to red spirals? Please comment.

p. 59 : A comment has been made that red spirals are more likely to be produced by a slower quench since spiral structure is often retained in secular processes, however may also be triggered by interactions which could be attributed to the rapid quench seen in Figure 3.5.

Also on this page, the 31.2% change requires a fuller explanation.

p.60 : The calculation of 31.2% has been laid out in a footnote to show how this was obtained.

Page 69. Bullet point (ii): “elliptical” is wrong. Should be ‘early-type’, or ‘smooth’. Check every occurrence of “elliptical” and consider whether you need to change this.

All occurrences of “elliptical” throughout the thesis have been considered and changed to early-type or smooth where appropriate.

Chapter 4

Page 71. Add a note of the relative timescales of AGN triggering and visibility versus quenching mechanisms.

p.72 : A sentence discussing the typical AGN visibility timescale ~ 0.01 Gyr in comparison to the time taken to drop below the SFS in a set of models with rapid quenching rates has been added.

Page 72. How have the emission lines been measured?

Give the definition of S/N in use here? (i.e. line or continuum?).

p. 73 : A sentence stating how the emission lines have been measured has been added.

p. 74 : The definition of the variables used to calculate S/N have been stated.

Page 73. Compare the typical (u-r) uncertainty to $\Delta(u-r)=0.09$ to demonstrate it is negligible.

p.74-75 : The two values have been compared long with a reference to Section 1.3.4 where the median uncertainty on u-r colours was originally stated.

Page 75. Fig 4.3. Some of the images look asymmetric. Comment on this in the figure caption in relation to recent merger activity.

p. 78 : Caption of Figure 4.3 updated to highlight the asymmetry of some of the galaxies shown along with a comment on the connection between this and merger triggered AGN activity.

Page 79. Fig 4.6 (and similar figures on subsequent pages).

Make a clear statement about the normalization of the y-axis of these plots.

p.81-83 : The captions of Figures 4.6-4.8 have been updated to state that the curves are normalised so that the areas underneath the curves in a single panel are equal.

Page 82. Tab 4.3. AGN-Hosts with $\tau < 1 \text{ Gyr}$ – for $10.25 < M_{\text{solar}} < 10.75$ the numbers 33 & 69 look the wrong way around. Please correct this in the table caption or main body of the text.

p.84 : The numbers quoted in Table 4.3 have been double checked and are all correct. The 33% and 69% quoted for the disc and smooth $10.25 < M_{\text{solar}} < 10.75$ populations with $\tau < 1 \text{ Gyr}$ are calculated from the curves shown in the left, middle panel of Figure 4.8. The dashed line, showing the smooth weighted population contains over double the area bounded by the solid line, showing the disc weighted population, in the $\tau < 1 \text{ Gyr}$ region.

Also 'three mass bins' -> 'three bins in stellar mass'

p. 84 : Caption of Table 4.3 updated to reflect that these are bins in stellar mass.

Page 86. 'This suggest that AGN.....' -> 'This suggests that AGN.....'

p.88 : Typo corrected

What fiducial level do Sparre & Springel (2016) use?

p.87 : The fiducial level of Sparre & Springel (2016) has been stated along with the level of the strongest AGN feedback. This is defined in terms of the metallicity input into the cooling function of the gas. Sparre & Springel (2016) do not state how these modes of feedback compare in terms of energy output.

Page 92. Fig. 4.10 In the figure caption Note the change in linear scale (in kpc) from top left to bottom right.

p. 94 : The caption of Figure 4.10 has been changed to note the change in linear scale in kpc/' from the top left to bottom right with redshift.

Page 93. Fig 4.11. Add a note in the figure caption that the 4th galaxy from the left has a bar.

p.95 : Note added to caption of Figure 4.11 to highlight the bar in galaxy J115338.14+72515.36

Spelling 'debiase' -> debias

p.95 : 'debiase' typo corrected

Page 96. Spelling: "catalogueue" -> catalogue - run a spell check on this chapter prior to re-submission.

p. 97: spelling of catalogue corrected here and throughout chapter. Spell check run and changes made.

Page 106. LIMMIX -> LINMIX

p. 107 : typo corrected

Page 110. Fig.4.20. The figure is missing the open circle points from Simmons.

p. 112 : Simmons et al. (2013) open circles added to the plot as requested.

Page 112. Fig 4.22. Either the distribution of points is strongly affected by systematics, or something very interesting is indicated. Explain why there might be excess points (i) at the very bright end of the blue cloud, and (ii) redder than the red sequence. Are any of the really red galaxies related to the work of Shearman & Pimbblet (2014) or is the cause of their colours different altogether?

p.113 : The excess points at the bright end of the blue cloud and above the red sequence have been discussed as possible under and over subtractions of the AGN contribution to the galaxy photometry respectively. The anomalously red galaxies of Shearman & Pimbblet (2014) are also discussed here in reference to those galaxies which appear redder than the red sequence.

Conclusions of Chapter 4. Where possible, quantify all conclusions.

p.121 - 123 : Where possible, conclusions have been quantified.

Chapter 5

Page 123. The fact that the Yang catalogue search results in only 38 galaxies found looks incorrect. Please consider whether this number is wrong.

p.126 : This number has been corrected after re-doing the cross match with the catalog. A statement has been made as to why the Berlind et al. (2006) sample was used instead.

How valid is it to assign the status of “central” to the most massive galaxy? Add plausible alternatives, and state why this route has been taken.

p.126 : A paragraph has been added discussion the alternative of assigning the brightest galaxy as the central. A statement has been made about the number of central galaxies which change their designation when using stellar mass rather than brightness.

Page 132
halo mass -> proxy for halo mass

p. 136 : wording changed to proxy for halo mass

In figure 5.9b the trend is absent, not ‘less apparent’ !

p.135 - 140 : wording has been changed when referring to absent trends in tau with R/R₂₀₀.

[Page 133. Fig 5.9 and similar plots on subsequent pages.
We do not require this but the conclusions would be clearer if a line was fitted to quantify the significance of any trend present.]

p. 141 : Lines have been fits to each of the central bins of Figures 5.9-5.11 the slopes for which

are quoted in Table 5.1 in order to quantify the significance of the trends.

Fig 5.11 What is the lowest sigma that can be measured? Adjust caption accordingly.
[We do not require this however, you might consider whether there are effects here over-and-above the influence of mass e.g. can a statement be made that environment is one-third as much of an influence as mass?]

p. 139 : The caption of Fig 5.11 has been updated with the lowest sigma that can be measured from SDSS spectra due to the instrument dispersion of 69 km/s.

Page 137. Table 5.1. What is the significance of the trends? (see comments above).

p.141 : Table 5.1 updated to display the median values from the walker chain of a linear regression fit (along with $\pm 1\sigma$ values) to the central bin data shown in the Figures 5.9-5.11 for both Δt and tau variables.

Chapter 6

Page 150 – last para – you have not used the ‘simplest possible SFH’, that would be a single burst.

p. 154 : This sentence has been clarified by adding the phrase “to describe a decline in star formation”.

Page 152 – would there be enough Ty1 AGN to make this a significant addition?

p. 156 : A discussion has been added about the ratio of Type 1 : Type 2 AGN and the size of sample that could be built.

Bibliography.

Please update any citations that were “in press”, “submitted” and so forth with an up-to-date status where relevant.

All references updated accordingly from arXiv to journal citation. Kruk et al. (in prep) has been altered to Kruk et al. (submitted to MNRAS).