
New draft of "Hubble Sequence" paper

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Reply-To: Sandor Kruk <sandor.kruk@merton.ox.ac.uk>
To: GZTEAM@jiscmail.ac.uk

Fri, Jun 8, 2018 at 3:35 PM

Hi Karen,

Just made the deadline, sorry for sending you comments later than I intended. I think the paper is very well and clearly written, with a clean fundamental result and to the point.

Regarding my specific task of checking the numbers, I've redone the checks and most of the numbers are good (according to Hart+2016 debiasing used in the paper), except:

- There are 6887 galaxies quoted in the "disc+Simard" sample quoted in Figure 4 (right) which is close but doesn't quite reconcile with the number of oblique discs in the paper (6614), and the text doesn't mention the cross correlation with the Simard decomposition sample anywhere.
- There are 4830 "nearby spiral galaxies" quoted in the caption of Fig. 5 which doesn't appear in the text. I did a little bit of digging and this number comes from a paragraph which was deleted from an earlier draft: "

We can plot these values only for the subsample of Galaxy Zoo galaxies which have reliable classifications for both - i.e., those galaxies with visible spiral arms. We select this sample (as advised by Willett et al. 2013) using cuts on the classification votes in answers earlier up the GZ2 tree, specifically $p_{\text{features}} > 0.430$, $p_{\text{notedgeon}} > 0.715$, $p_{\text{visiblearms}} > 0.619$, and in addition require the number of people answering the question about spiral arm windiness to be at least 20. This gives a sample of **N = 4830** spiral galaxies in which we can ask how well bulge size correlates with spiral arm winding angles." So we can either add this paragraph back, check what sample was used to plot Figures 5 and 6, or redo the plots with the sample of 6614 galaxies mentioned in the text (the difference is mainly in the extra $p_{\text{visible arms}}$ cut).

More comments:

- One thing I find odd between Fig. 4 and Fig. 5 and 6 is that most galaxies are concentrated around $w_{\text{avg}}=0.2$ in Fig. 4, but around $w_{\text{avg}}=0.8$ in Fig. 5 and 6. It looks like we're plotting the complement ($1-w_{\text{avg}}$) in one of the plots, but I'm not sure in which. In Hart+2017 the order of w_{avg} is the other way round i.e. $w_{\text{avg}}=3$ for loose and $w_{\text{avg}}=1$ for tight, so maybe Fig 4 should be the other way around.
- I would add a short paragraph discussing the physical resolution of SDSS at the redshifts of

the sample, between 0.1-0.8 kpc (mean SDSS FWHM $\sim 1.2''$), which is good for recognizing the sizes of bulges (resolution \sim size of bulges) and winding of spiral arms. I'd also compare to other GZ2 studies which select samples up to $z < 0.06$.

- I'd mention about the large scatter in the L_{simard} vs B plot, arguing that some of the scatter is due to bars not being fitted in their disc+bulge models (in my 2018 paper I show a good match for B/T and volunteer's classification for the bulges of barred galaxies)
- Regarding the spiral arms being looser in barred galaxies, I think Ross discussed this in quite some detail, with a more quantitative measure in his Hart+2017 paper ("We find that galaxies hosting strong bars have spiral arms substantially (4° – 6°) looser than unbarred galaxies"). We could quote some of this in the paper. Strong bars are also more likely to have 2 spiral arms (Hart+2017a) which, in turn, are looser. I actually find this quite obvious just by looking at the Hubble sequence in the paper: the Sc galaxy (M101) has tighter arms than the SBc galaxy (NGC 7479) even though both are classed as "c". Playing the devil's advocate - would spiral arms appear "looser" when they're attached to the end of the bar compare to when they're not? But then I guess even if this is true, Ross showed more quantitatively with SPARCFIRE that there is something physical going on for barred vs unbarred galaxies...
- I would definitely not add Table 2 as it is not relevant for this paper. We do not select subsamples based on the absolute magnitude anywhere. If I'd add a table it would be summarizing the cuts made to select the final sample of oblique discs.

More minor comments and typos in the attached annotated copy. Let me know if you cannot open the annotations - I used Mac Preview to stick the notes.

Well done, it's a very good paper!


Cheers,
Sandor

From: Galaxy Zoo team list <GZTEAM@JISCMail.AC.UK> on behalf of Keel, William <keel@UA.EDU>
Sent: 08 June 2018 07:31:23
To: GZTEAM@JISCMail.AC.UK
Subject: Re: New draft of "Hubble Sequence" paper

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