Mon. Not. R. Astron. Soc. **000**, 000–000 (0000) Printed 3 May 2014 (MN LATEX style file v2.2)

Galaxy Zoo: Detailed Morphological Classifications for 48,000 galaxies from CANDELS⋆

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3 May 2014

ABSTRACT

Galaxies are sometimes really far away. The distant ones are pretty cool, because they tell us what the Universe was like back when it was just a kid, or maybe a teenager. You really have to look hard to see these galaxies, but once you do, what you do see tells you a whole lot. I mean, it's not exactly a WYSIWYG type of thing: there's a lot of work to figure out what the faint stuff you see really means. We did a bunch of work, and we think we did pretty well. Also, we compared to others who have done different kinds of work to try and answer some of the same questions. But we have a unique way of answering them, so here are those answers, and you can use them to answer other questions about the Universe.

Key words:
galaxies: general — galaxies: evolution — galaxies: morphology — galaxies: structure

1 INTRODUCTION

All hail morphologies.

2 OBSERVATIONAL DATA

2.1 Images

Description of CANDELS.

Description of imaging, including wide vs deep and magnitude limits.

How images were made: stretch, exact parameters, zoom, etc.

Note the difference between the number of subjects and the number of galaxies – because some images went in at 2 depths.

2.2 Photometry

Brief description of photometric catalogs. Focus on IJH because that's all the images consider. Do mention all the extra stuff available, but note that the classifications themselves don't depend on them.

2.3 Redshifts

Some of them have speczs. Lots of them have photzs, including CANDELS, 3D-HST and several previous surveys.

Comparison of photozs and speczs; might be able to just reference the other papers.

What do we do about those without redshifts? We use them with caution, I guess.

2.4 Simulated Images

Describe simulations and what we'll use them for.

3 CLASSIFICATION DATA

3.1 Decision Tree

Details on the decision tree, plus a table mapping questions and answers to unique tasks and answers, like the one in Willett et al. 2013.

⋆ This publication has been made possible by the participation of more than COUNT volunteers in the Galaxy Zoo project. Their contributions are individually acknowledged at http://authors.galaxyzoo.org/ .
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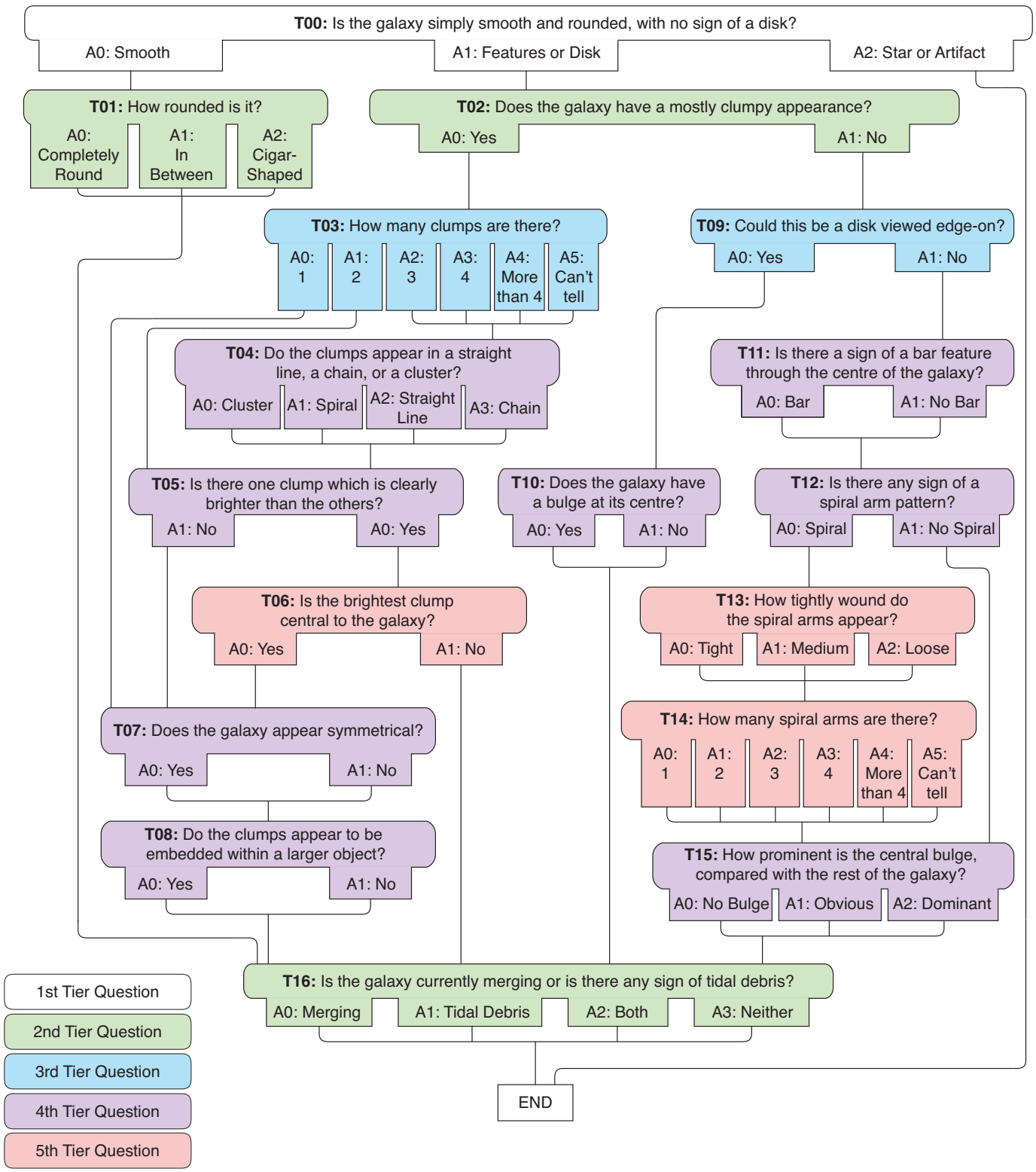

Figure 1. The Decision Tree for Galaxy Zoo: CANDELS

3.2 Raw classifications

Basic details on raw classifications, including the start and end dates considered in this paper, how many classifications which galaxies have, why some have less than others and some more.

How many users participated, and the distribution of classifications (typical number per person, number signed in and not, maybe that square diagram Old Weather uses).

3.3 User Weighting

Note: we may discuss other weighting if that proves useful.

3.3.1 Consensus Weighting

3.3.2 IBCC

4 COMPARISON TO OTHER CLASSIFICATIONS

Kartaltepe et al. 2014
CAS? Gini? M20?

5 SOME KIND OF INITIAL RESULT

Hubble Sequence, maybe?

6 SUMMARY

Galaxies! We have galaxies!

ACKNOWLEDGMENTS

The development of Galaxy Zoo was supported in part by the Alfred P. Sloan Foundation. Galaxy Zoo was supported by The Leverhulme Trust.

This work is based on observations taken by the CANDELS Multi-Cycle Treasury Program with the NASA/ESA HST, which is operated by the Association of Universities for Research in Astronomy, Inc., under NASA contract NAS5-26555.