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The expected shape of the Milky Way's Dark Matter halo

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ABSTRACT
This is a simple template for authors to write new MNRAS papers. The abstract should briefly describe the aims, methods, and main results of the paper. It should be a single paragraph not more than 250 words (200 words for Letters). No references should appear in the abstract.

Key words: keyword1 – keyword2 – keyword3

1 INTRODUCTION

This is a simple template for authors to write new MNRAS papers. See `mnras_sample.tex` for a more complex example, and `mnras_guide.tex` for a full user guide.

All papers should start with an Introduction section, which sets the work in context, cites relevant earlier studies in the field by Others (2013), and describes the problem the authors aim to solve (e.g. Author 2012).

2 NUMERICAL SIMULATIONS

Auriga simulations.

3 DETERMINING THE HALO SHAPE

4 RESULTS

Here we present our principal results blah blah blah.

4.1 The radial tendency of axial ratios

First, it is important to verify that halos are rounder at larger radii, for both MHD and DM simulations.

4.2 The rounding effect of baryons

Here we discuss the rounding effect of baryons. We quantify this rounding effect and look for correlations with important baryonic properties of the galaxy.

asphericity Vs Star Density.png

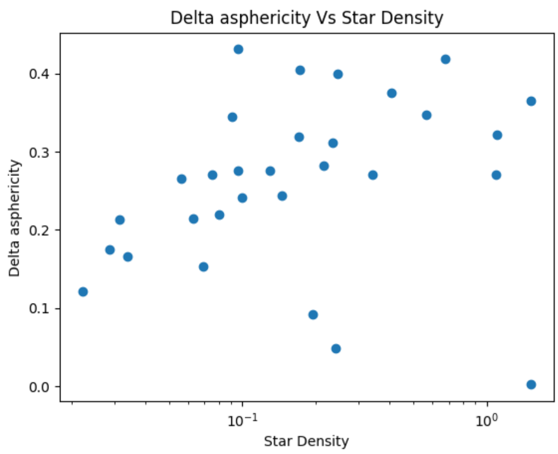

Figure 1. Difference in asphericities between MHD and DM shapes Vs Star Density of the simulation.

4.3 The historical shape

Here we study the memory shape and how it can be deduced from the historic radial shapes. Also why it is lost for MHD even when radial profiles have the same historic tendencies.

4.4 The orientation of the principa axes

This is an important result of our study. We study the radial evolution of the principal axes, compared also to the angular momentum vector from the disk. We found that while the angular momentum tend to be aligned with the minor axis of the ellipsoid, this may not be the case all times. When there is an alignment it is usually within 20 degrees. When there is not an alignment, then there is no simple way to determine

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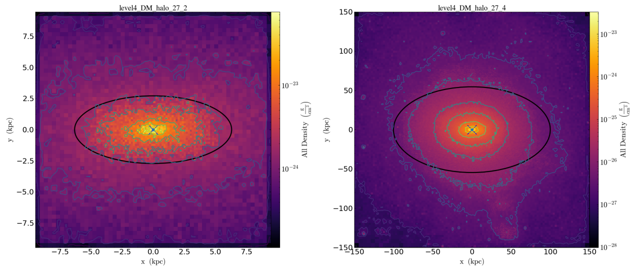
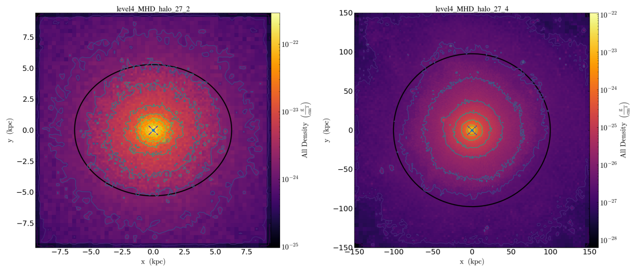
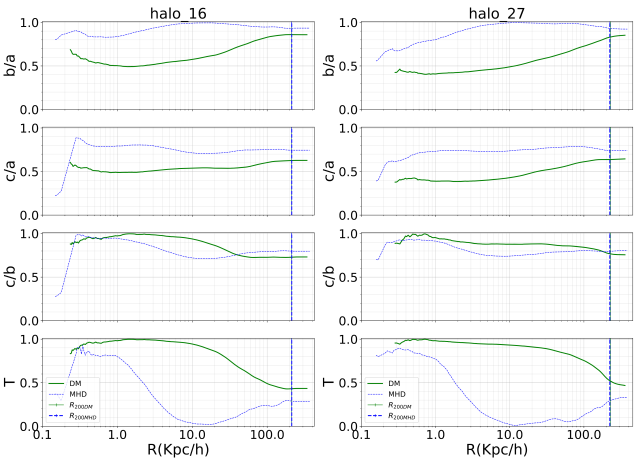


(a) halo 27 DM shape at small radius (b) halo 27 DM shape at big radius



(c) halo 27 MHD shape at small radius (d) halo 27 MHD shape at big radius

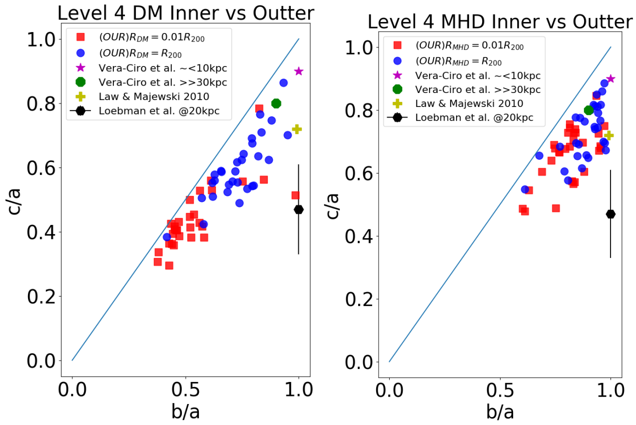
Figure 2. DM density for inner (left) and outer (right) parts of the halo 27. We present both versions of the halo: DM (up) & MHD (down). The horizontal (vertical) axes are aligned to the major (medium) axes. (optimaze space and description)



(a) halo 16 (b) halo 27

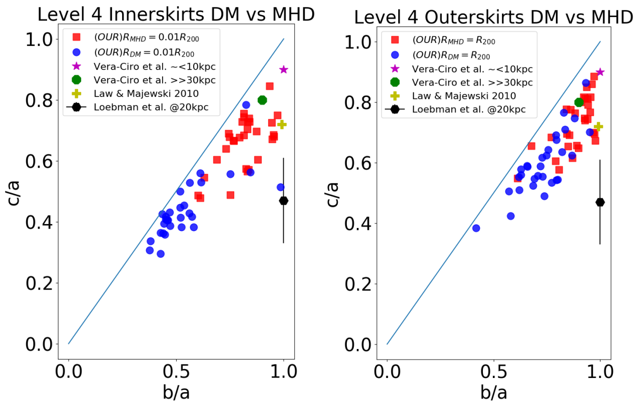
Figure 3. Radial profile for axial ratios and the triaxiality parameter $T = \frac{1-b/a}{1-c/a}$ from halo 27 and halo 16. These halos have a clear radial tendence towards sphericity (for smaller radii until ≈ 3Kpc), which can be confirmed with the triaxiality parameter. (Merged Column)

toward which axis it is oriented. Furthermore, the principal axes alignment usually change with radius (rotation, swap). This really questions the strong constrains on the MW DM halo models.



(a) Level4 DM inner Vs outer regions (b) Level4 MHD inner Vs outer regions

Figure 4. General tendency on the triaxial plane c/a Vs b/a. Some observational constraints are plotted alongside our results (Optimize space. caption replaces title. Present constraints representation of density)



(a) Level4 MHD Vs DM at inner regions (b) Level4 MHD Vs DM at outer regions

Figure 5. Axial ratios as shown on c/a Vs b/a. Each dot represents a halo shape at some radius. Some observational constraints are plotted alongside our results. Here, dots are clustered, proving the general tendence of halos to get rounder on the outer parts.(Optimize space. caption replaces title. Present constraints representation of density)

5 CONCLUSIONS

The last numbered section should briefly summarise what has been done, and describe the final conclusions which the authors draw from their work.

6 DISCUSSION

ACKNOWLEDGEMENTS

The Acknowledgements section is not numbered. Here you can thank helpful colleagues, acknowledge funding agencies, telescopes and facilities used etc. Try to keep it short.

asphericity Vs Star Density.png

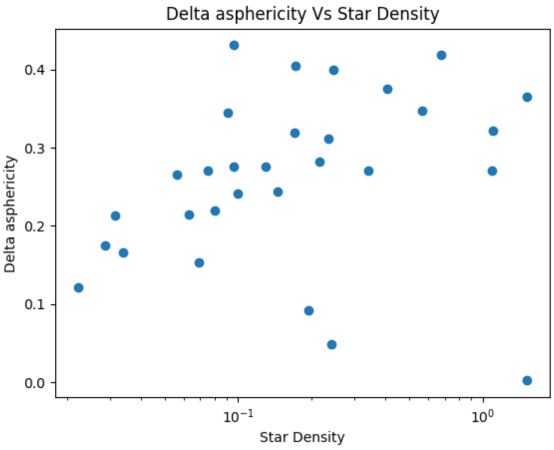
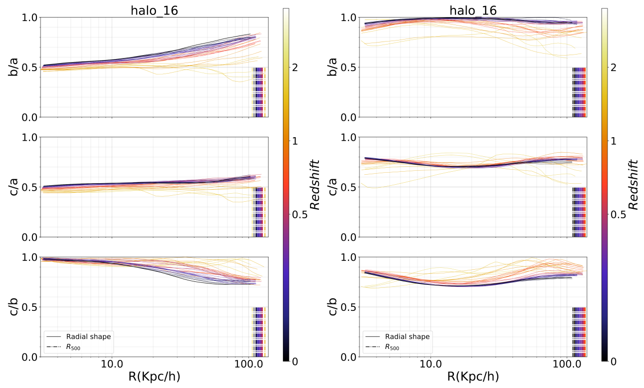


Figure 6. Difference in asphericities between MHD and DM shapes Vs Star Density of the simulation.



(a) halo 16 DM (b) halo 16 MHD

Figure 7. Radial profile (comoving) of axial ratios for halo 16 in terms of redshift (color). This halo maintains its shape until $z \approx 1$ obviating the systematic rounding effect in time from asymmetric potentials.

REFERENCES

Author A. N., 2013, Journal of Improbable Astronomy, 1, 1
Others S., 2012, Journal of Interesting Stuff, 17, 198

APPENDIX A: SOME EXTRA MATERIAL

If you want to present additional material which would interrupt the flow of the main paper, it can be placed in an Appendix which appears after the list of references.

This paper has been typeset from a TEX/LATEX file prepared by the author.