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Halo alignments with large scale tidal and velocity fields

Sergio Contreras[1] Jaime E. Forero-Romero[1]

[1] *Uni A* [2] *Uni B*

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ABSTRACT

Key words: methods: N-body simulations, galaxies: haloes, cosmology: theory, dark matter, large-scale structure of Universe

1 INTRODUCTION

2 THEORETICAL ANTECEDENTS

... There is abundant literature on the issue of shape and angular momentum aligmnent of dark matter haloe with respect to the cosmic we.

... This alignment is often measured from the distribution of the $\cos\theta$ where θ is the angle between the two axes of interest.

... Table 1 summarizes recent results found in the literature for shape and angular momentum alignment.

(Libeskind et al. 2013) (Codis et al. 2012) (Faltenbacher et al. 2009) (Paz et al. 2008) (Platen et al. 2008) (Aragón-Calvo et al. 2007) (Lee & Erdogdu 2007)(Hahn et al. 2007)(Lee & Pen 2002)(Hatton & Ninin 2001)

3 N-BODY SIMULATION AND HALO FINDING

... In this paper we use groups found with a FOF halo finder.

4 THE COSMIC WEB ALGORITHMS

4.1 The Tidal Web

4.2 The Velocity Web

4.3 Numerical considerations

... In this paper we compute the cosmic web on grids of two different resolutions 256^3 and 512^3.

5 RESULTS

5.1 Interweb Alignment

... We compute the pair-wise allignment between the eigenvectors in the two web finders.

... We also compute the alignment between the eigenvectors in cells occupied by dark matter halos. This will be a key element in the interpretation of the results for halo-based allignments in the next sections: shape, angular momentum and peculiar velocities.

...

5.2 Shape Alignment

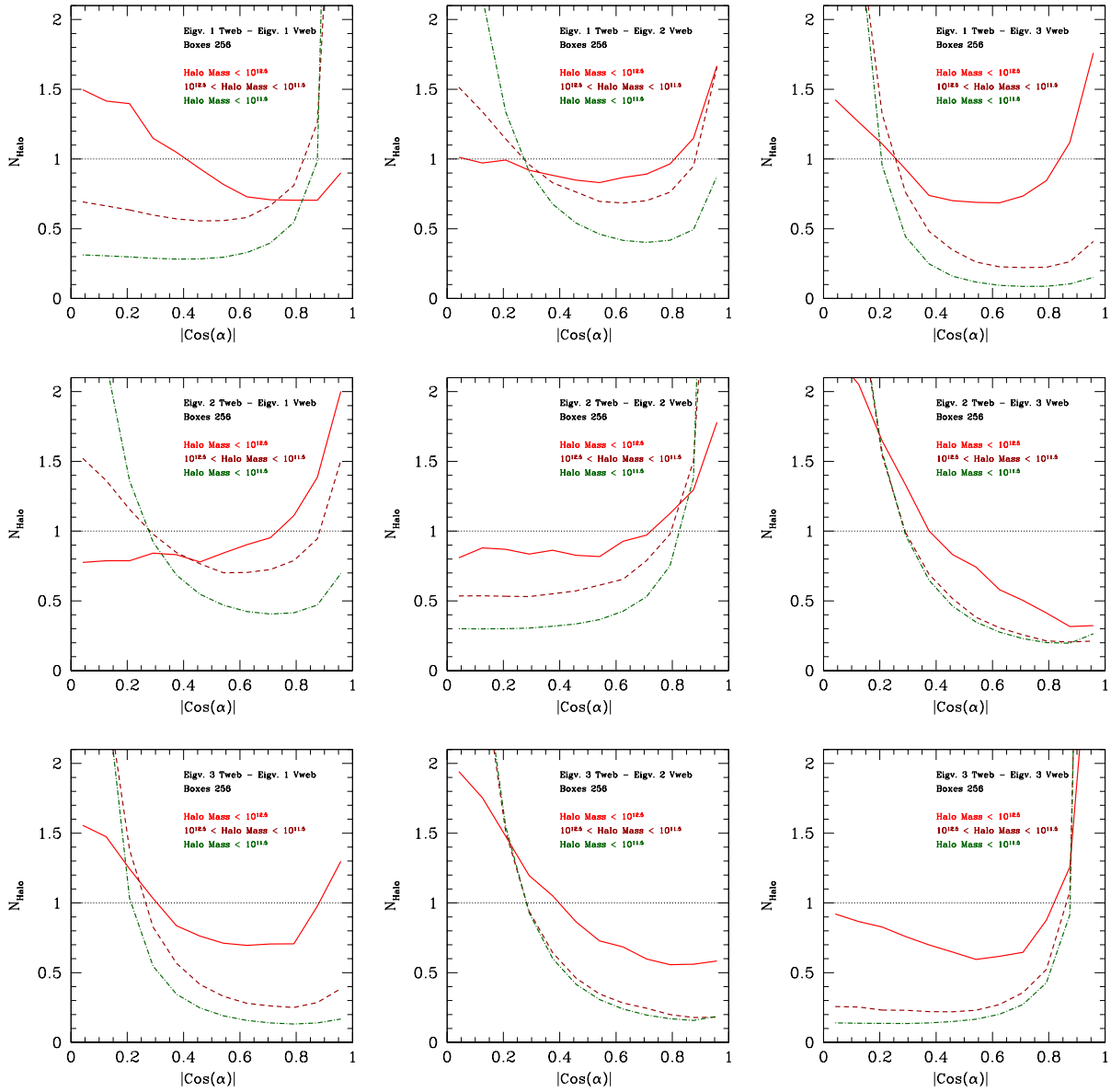

Figure 1. Interweb alignment for 256^3 grid resolution.

5.3 Angular Momentum Alignment

5.4 Peculiar velocity Alignment

6 DISCUSSION

7 CONCLUSIONS

ACKNOWLEDGMENTS

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Libeskind N. I., Hoffman Y., Forero-Romero J., Gottlöber S., Knebe A., Steinmetz M., Klypin A., 2013, MNRAS, 428, 2489

Paz D. J., Stasyszyn F., Padilla N. D., 2008, MNRAS, 389, 1127

Platen E., van de Weygaert R., Jones B. J. T., 2008, MNRAS, 387, 128

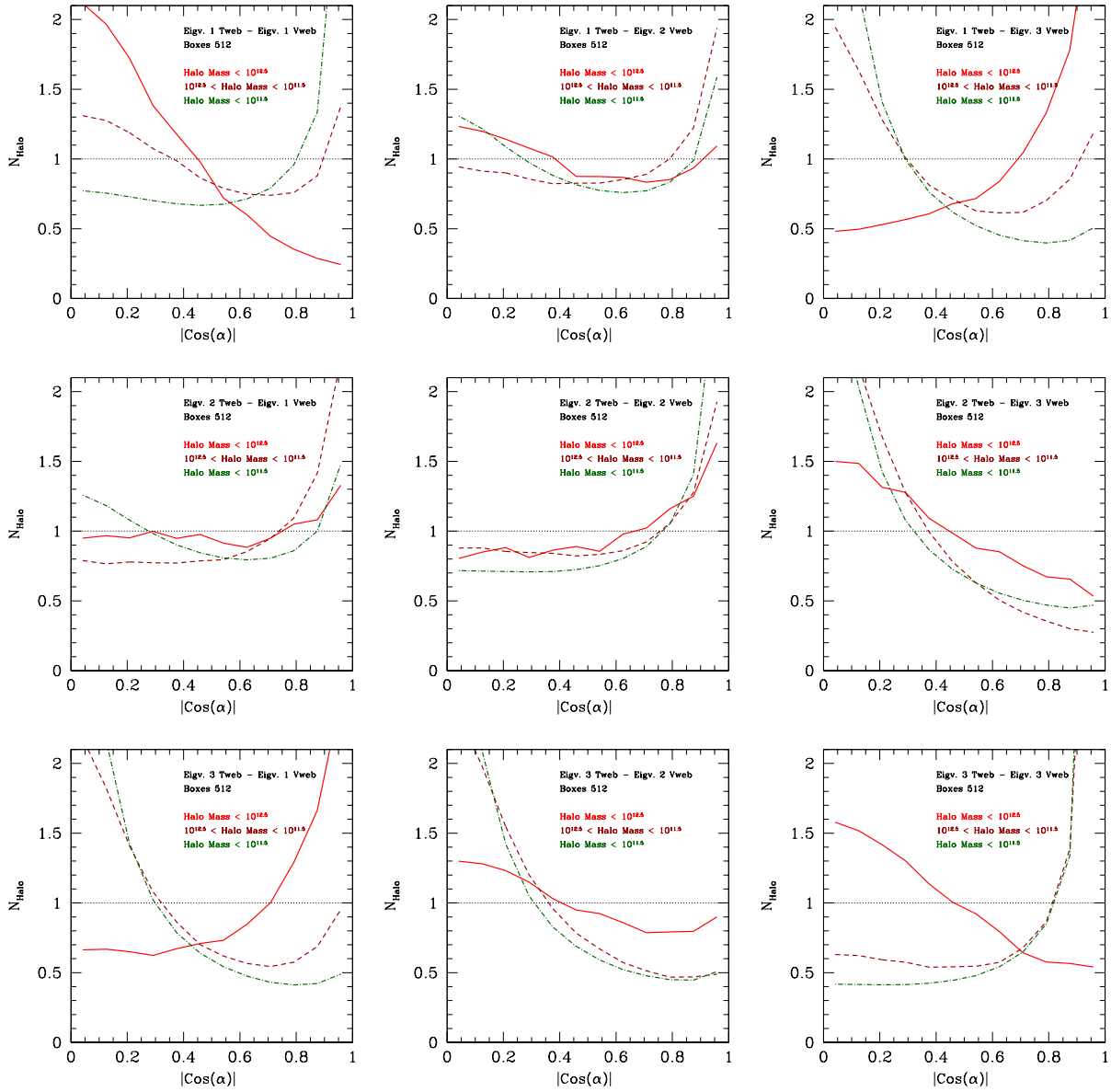

Figure 2. Interweb alignment for 512^3 grid resolution.

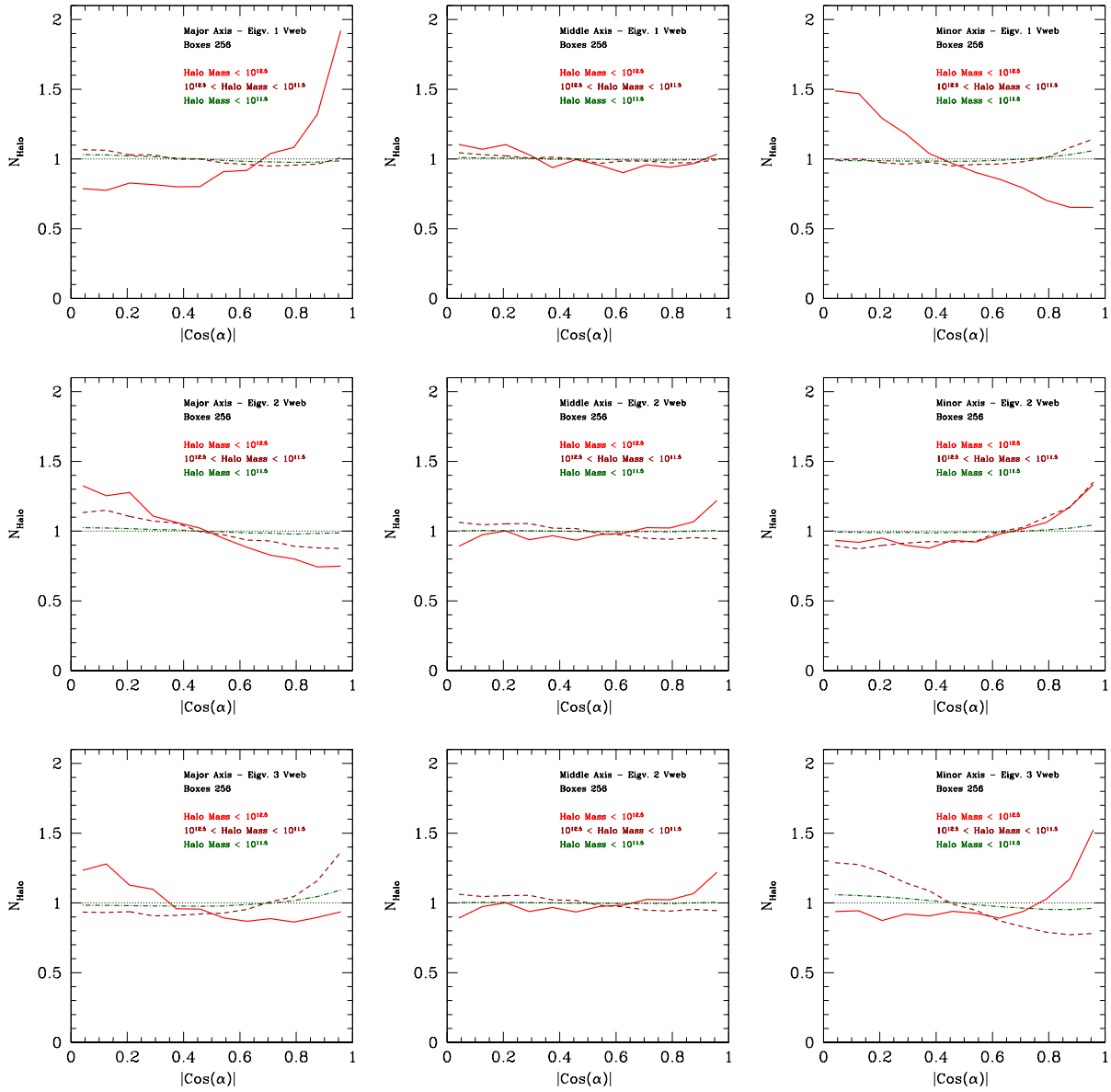

Figure 3. Shape alignment for the vweb at 256^3 resolution.

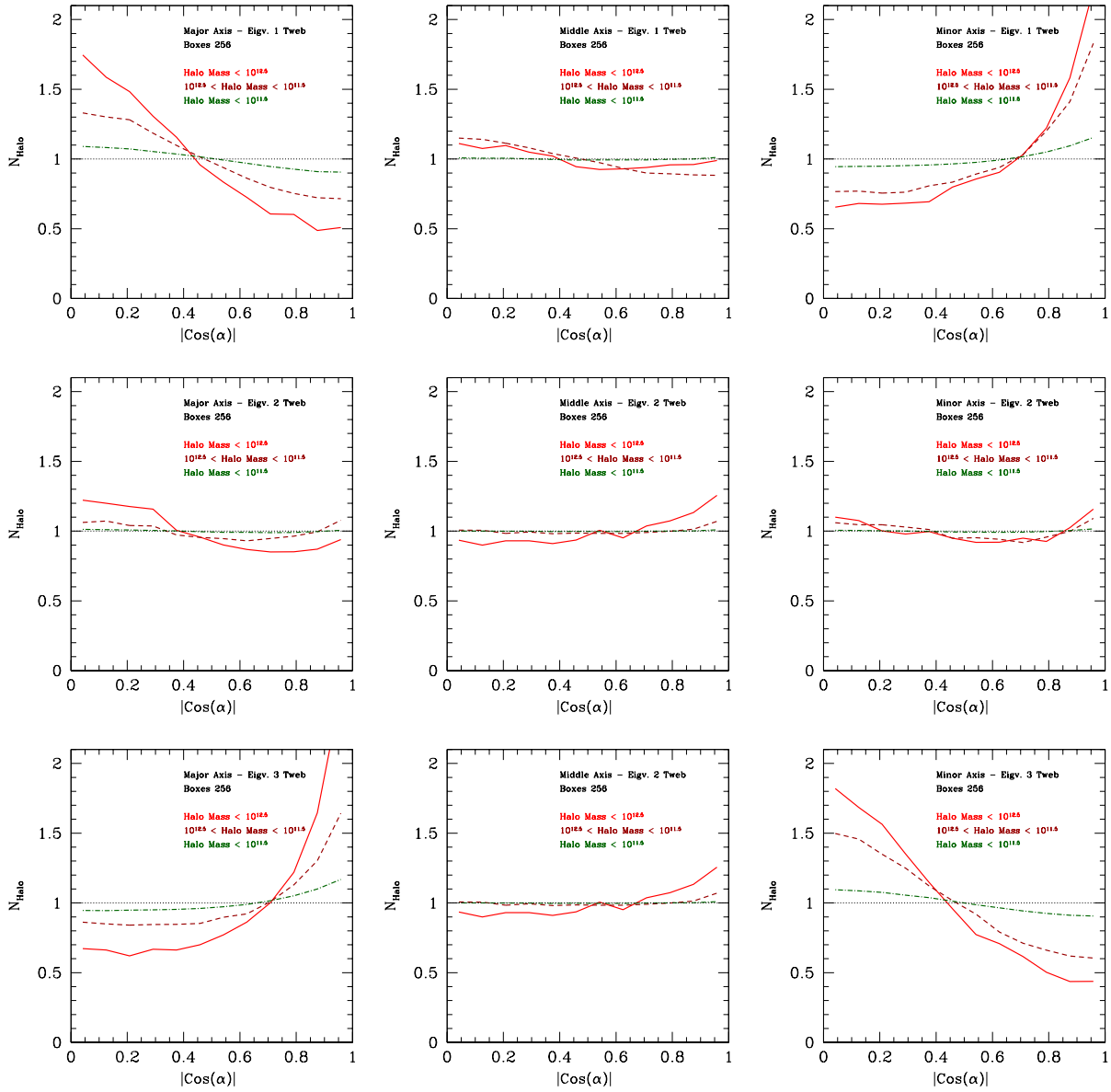

Figure 4. Shape alignment for the tweb at 256^3 resolution.

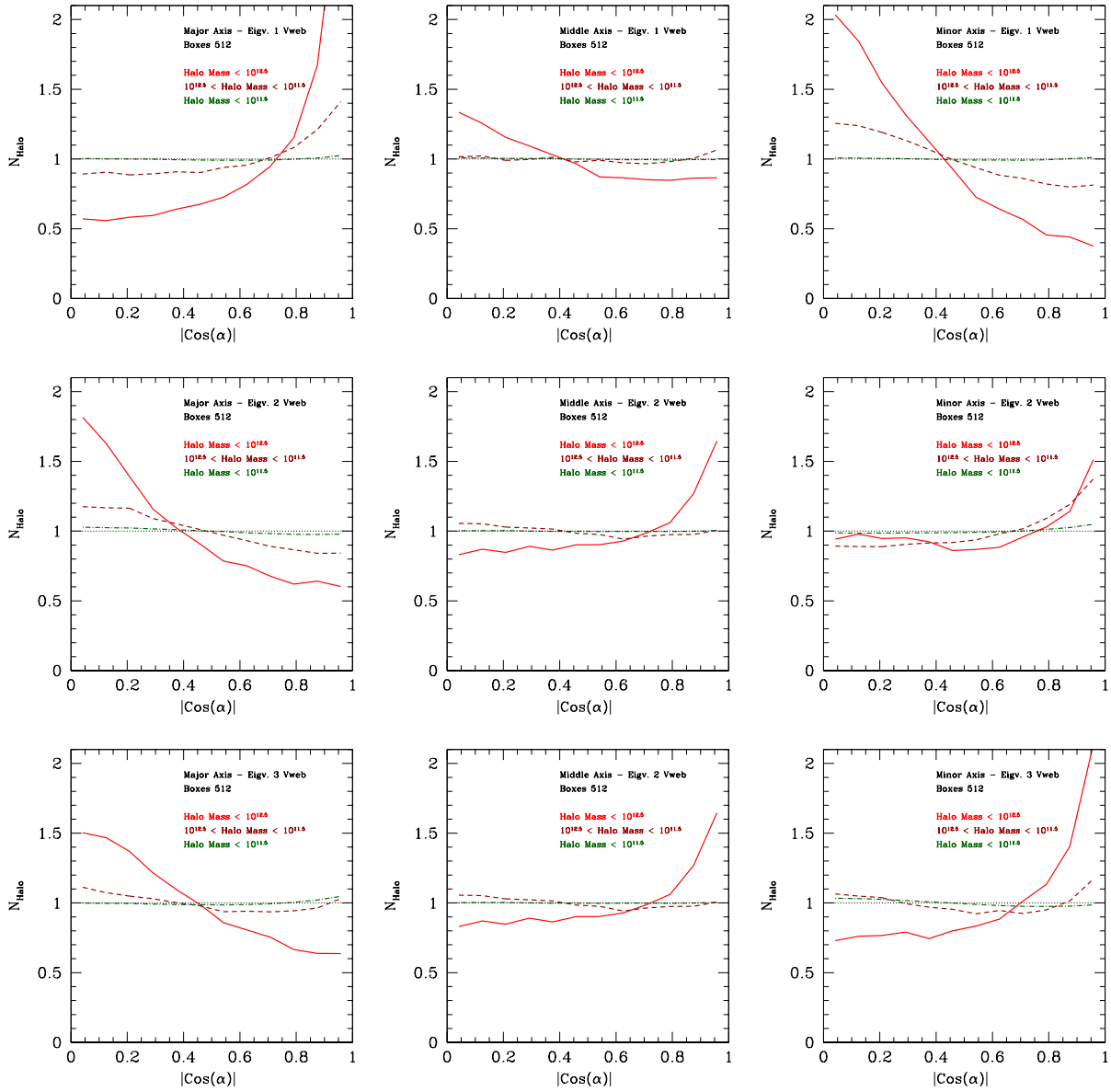

Figure 5. Shape alignment for the vweb at 512^3 resolution.

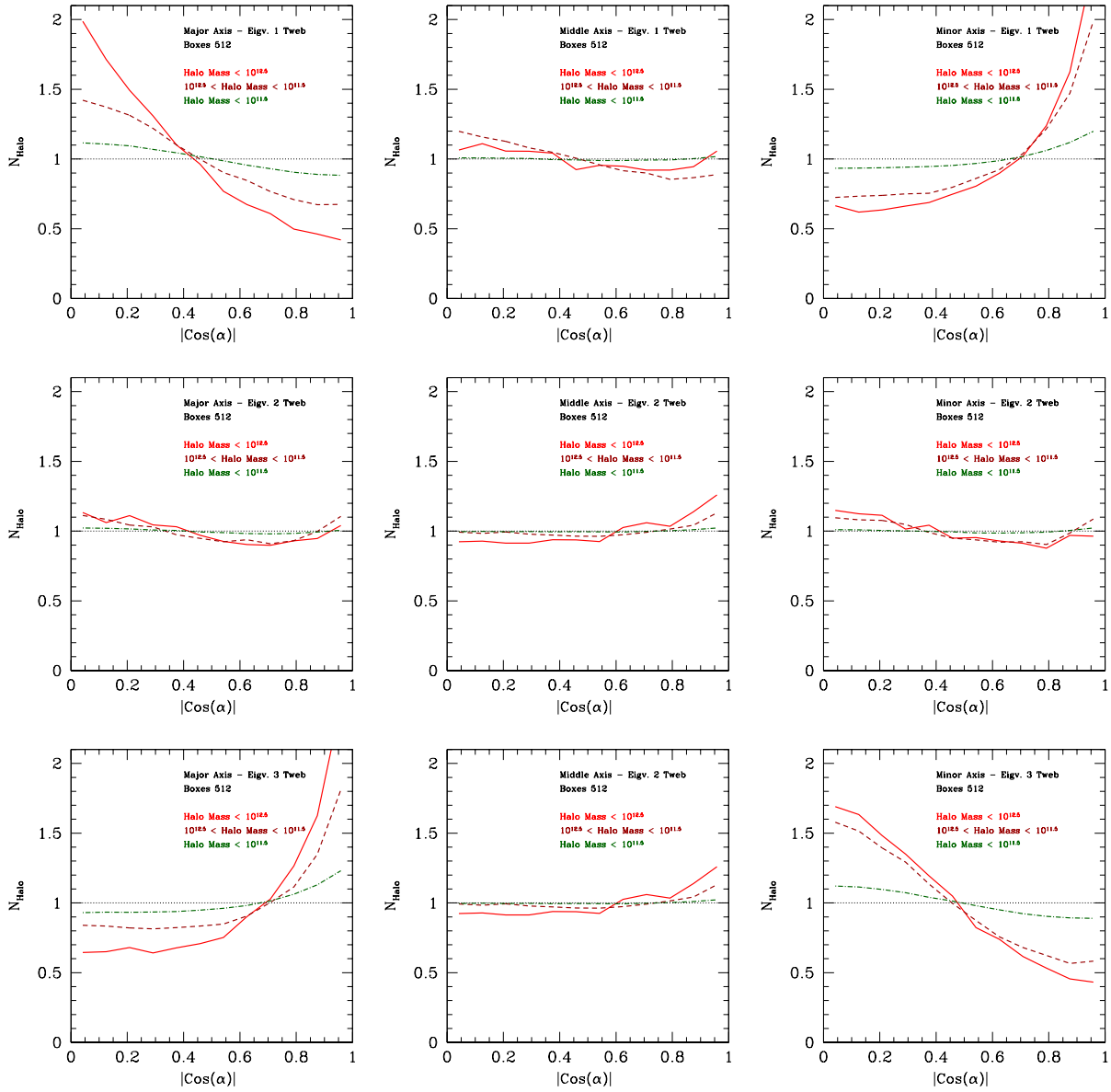

Figure 6. Shape alignment for the tweb at 512^3 resolution.

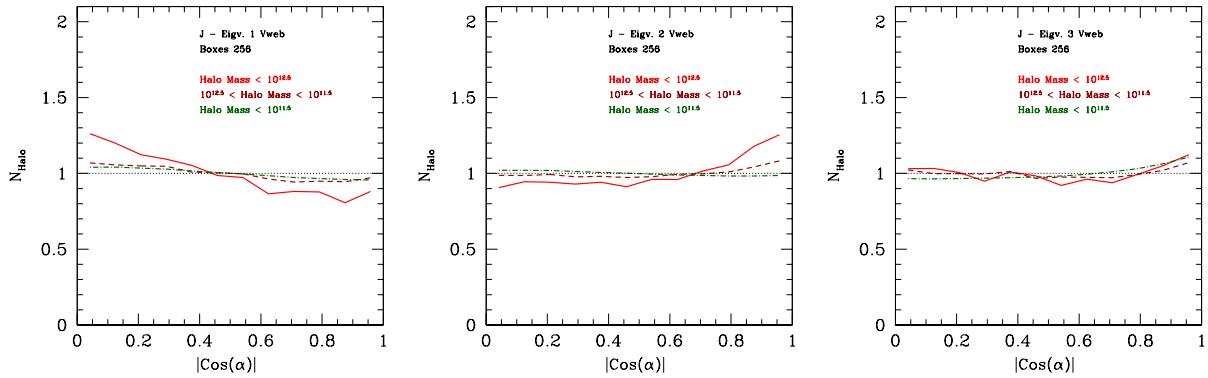

Figure 7. Angular momentum alignment with the Vweb for 256^3 grid resolution.

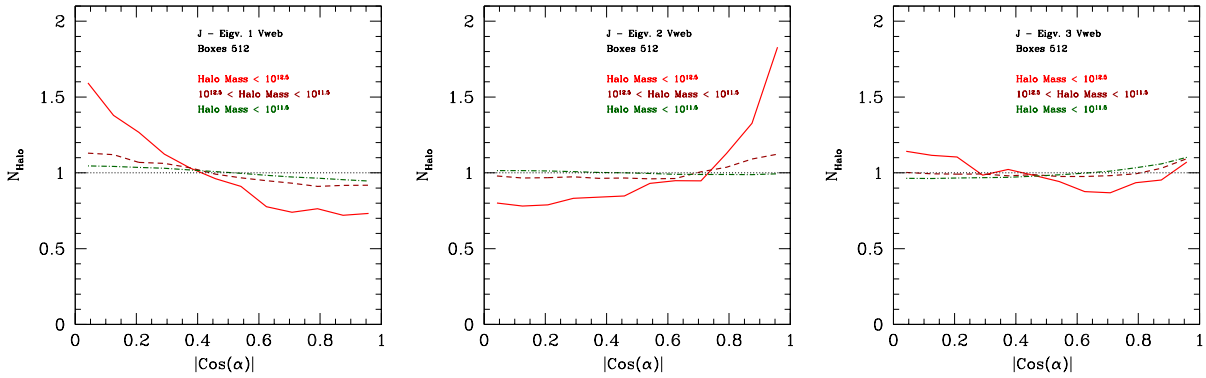

Figure 8. Angular momentum alignment with the Vweb for 512^3 grid resolution.

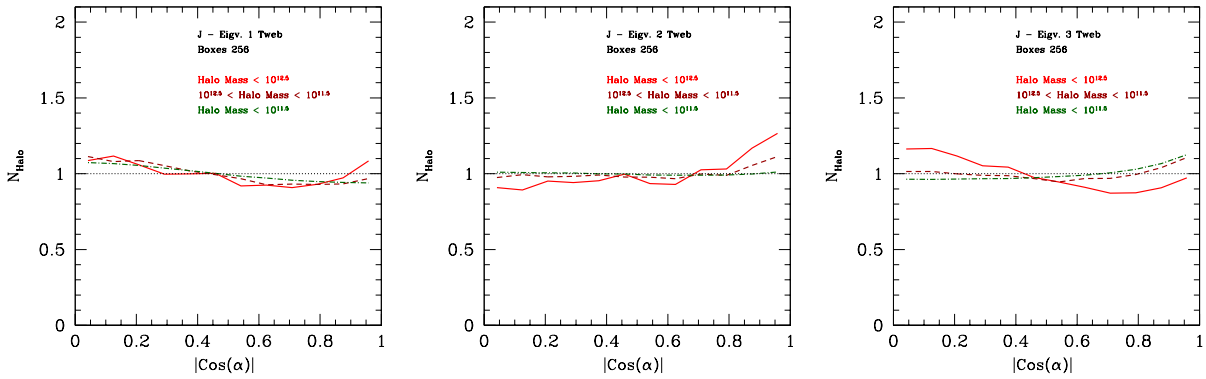

Figure 9. Angular momentum alignment with the Tweb for 256^3 grid resolution.

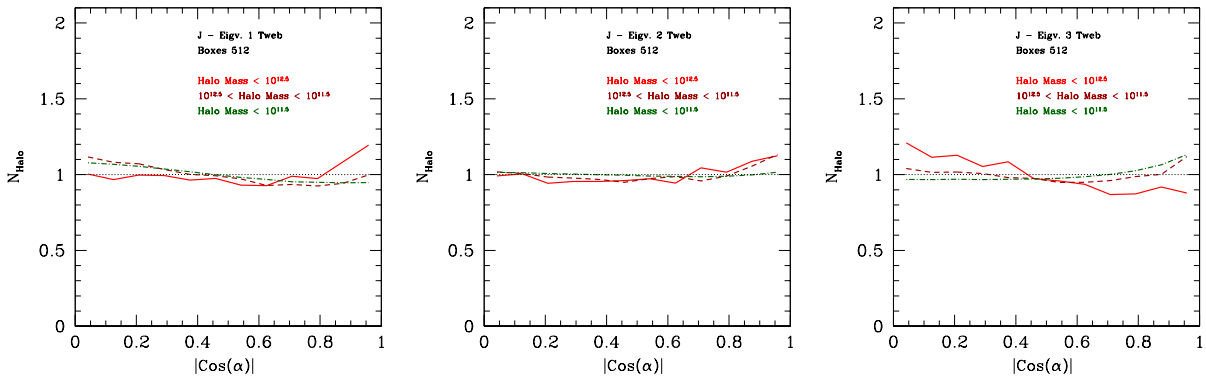

Figure 10. Angular momentum alignment with the Tweb for 512^3 grid resolution.

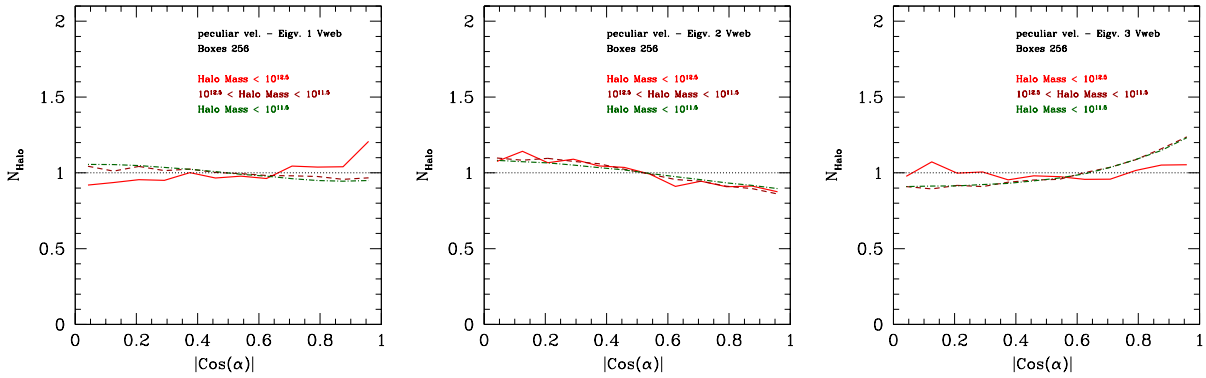

Figure 11. Peculiar velocity alignment with the Vweb for 256^3 grid resolution.

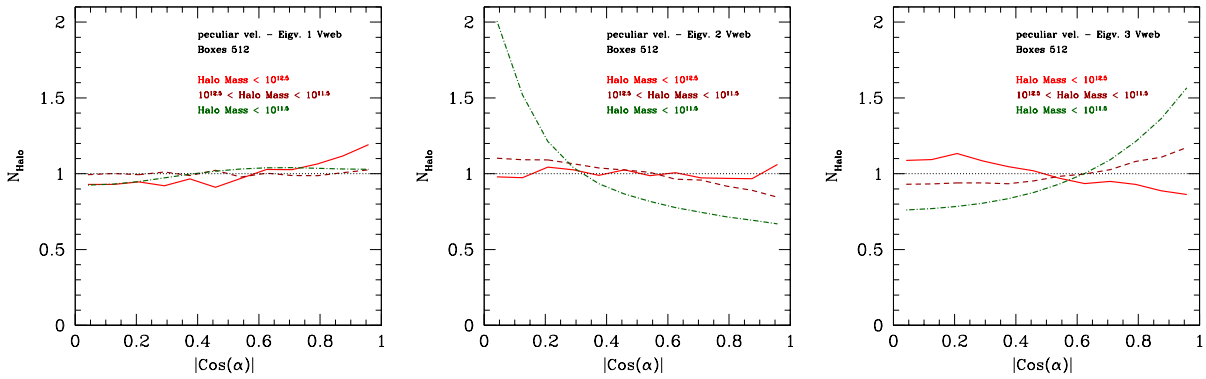

Figure 12. Peculiar velocity alignment with the Vweb for 512^3 grid resolution.

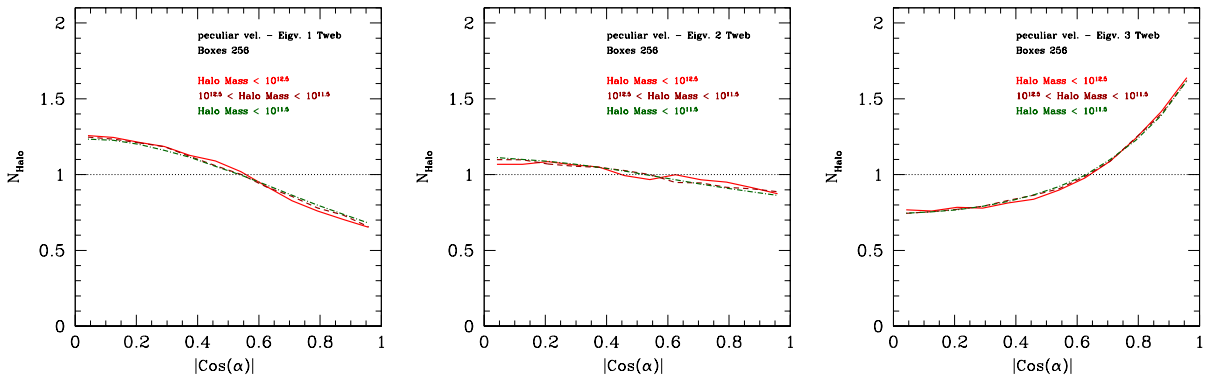

Figure 13. Peculiar velocity alignment with the Tweb for 256^3 grid resolution.

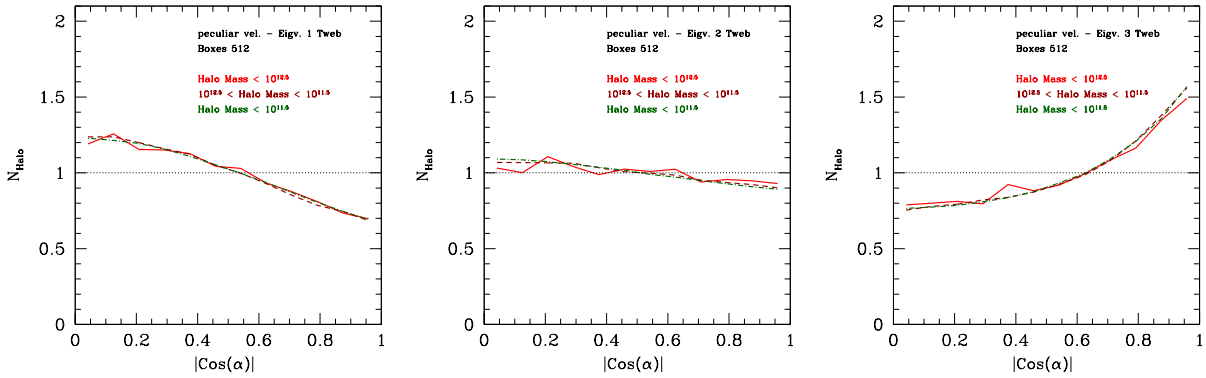

Figure 14. Peculiar velocity alignment with the Tweb for 512^3 grid resolution.