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FIRST ESTIMATE OF A GALAXY ROTATIONAL VELOCITY FROM ITS OBSERVED LYMAN-α LINE

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ABSTRACT

First.
Subject headings: galaxies: high-redshift — line: formation — methods: numerical — radiative transfer

1. INTRODUCTION

Introduction...
Garavito-Camargo et al. (2014)

2. THEORETICAL BACKGROUND

Garavito-Camargo et al. (2014) presented an analytical expresion that approximates the results for the Lyman-α line morphology for a spherical galaxy rotating as a solid body.

Ths input parameters of the analytical solution are the optical depth τ_H, the rotational velocity at the sphere's surface $V_{\rm max}$ and the angle of view measured from the equatorial plane (which is perpendicular to the rotational axis) θ. A `C` source code implementation is available in the public repository associated to this paper.

The main result Garavito-Camargo et al. (2014) is that rotation does have a noticeable impact on the Lyα line morphology. This impact is two fold. First, the rotation axis breaks the spherical symmetry, introducing a dependence of the line shape with viewing angle. Second, for increasing rotational velocities and viewing angles off the rotational axis, the intensity at the line's centers increases; for sufficiently high rotational velocities the line becomes single peaked.

3. RESULTS

$$\tau_H = 69663.485$$
$$V_{\rm max} = 49.961\,{\rm km\ s^{-1}}$$
$$\theta = 44.495^\circ$$
$$T = 9962.731{\rm K}$$
$$\Delta V_{off} = -9.722\,{\rm km\ s^{-1}}$$

Results...

4. DISCUSSION

Discussion...

5. CONCLUSIONS

Conclusions...

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Acknowledgments...

REFERENCES

Garavito-Camargo, J. N., Forero-Romero, J. E., & Dijkstra, M. 2014, ApJ, 795, 120

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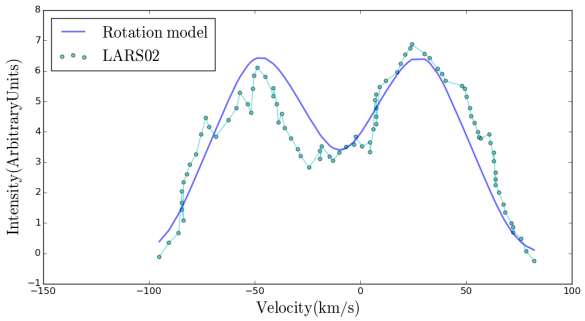
Rotation model
LARS02
Intensity(ArbitraryUnits)
Velocity(km/s)

FIG. 1.—

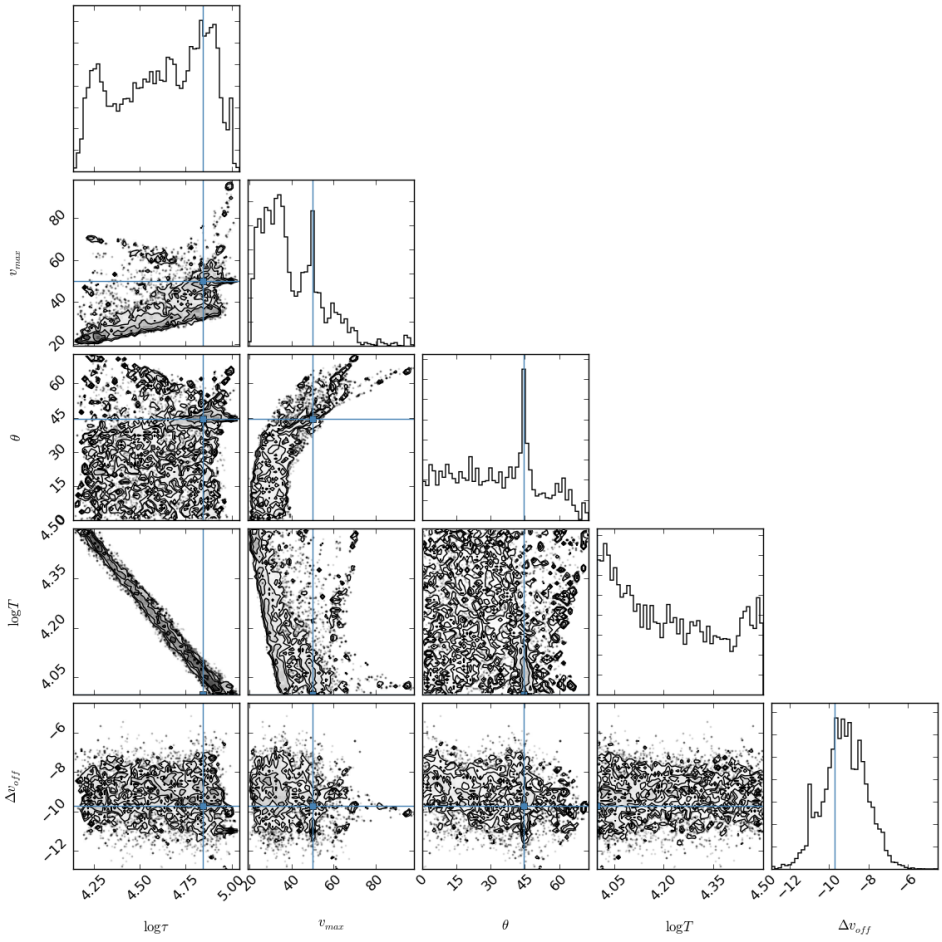
logτ
v_{max}
θ
log$T$
Δv_{off}

FIG. 2.—