Draft version July 30, 2018
Typeset using LaTeX **twocolumn** style in AASTeX62

HD 143006 by ALMA

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Submitted to ApJ

ABSTRACT

HD 143006 abstract

Keywords: ALMA — protoplanetary disks

1. INTRODUCTION

- T-Tauri star
- scattered light images suggest a misalignment of the inner and outer disk, smaller than 30deg
- never before seen substructure in this disk at long wavelengths
- here we present new ALMA observations (§2), a characterization of this substructure (§3), we discuss the warp hypothesis in light of these new data (§4), and the conclusions of our work (§5).

2. OBSERVATIONS

Not sure how much are we supposed to say here, compared to Sean's paper, but for sure highlight any differences in the "standard" way of doing things (different robust used for example), and discuss the CO calibration and imaging. Also list the sensitivity reached

3. RESULTS

3.1. *Continuum Emission*

The continuum emission from HD 143006 is presented in Figure 1 and resolves into three bright rings at $0.X''$, $0.X''$, $0.X''$ from the disk center[1], two dark rings at $0.X''$ and $0.X''$, and a bright azimuthal feature just outside of the outermost ring. The azimuthally-averaged radial profile presented in Huang et al. (2018) indicates that the first and second brightest rings have a contrast of $\sim$ 20 and $\sim$ 4 with respect to the first dark ring in the continuum; these are one of the highest contrast ring-features of the sample. The dark rings are not completely empty ... The bright asymmetric feature is found at a position angle (PA) of XX deg at $0.X''$ from the center, and has an azimuthal extent of YY deg.

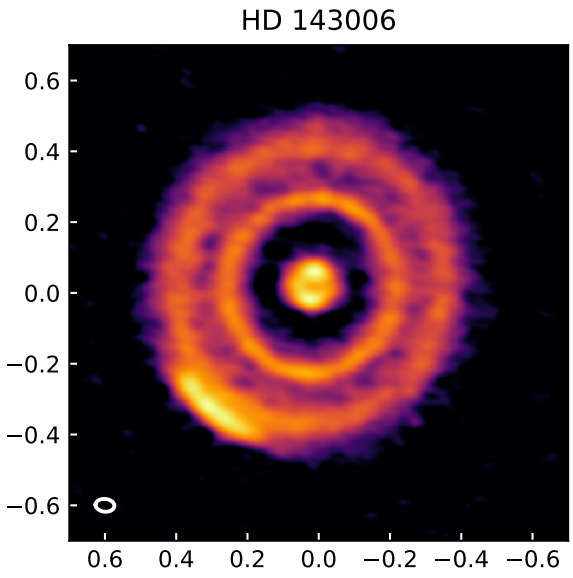

Figure 1. 1.3mm continuum emission

3.2. *CO emission*

Use it to define the center of the disk. It seems there is a small warp (mom1 map), can we confirm this by fitting a simple keplerian model and showing it doesn't fit? Can we see the moment maps as predicted by Benisty et

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[1] the disk center has been defined as the ...

al. 2018? Can we see any excess of emission at large velocities (+/-10km/s) from the central star that we could identify as disk winds?

3.3. *Model fitting of rings and asymmetry*

For the outer disk I get: $i = 17.3$, $PA = 174.7$, while $i = 22.9$, $PA = 169.9$. Describe model. Table with best-fit parameters. Figures with model and residuals. resonances between bright or dark rings Residual at the vortex location: clumpy, three bright features at high significance that appear unresolved in the radial direction but resolved in the azimuthal direction with extents between X to Y au. There are also negative features indicating that the best fit gaussian is too broad compared to the original data

3.4. *Comparison with scattered light imaging*

Figure of both observations with features marked from the modeling, side by side. Comparison between PA and azimuthal extent of the features in both ALMA and scattered light. Can we explain the blob in scattered light with the asymmetry seen in ALMA? Is this the first vortex at mm-wavelengths with no spiral arms at scattered light?

4. DISCUSSION

Discuss features in the context of Zhu's modeling, with the vortex/asymmetry outside of the ring. Include optical depth of the rings and asymmetry. Is the large azimuthal extent of the asymmetry due to high optical depth? (large extent but also flat-top) Could the inner perturber that drives the inner disk misalignment be the one responsible for the outer disk asymmetry? Can we infer the mass of the perturber based on the asymmetry? Could we see evolution in future observations? (either regarding the azimuthal extent or orbital motion) This is a TTauri, but we have found similar features in Herbig ABe, is this a first somehow?

5. CONCLUSIONS

REFERENCES

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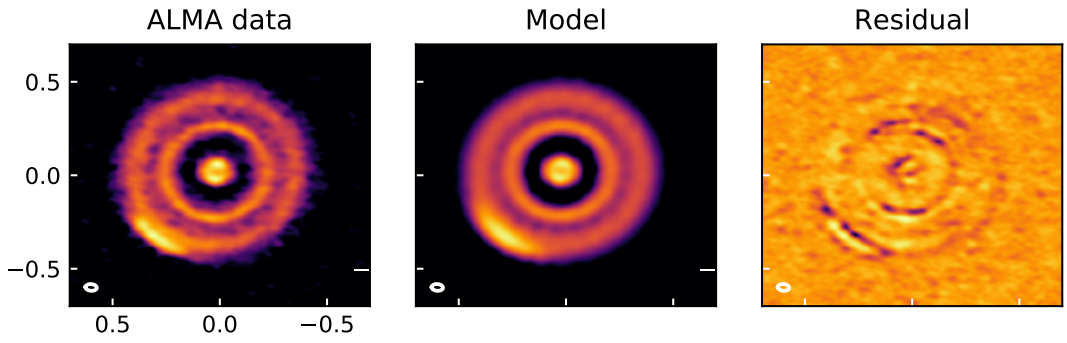

Figure 2. Modeling of 1.3mm continuum emission