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Small scale features in the HD163296 planet forming disk revealed by ALMA

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[2]

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ABSTRACT

1. INTRODUCTION

2. DATA

- Data acquisition and calibration (do we need this in each paper or could we just refer to Sean's uber paper?)
- Show continuum image and azimuthally averaged radial intensity profile
- Discuss the general properties of the image. Highlight the new features: arc, inner gap, innermost asymmetry
- Show CO channel maps and moments
- Discuss the general properties of the CO emission

3. ANALYSIS

- Fit bright and dark continuum rings with ellipses. Derive position of the centers, radii, inclinations, and position angles using emcee.
- Subtract azimuthally averaged intensity profile to reveal azimuthal asymmetries.
- Derive optical depth of the continuum emission by adopting disk temperatures derived in Isella et al., Rosenfeld et al. Flaherty et al.
- Derive optical depth of the continuum emission using extinction of CO emission arising from the back side of the disk
- (Calculate velocity centroid of the CO emission. Compare to Keplerian rotation.)

Table 1. Properties of dark and bright rings

Name	x_0 ($''$)	y_0($''$)	r(au)	i(°)	PA(°)
(1)	(2)	(3)	(4)	(5)	(6)
b66	1	2	3	4	5

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4. DISCUSSION

- Discuss the new results in the context of Isella et al. 2016, Liu et al. 2018, Teague et al. 2018, Pinte et al. 2018. Do we confirm Pinte et al. kink in the CO emission? Do we detect deviations from Keplerian rotation? Connect to Zhauhuan's simulations of planet disk-interaction.

- Discuss upper limits for the detection of circumplanetary disks (e.g. at the position of the putative planet proposed by Pinte et al.)

5. CONCLUSION

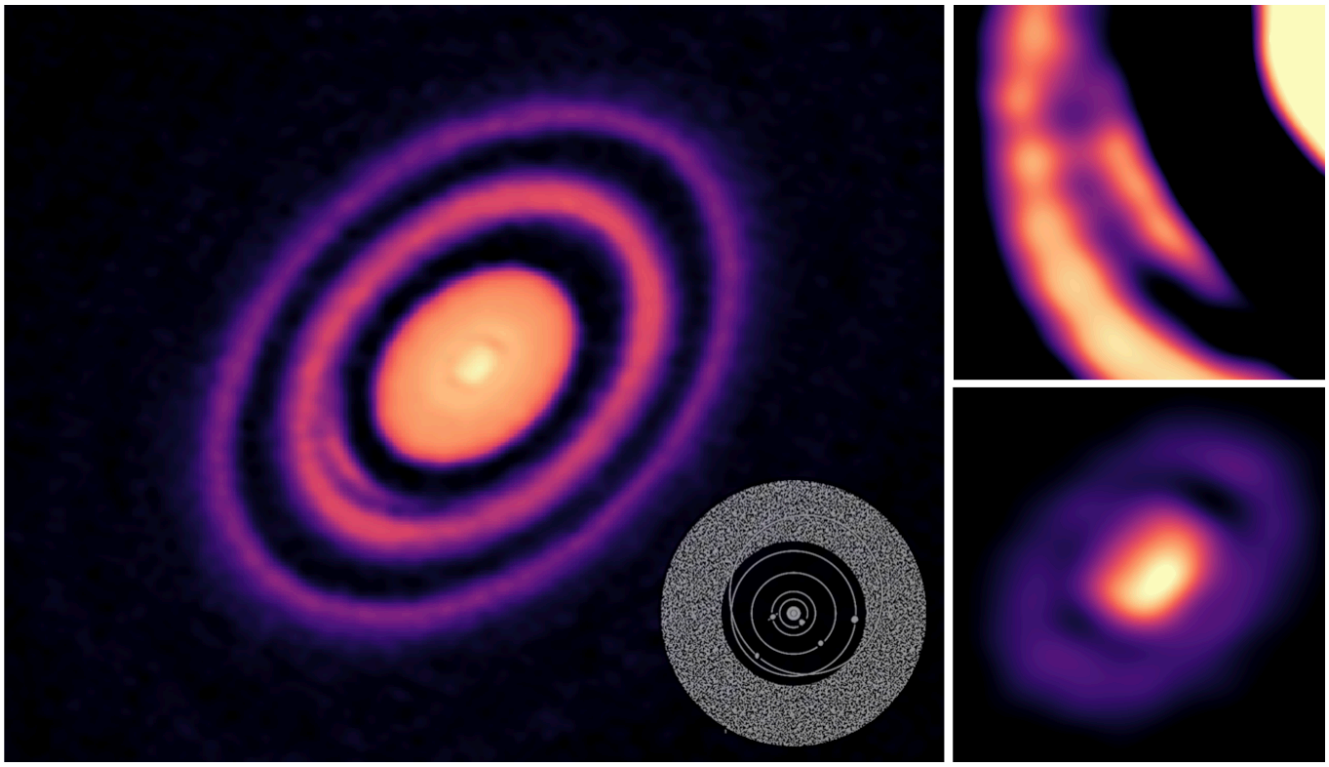

Figure 1.

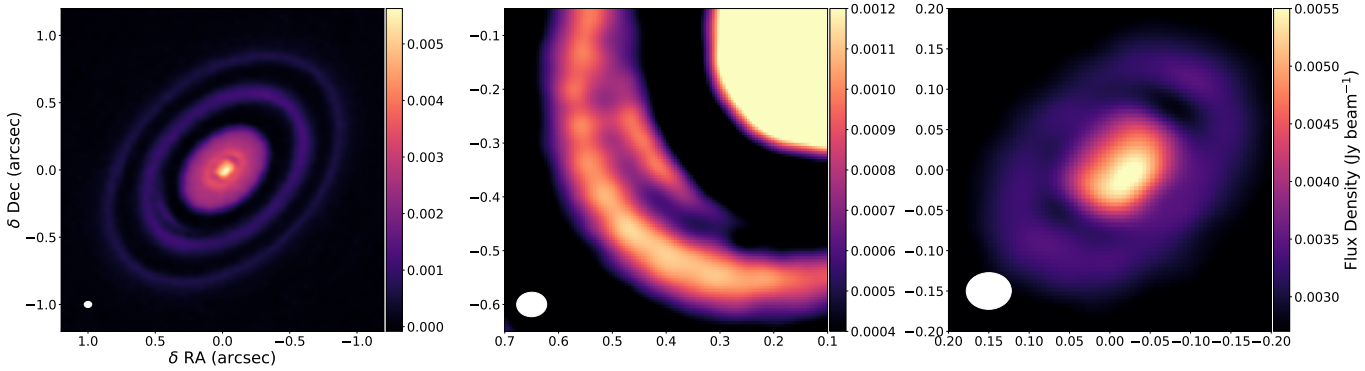

Figure 2. Map of the 1.3 mm dust continuum emission. The beam FWHM is $0.045'' \times 0.055''$. Color scale is linear.

REFERENCES

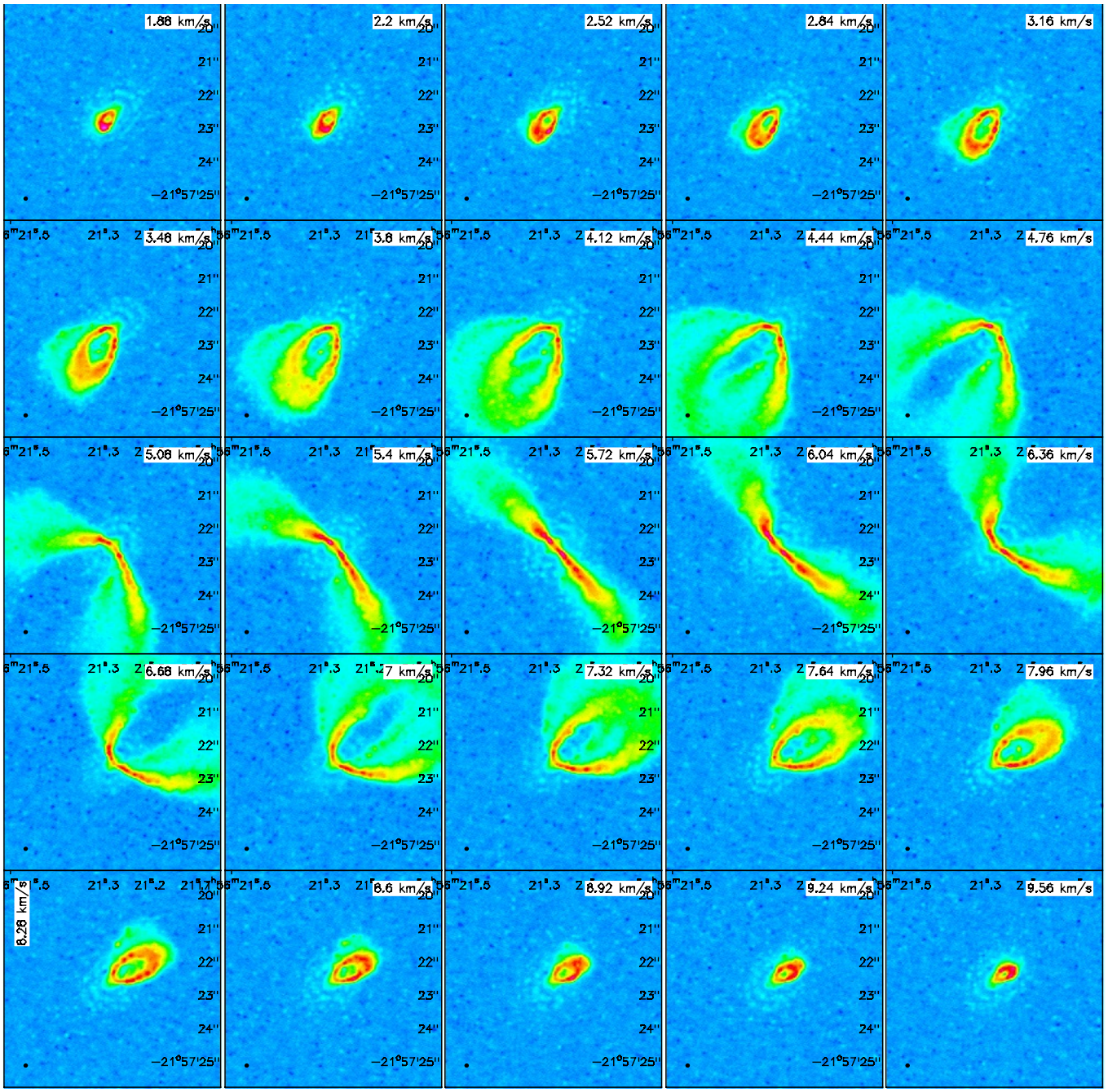

Figure 3. Map of the emission recorded in the 12CO line. The beam FWHM is $0.104'' \times 0.095''$. Color scale is linear.

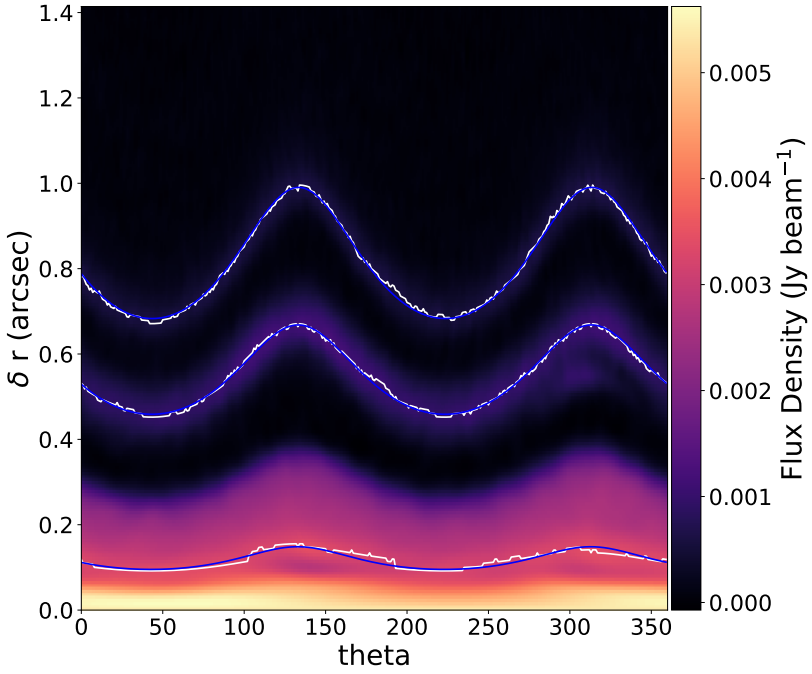

Figure 4. Map of the 1.3 mm dust continuum emission in polar coordinates. White lines indicate the crests of the emission. Blue lines indicate the elliptical fits to the crests (see table 1)

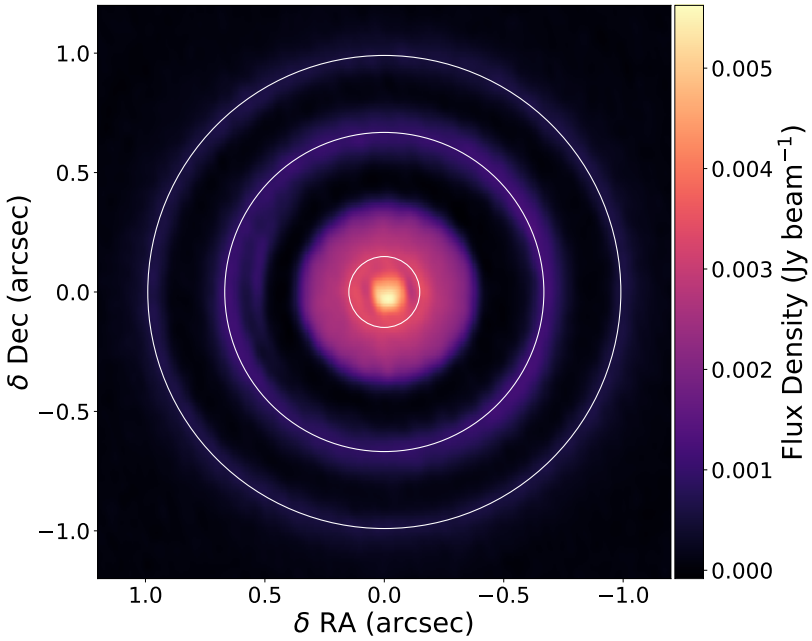

Figure 5. Map of the 1.3 mm dust continuum emission deprojected adopting a disk inclination of 46.5° and a position angle of 133.3°. The white lines show the deprojected elliptical fit to the crests of the emission

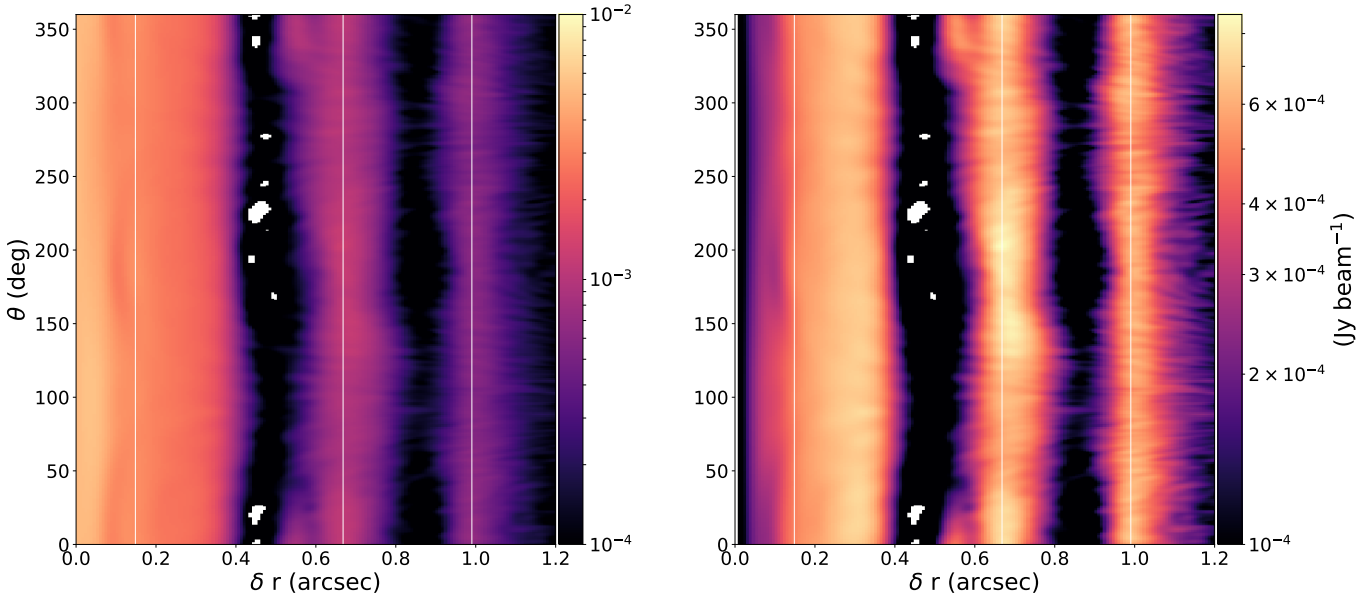

Figure 6. Polar map of the deprojected emission shown in the previous figure. The left panel shows the flux density while the right panel show the flux density multiplied by $\delta(r)$. The color scale is logarithmic in both panels. The white vertical lines show the position of the rings.

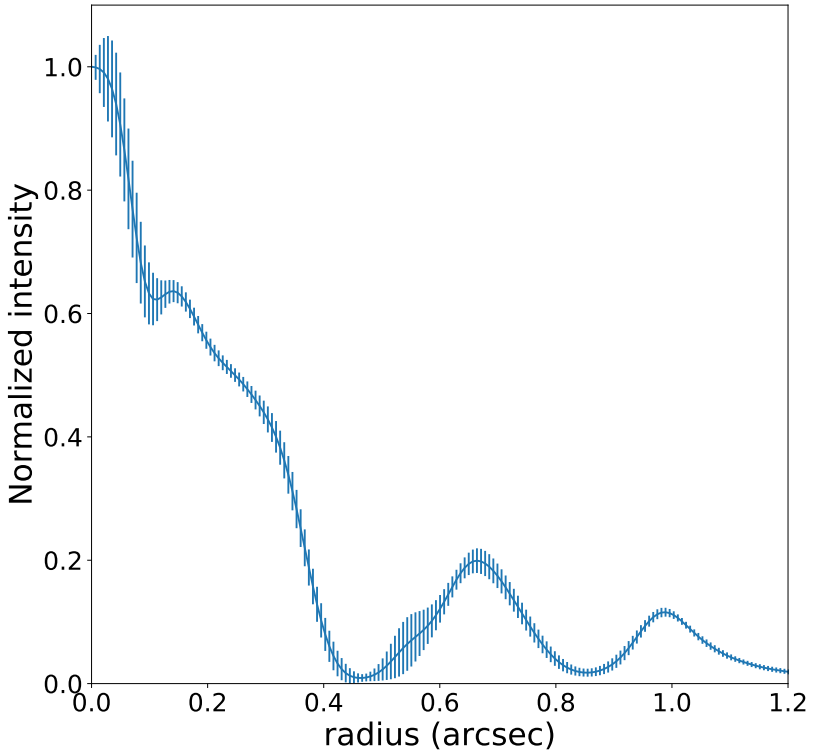

Figure 7. Mean radial profile of the dust emission, $\bar{I}(r)$, extracted from the deprojected map shown in the previous figures. Error bars show the standard deviation calculated by assuming that the flux measurements along the azimuthal direction are independent. This is not correct.

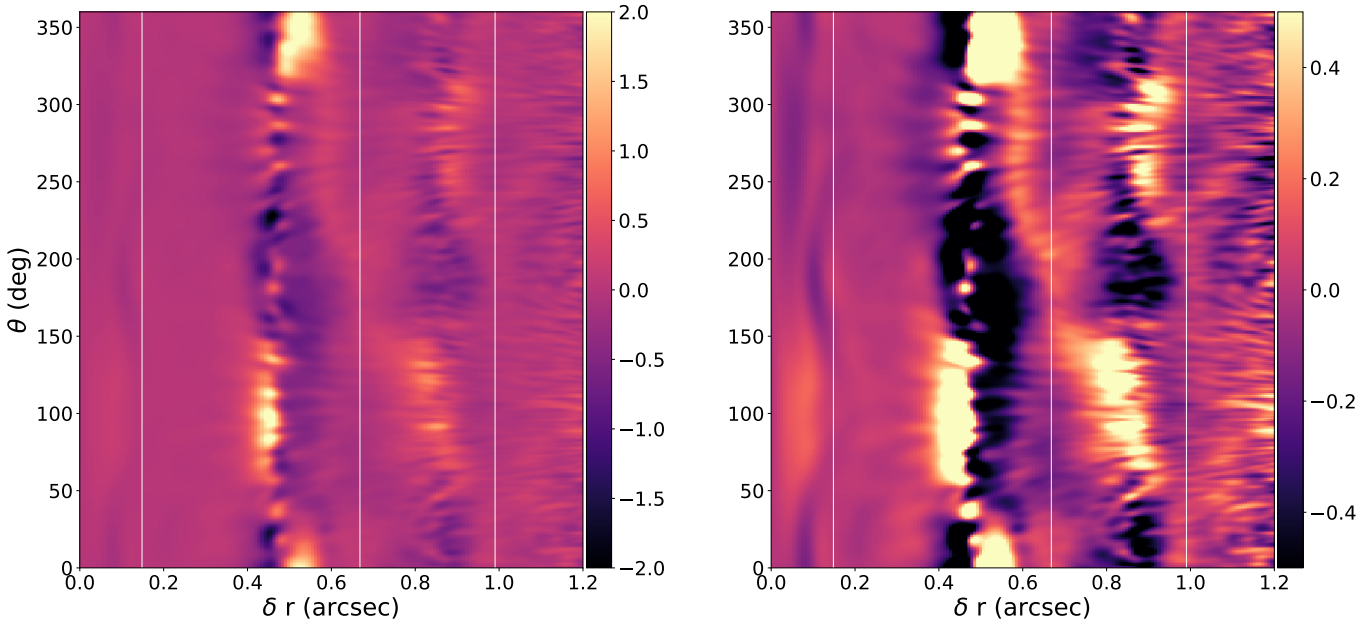

Figure 8. Relative deviation from the mean. The color scale show $(I(r,\theta) - \bar{I}(r))/\bar{I}(r)$