ALMA Detection of a Disk Wind from HD163296

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Disk Dissipation

As main accretion phase ends, and the protostar moves towards the main sequence, how does it disperse its disk?

Disk winds offer a possible solution to this problem, but have never before been observed.

What is a disk wind?

Disk winds are magnetically driven winds launched from the disk at radii of a few AU. They differ from jets (launched at ~0.1 AU) and entrained outflows (swept up ambient material) as they primarily dissipate the disk material, and are not a direct release mechanism for the build up of angular momentum in the system.

This is the first detection of a molecular disk wind (Fig. 1).

Our ALMA observations of CO were taken in Band 6 and Band 7. The disk wind has a double corkscrew morphology (Fig. 2), and is interacting with the HH object HH 409 (Fig. 3).

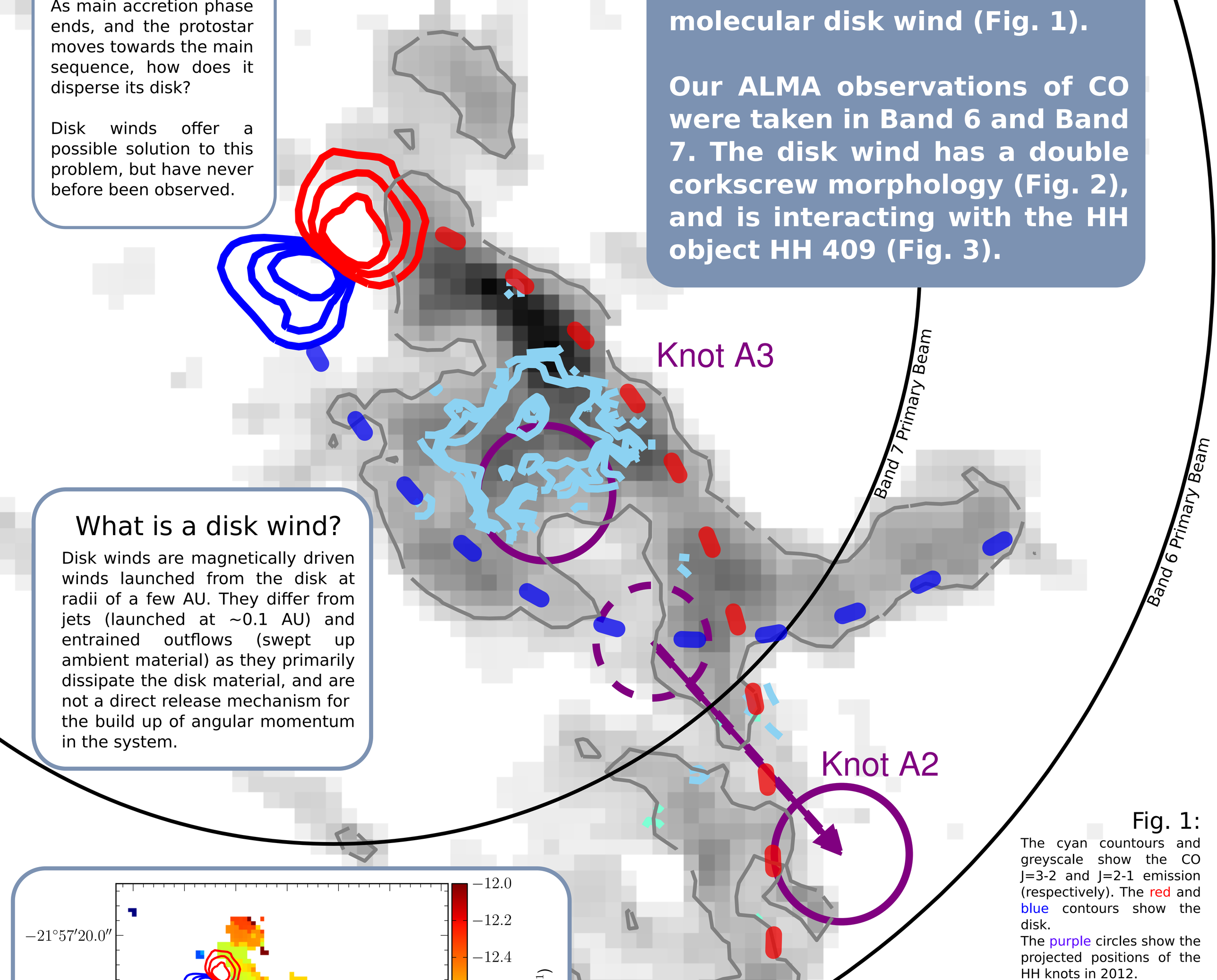

Fig. 1:
The cyan countours and greyscale show the CO J=3-2 and J=2-1 emission (respectively). The red and blue contours show the disk.
The purple circles show the projected positions of the HH knots in 2012.

Fig. 2:
The first moment map of the blue shifted CO J=2-1, This shows that there are two velocity components to the wind. This likely comes from there being two footpoints on the disk

Fig. 3:
Primary beam corrected CO J=3-2 emission. This shows that the strongest CO emission is just upwind from the knots suggesting wind and jet interaction. In the interaction region we determine a temperature of 960 K