The Blue Needle

A highly asymmetric debris disk surrounding HD 15115

Paul Kalas (UCB) | Michael Fitzgerald (UCB) | James R. Graham (UCB)

Background

- HD 15115 is an F2 star at 45 pc with significant far...
- HD 15115 observed on July 17, 2000, using the ACS/HRC coronagraph and 1.8 arcsec occulting spot (above).

HST Observations

- Surface brightness increases from 10x to 15x in F606W.
- The jet angle from the star to the disk is 11.8 degrees.
- The jet is 5.3 light-years long from the star.
- The jet is 2.2 light-years long from the star.
- The jet is 1.5 light-years long from the star.

Keck Observations

- We confirmed the HD 15115 disk using Keck adaptive optics on October 7, 2004, and January 26, 2007, in J, H, and K.

The origin of needle disks

For this to be a dynamical equilibrium, we must consider the effects of the...
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**HST/ACS F606W**

Keck H-band

5" (225 AU)

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**Background**

- HD 15115 is a F2 star at 45 pc with significant...

**HST Observations**

- Surface brightness countermapping for the HD 15115 disk
- Diagonal strikes from a 2" major axis and the annular contrast is 2.3 mag.
- Overall magnitude: -0.3 mag.
- 5" arcsecond Gaussian beam size from the ACS/HRC.
- HD 15115 observed on July 17, 2005, using the ACS/HRC coronograph and 1.8 arcsec occulting spot above.

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**Keck Observations**

- Radial surface brightness profile of HD 15115 disk.
- The difference between the measured disk surface brightness and the center magnitudes of B = 0.4 and H = 0.0.
- Disk plane was extracted from image.
- 5" arcsecond beam size from Keck.
- We plot a representative sample of HD 15115 using the standard subtraction scheme with background residuals as a function of radius.

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**The origin of needle disks**

For those with moderate ages, we expected the debris disk in the field. A population parameter has been found for those disks. More information on the theory of needle disks.

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*Image shows a simulation from the youth of the disk.*