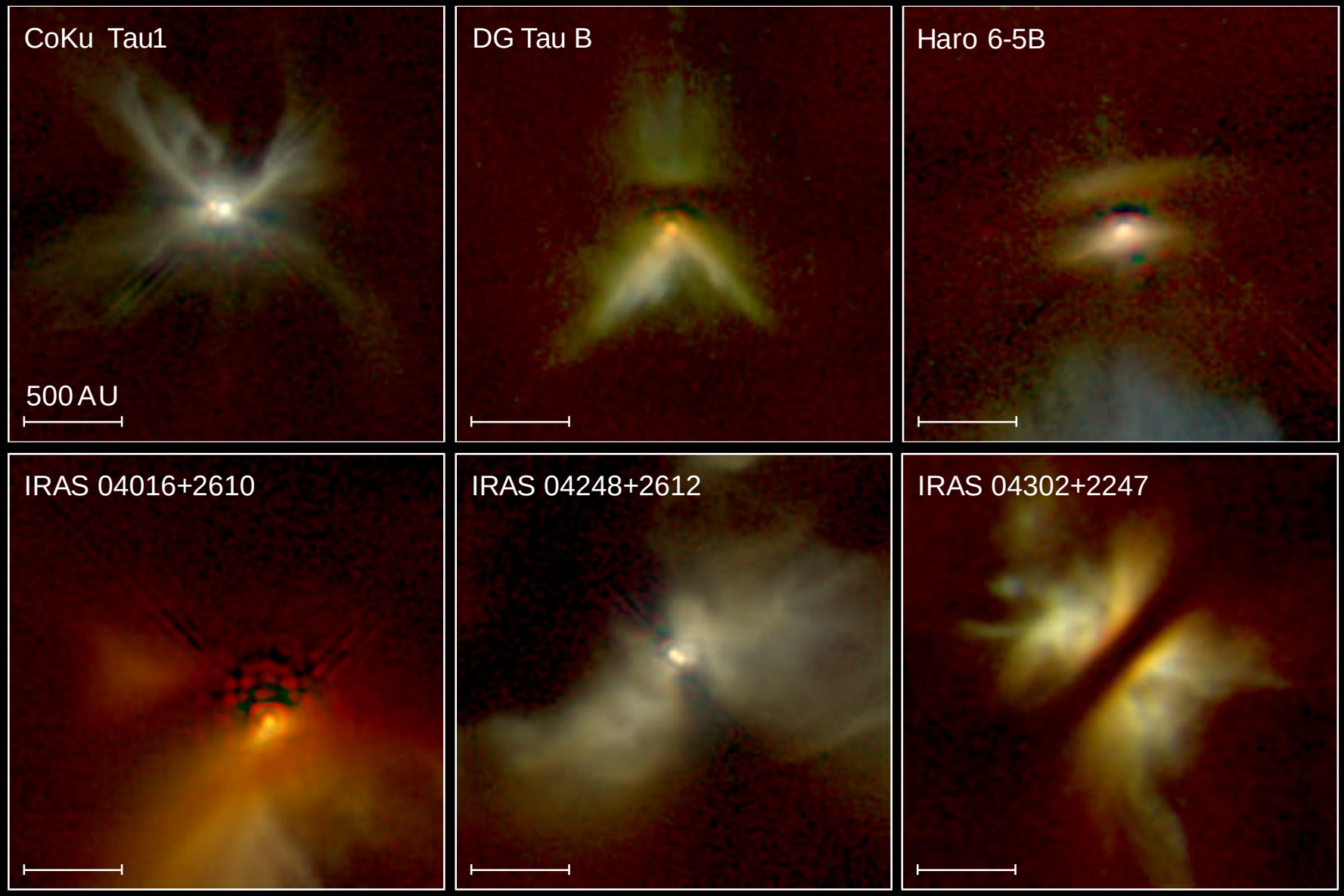

Young Stellar Disks in Infrared

Hubble Space Telescope • NICMOS

PRC99-05a • STScI OPO • D. Padgett (IPAC/Caltech), W. Brandner (IPAC), K. Stapelfeldt (JPL) and NASA

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NICMOS PEERS THROUGH DUST TO REVEAL YOUNG STELLAR DISKS

The following images were taken by NASA Hubble Space Telescope's Near-Infrared Camera and Multi-Object Spectrometer. All of the objects are extremely young stars, 450 light-years away in the constellation Taurus. Most of the nebulae represent small dust particles around the stars, which are seen because they are reflecting starlight. In the color-coding, regions of greatest dust concentration appear red.

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Top left: CoKu Tau/1
This image shows a newborn binary star system, CoKu Tau/1, lying at the center of four "wings" of light extending as much as 75 billion miles from the pair. The "wings" outline the edges of a region in the stars' dusty surroundings, which have been cleared by outflowing gas. A thin, dark lane extends to the left and to right of the binary, suggesting that a disk or ring of dusty material encircles the two young stars.

Top center: DG Tau B
An excellent example of the complementary nature of Hubble's instruments may be found by comparing the infrared NICMOS image of DG Tau B to the visible-light Wide Field and Planetary Camera 2 (WFPC2) image of the same object. WFPC2 highlights the jet emerging from the system, while NICMOS penetrates some of the dust near the star to more clearly outline the 50 billion-mile-long dust lane (the horizontal dark band, which indicates the presence of a large disk forming around the infant star). The young star itself appears as the bright red spot at the corner of the V-shaped nebula.

Top right: Haro 6-5B
This image of the young star Haro 6-5B shows two bright regions separated by a dark lane. As seen in the WFPC2 image of the same object, the bright regions represent starlight reflecting from the upper and lower surfaces of the disk, which is thicker at its edges than its center. However, the infrared view reveals the young star just above the dust lane.

Bottom left: I04016
A very young star still deep within the dusty cocoon from which it formed is shown in this image of IRAS 04016+2610. The star is visible as a bright reddish spot at the base of a bowl-shaped nebula about 100 billion miles across at the widest point. The nebula arises from dusty material falling onto a forming circumstellar disk, seen as a partial dark band to the left of the star. The necklace of bright spots above the star is an image artifact.

Bottom center: I04248
In this image of IRAS 04248+2612, the infrared eyes of NICMOS peer through a dusty cloud to reveal a double-star system in formation. A nebula extends at least 65 billion miles in opposite directions from the twin stars, and is illuminated by them. This nebula was formed from material ejected by the young star system. The apparent "pinching" of this nebula close to the binary suggests that a ring or disk of dust and gas surrounds the two stars.

Bottom right: I04302
This image shows IRAS 04302+2247, a star hidden from direct view and seen only by the nebula it illuminates. Dividing the nebula in two is a dense, edge-on disk of dust and gas which appears as the thick, dark band crossing the center of the image. The disk has a diameter of 80 billion miles (15 times the diameter of Neptune's orbit), and has a mass comparable to the Solar Nebula, which gave birth to our planetary system. Dark clouds and bright wisps above and below the disk suggest that it is still building up from infalling dust and gas.

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