# Text Description for “Webb Telescope Reveals the Protostar L1527 IRS”

Vertically oriented video, with a 9 to 16 aspect ratio, showing a scientific visualization of a space telescope image, with explanatory text in white, centered on the bottom quarter of the screen, and animated mark-up pointing out key features.

Video opens with a colorful image of an hourglass-shaped nebula with the bright light of a protostar at the center. The protostar itself is hidden from view within the “neck” of the hourglass. An edge-on protoplanetary disk appears as a dark line across the middle of the neck. Light from the protostar leaks above and below the disk, illuminating cavities within the surrounding gas and dust.  The long axis of the nebula is oriented about 10 degrees counter-clockwise from vertical.

Above the protostar is a triangular orange lobe of gas that expands out toward the top of the image. The color is brightest near the protostar, and grows dimmer with distance as the cloud expands toward the top. There are turbulent, flame-like filaments and plumes and bubble-like cavities of orange that appear to be blowing out from the protostar at the center.

Below the protostar is another triangular lobe of gas, which expands in the opposite direction, out toward the bottom of the image. The region closest to the protostar is composed of bright pinkish orange plumes. Moving away from the protostar, toward the bottom, the color changes from pink to purple to bright blue.

A number of stars and galaxies of different shapes and sizes are scattered unevenly in the background of the image: Only a few are visible to the left of the hourglass. The hourglass takes up most, but not all of the frame: There is darkness above and below the outer edges of the nebula.

[0:01 text on screen] *This is the Webb Space Telescope's infrared view of the protostar L1527 IRS.*

The camera begins to zoom in slowly toward the protostar at the center of the hourglass. The three-dimensional shape and structure of the nebula becomes apparent as the camera moves counter-clockwise around the vertical axis, and the viewing angle changes. The change in viewing angle is emphasized by the apparent motion of background stars and galaxies, which appear on the right side of the frame, move toward the left behind the nebula, and then disappear off the left side of the frame, while the hourglass appears to rotate.

The camera zooms in quickly toward the center until the nebula fills most of the frame. The top and bottom edges of the nebula are no longer visible.

[0:07 text on screen] *The forming star is hidden within a dusty disk, roughly the size of our solar system*

The camera zooms in slightly and moves a few degrees counter-clockwise around the nebula. Two thin, crisp white lines appear from either side to circle the neck of the hourglass, outlining the dusty disk hiding the protostar.

The camera moves a few more degrees counter-clockwise.

[0:13 text on screen] *Material flows in from the sides, and then spirals onto the protostar*

A number of semi-transparent, blue-white line segments move across the frame to illustrate the spiraling flow of material. The lines look like contrails from airplanes and are oriented roughly perpendicular to the long axis of the nebula, and parallel to the dusty disk surrounding the protostar in the center. Most of the lines crossing the upper lobe of the nebula move from right to left. Most of the lines in the bottom lobe move from left to right. The first lines that appear are long and cross the nebula about halfway above and below the protostar and dusty disk at the neck of the hourglass. New lines are shorter and appear closer and closer until they converge, tightly circling the neck. As these lines tighten around the neck, another set of lines begins to trace the flow of material from the center, up and down toward the top and bottom of the nebula. The camera zooms out as the lines lengthen and diverge like firework trails from the center to trace the hourglass shape.

[0:18 text on screen] *Some is ejected perpendicular to the disk producing the hourglass shape of the nebula*

The camera zooms out more, and the lines fade away as they move toward the top and bottom of the nebula.

The camera zooms quickly back in toward the center, and then tilts up slightly to focus on the bright orange bubble-like cavities in the upper lobe.

[0:25 text on screen] *Explosive emissions create bubble-like structures in the upper lobe*

The camera moves a few degrees counter-clockwise, highlighting the three-dimensional structure of the bubble.

The camera moves down to focus on the pink to blue clouds and flame-like structures in the lower lobe.

[0:30 text on screen] *In the lower lobe, light from the protostar illuminates and heats some dusty clouds*

The camera begins to move out again with the viewing angle tilting slightly.

[0:38 text on screen] *Only Webb can provide such a detailed view of this star still in the process of formation*

The camera continues to zoom out until the entire nebula is back in the frame.

[0:45 credit text on screen] *Protostar L1527 IRS*

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