

Neutron Star Interior Composition Explorer (NICER)



Nearly 50 years after British astrophysicist Jocelyn Bell discovered the existence of rapidly spinning neutron stars, NASA will launch the world's first mission devoted to studying these unusual objects. The agency also will use the same platform to carry out the world's first demonstration of X-ray navigation in space.

About a week after its installation as an external attached payload, this one-of-a-kind investigation will begin observing neutron stars, the densest objects in the universe. The mission will focus especially on pulsars — those neutron stars that appear to wink on and off because their spin sweeps beams of radiation past us, like a cosmic lighthouse.

These objects are the remnants of massive stars that, after exhausting their nuclear fuel, exploded and collapsed into super-dense spheres about the size of New York City. Their intense gravity crushes an astonishing amount of matter — often more than 1.4 times the content of the sun or at least 460,000 Earths — into these city-sized orbs, creating stable, yet incredibly dense matter not seen anywhere else in the universe. Just one teaspoonful of neutron star matter would weigh a billion tons on Earth.

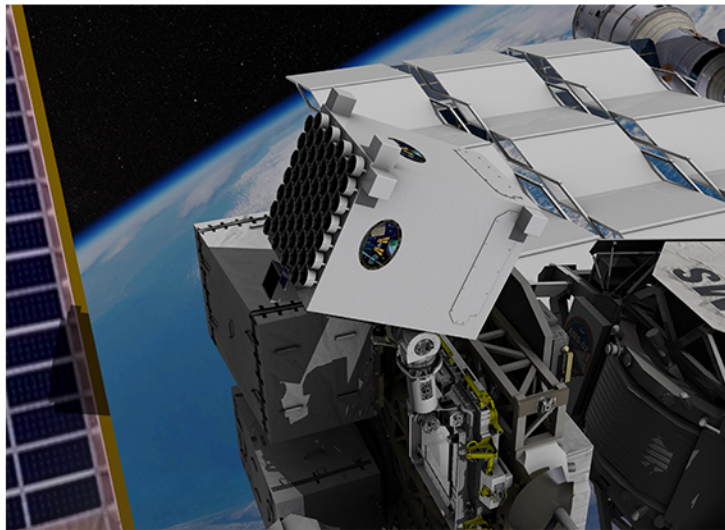
Although neutron stars emit radiation across the spectrum, observing them in the energetic X-ray band offers the greatest insights into their structure and the high-energy phenomena that they host, including starquakes, thermonuclear explosions, and the most powerful magnetic fields known in the cosmos.

During its 18-month mission, NICER will collect X-rays generated from the stars' tremendously strong magnetic fields and from hotspots located at their two magnetic poles. At these locations, the objects' intense magnetic fields emerge from their surfaces and particles trapped within these fields rain down and generate X-rays when they strike the stars' surfaces.

Because these pulsations are predictable, they can be used as celestial clocks, providing high-precision timing, like the atomic-clock signals supplied through the Global Positioning System, also known as GPS. Although ubiquitous on Earth, GPS signals weaken the farther one travels out beyond Earth orbit. Pulsars, however, are accessible virtually everywhere in space, making them a valuable navigational solution for deep-space exploration.

Using the same NICER hardware, the mission also plans to demonstrate the viability of autonomous X-ray or pulsar-based navigation, which has never been demonstrated before.

NICER was launched on June 3, 2017, with the SpaceX CRS-11 ISS resupply mission aboard a Falcon 9 rocket and is now installed aboard the International Space Station.



Neutron Star Interior Composition Explorer (NICER)



9

8

1

1A

Glue to back side of the cut out you made below before closing the body into a box.

14

15

10

X

Cut out the blue rectangle above

10

11

Color back black

12

13

8

NICER

X

5

7

5

9

1 to 2 connector

5

6

7

1 to 3 connector

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1 to 2 connector

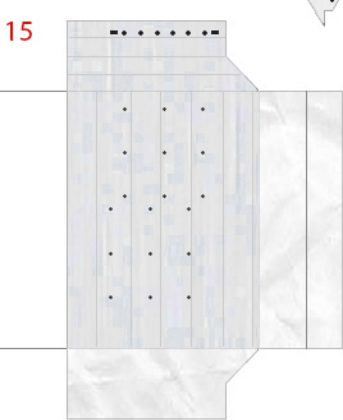
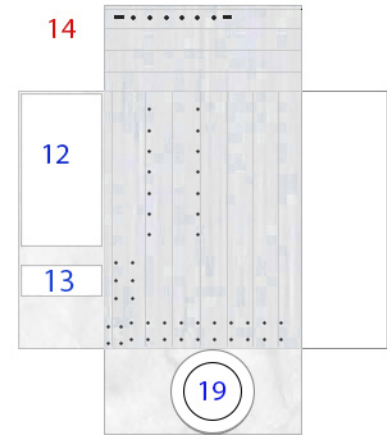
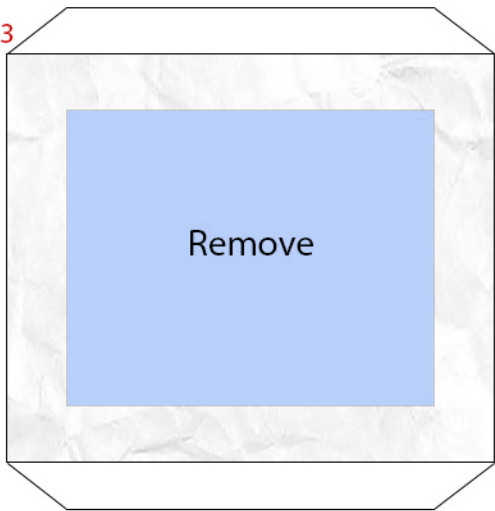
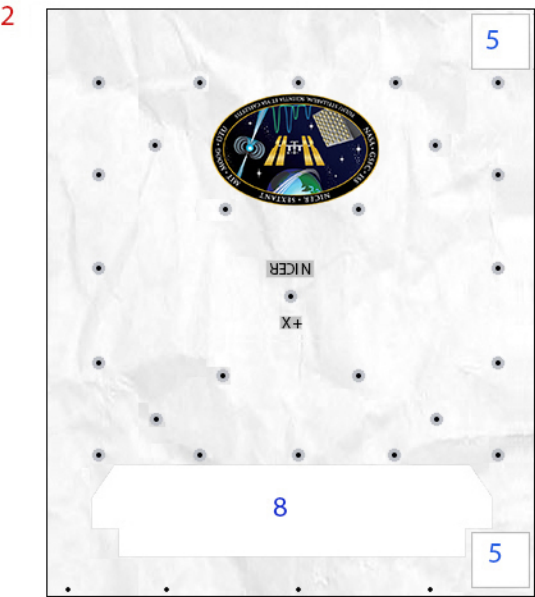
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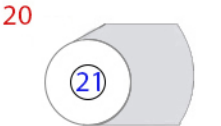
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1 to 3 connector

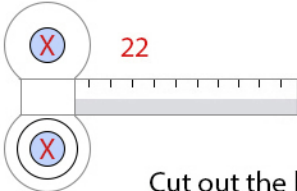
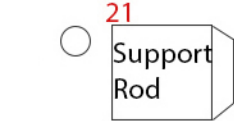
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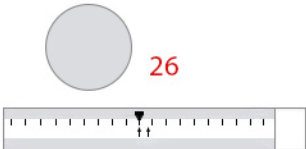
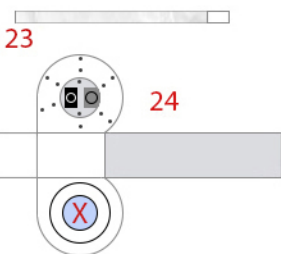
Includes 1 spare



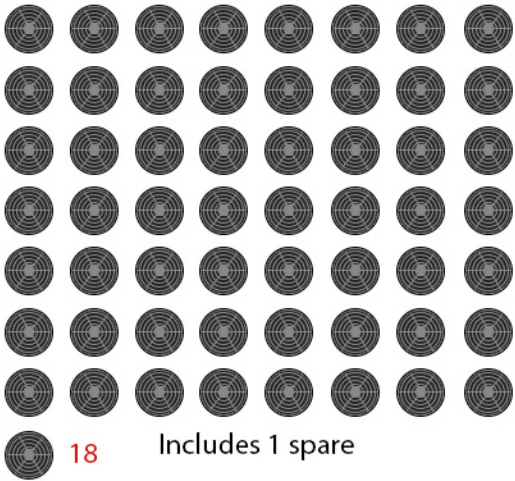
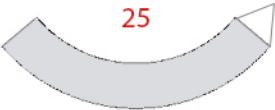
Glue to FOUR (4) layers of cardstock



Cut out the blue circles

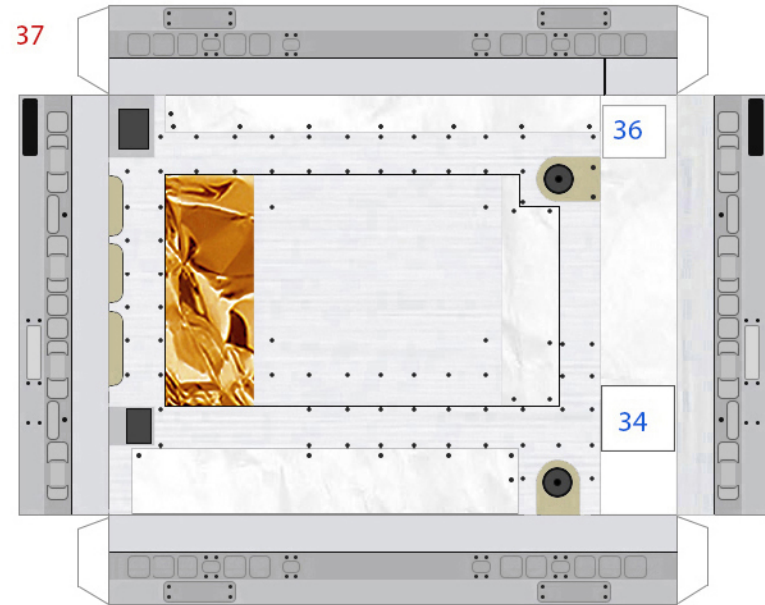
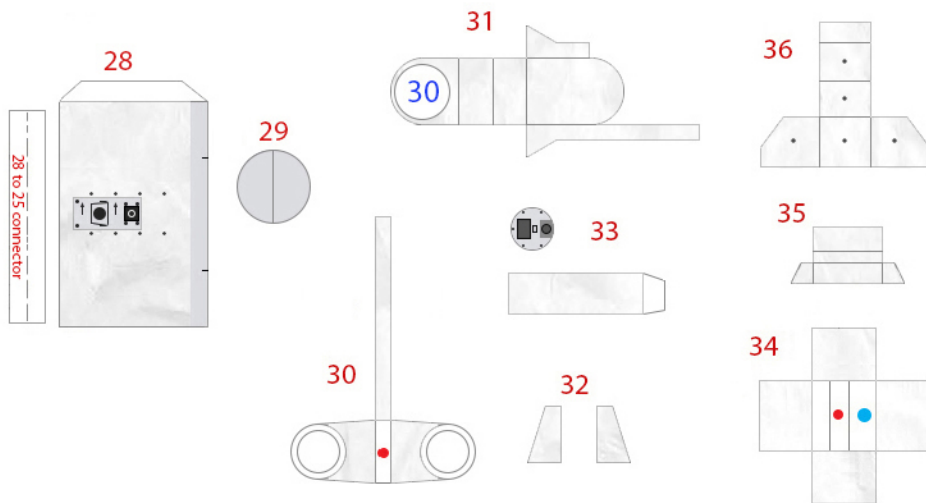


Glue to two layers of cardstock

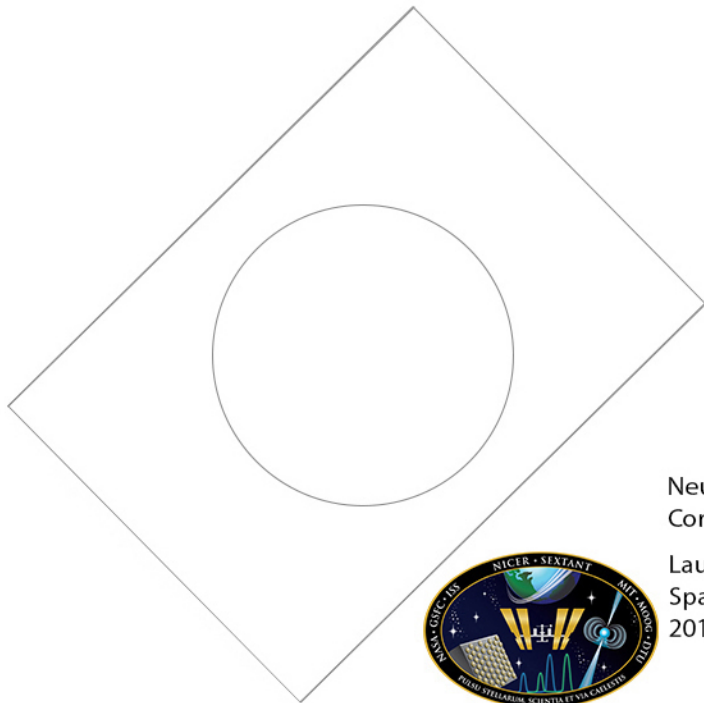


Includes 1 spare

Neutron Star Interior Composition Explorer (NICER)



Bottom support, roll to a ring



Neutron Star Interior
Composition Explorer (NICER)
Launched to the International
Space Station (ISS) on June 3,
2017



Fold the four sides on part 37, but
don't glue.
Reinforce part 37 by gluing
cardstock to the back side before
gluing together.

Glue to thick cardboard
or foamboard