

Exceptional Thermonuclear X-Ray Burst Impacts the Surroundings of a Pulsar

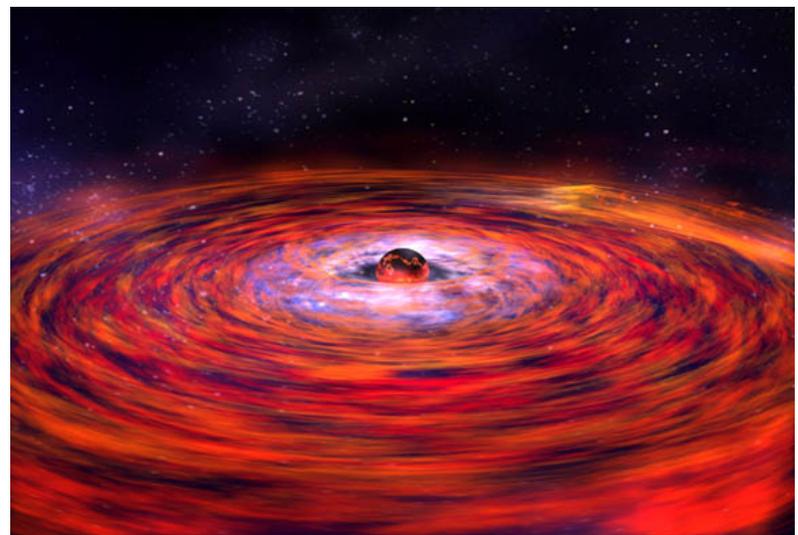
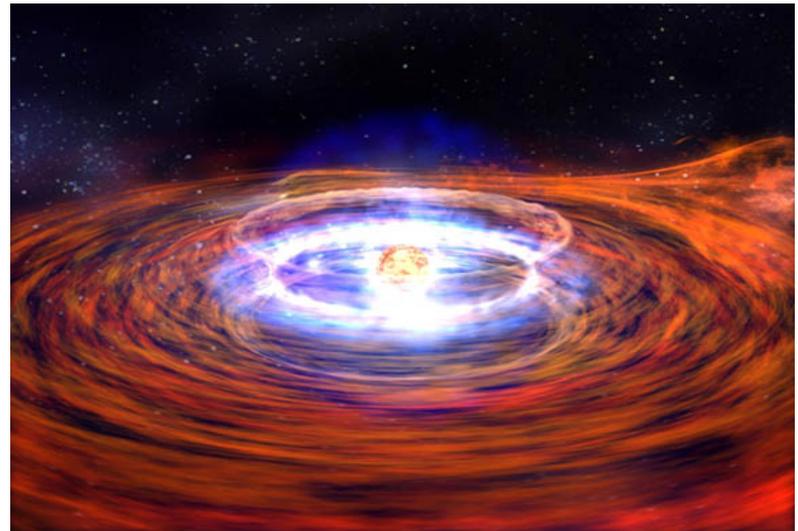
What is the science question? What happens when material falls onto a neutron star from the surrounding disk of material?

What were your findings?

- Before the burst: Chandra and NuSTAR observe the disk to be truncated ~100 miles from the neutron star, which is surrounded by a hot corona (blue in the top figure).
- During the burst: MAXI and Swift see the strong impact of the burst. The inner disk collapsed too close to the star (bottom figure). The corona briefly disappears, but reforms within hours.
- Surprise from the RXTE archive! A single observation of just 20 minutes shows the neutron star to be an X-ray pulsar. The magnetic field that causes the pulsations may also truncate the disk, and was briefly disrupted by the powerful burst.

What was the impact? *This is the most detailed burst study to date in the soft X-ray band.* Soon NICER will perform more and higher quality detections in the same band, as its sensitivity and energy band are optimal for study of these objects.

Why does it matter to non-scientists? It is a unique probe into one of the most extreme environments in the Galaxy, where nuclear explosions, strong gravity, and strong magnetic fields all interact.



Laurens Keek (662), Tod Strohmayer (662) et al. 2017: "X-Ray Reflection and an Exceptionally Long Thermonuclear Helium Burst from IGR J17062-6143," *The Astrophysical Journal*.
Strohmayer & Keek 2017 "IGR J17062-6143 Is an Accreting Millisecond X-Ray Pulsar," *The Astrophysical Journal Letters*.