

Exploring Long-term Variability in "Be star" X-ray binaries with *Swift*

What is the Science Question?

"Be star" X-ray binaries are double star systems consisting of a neutron star orbiting a hot young ("Be") star which has a disk around it.

The question is: How and why does the X-ray flux from "Be star" X-ray binaries vary on long timescales?

What were your findings?

- Some binaries show regular X-ray flares once per orbit. (Periods of 10s to 100s of days.)
- One binary doubled its flare period.
- Could the neutron star hit the disk either once or twice per orbit?
- One binary showed *two* periods – still a mystery!
- Another system was more irregular, with only hints of a period.

What was the impact? Be X-ray binaries have a very wide diversity of variability. This helps us learn about the nature of the disks around the Be stars, and how they interact with neutron stars.

Why does it matter to non-scientists? This work helps us figure out what happens to stars when they die, and whether or not physics works as we expect in the incredibly strong gravity and magnetic fields of exotic neutron stars.

