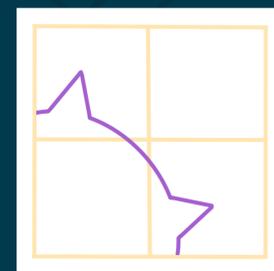


NuSTAR's **contamination light** can monitor **rotation rate** and **orbital behavior** in the accreting neutron star SMC X-1.

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Read the paper:



Extending the baseline for SMC X-1's spin and orbital behavior with NuSTAR stray light

Introduction:

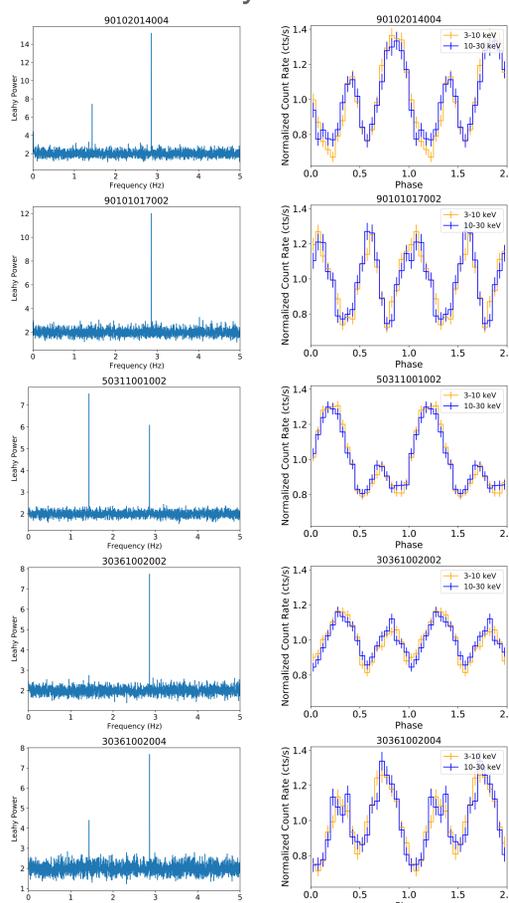
Stray light, or aperture flux, bypasses NuSTAR's optics and strikes the detectors when a bright source is 1-4 degrees from the focused target. This contaminating light can probe energies higher than the calibrated 3-79 keV range and offer serendipitous data.

Visit the StrayCats poster - 110.24!

The high mass X-ray binary SMC X-1 displays several timing behaviors including X-ray pulsations, an eclipsing orbit, and an unstable superorbital cycle, making it an ideal testbed for timing analyses with stray light. We examined eight stray light observations of SMC X-1 and found five appropriate for analysis.

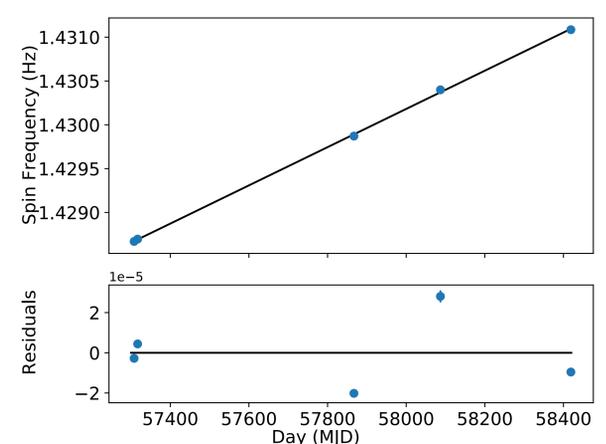
Timing Results:

We searched for pulsations and extracted pulse profiles in two energy bands. Pulsations were detected in all five viable observations. The pulsation shape changes dramatically over the three year interval.



Long-term spin behavior:

These five observations showed a long-term spin up rate of $(2.52 \pm 0.03) \times 10^{-11}$ Hz s⁻¹, which is consistent with previous results from focused observations.



Verifying SMC X-1's orbital ephemeris:

Because two observations contained eclipses, we were able to verify the Falanga et al. (2015) orbital ephemeris for SMC X-1.

