

# Observations of the accreting X-Ray pulsar GX 301-2 with the X-Calibur Hard X-ray polarimetry mission

*Thursday, 11 July 2019 15:30 (15 minutes)*

Measurements of polarization of the X-ray emission in accreting neutron stars probe the particle acceleration region and can distinguish between fan-beam and pencil-beam approximations of the geometry of the accretion column.

In Dec 29th 2018, NASA's hard X-ray polarimetry mission X-Calibur was launched on a 2.5-day stratospheric balloon flight from McMurdo station in Antarctica. During the campaign, X-Calibur observed the high-mass X-ray binary GX 301-2 in a rare flaring state at orbital phase  $\sim 0.35$ , close to apastron, resulting in a clear detection of GX 301-2 in the hard X-ray band. The ability of X-Calibur to measure the azimuthal scattering angle of the incoming X-rays resulted in a measurement of a 22%  $\pm$  14% polarization fraction of the hard X-ray emission from GX 301-2 during the main peak of its 685s-long pulse profile. The measured polarization agrees better with fan-beam emission predictions ( $\sim 20\%$ ) than pencil beam scenarios ( $\sim 0\%$ ).

We will report on the results of the X-Calibur observations of GX 301-2 including a 15-60 keV light curve, hard X-ray energy spectrum, phase-resolved analysis, and constraints on linear polarization. We will also present contemporaneous observations of GX 301-2 in the soft X-ray band with the Neil Gehrels Swift observatory and NICER X-ray telescope that show significant variability of the shape of the pulse profile during the flaring event. We will conclude with a discussion of how neutron star, accretion, and fundamental physics can be constrained with future deeper polarimetric observations of accreting X-ray pulsars.

**Primary author:** ERRANDO, Manel (Washington University in St Louis)

**Co-authors:** ABARR, Q.; BOSE, R.; BRAUN, D.; BEHESTIPOUR, B.; BEILICKE, M.; DE GERONIMO, G.; GADSON, T.; DOWKONTT, P.; HEATWOLE, S.; IYER, N. K.; GUARINO, V.; KISLAT, F.; KISS, M.; KITAGUCHI, T.; KUSHWAH, R.; KRAWCZYNSKI, H.; LANZI, J.; LI, S.; LISALDA, L.; OKAJIMA, T.; PEARCE, M.; PETERSON, Z.; PRESS, L.; RAUCH, B.; STUHLIK, D.; TAKAHASHI, H.; TANG, J.; UCHIDA, N.; WEST, A.

**Presenter:** ERRANDO, Manel (Washington University in St Louis)

**Session Classification:** Relativistic outflows from galactic sources

**Track Classification:** Relativistic outflows from galactic sources