Mining the Rich Archive for 47 Tucanae

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Abstract

We propose to capitalise on the extensive set of scientific and calibration observations of the remarkable globular cluster 47 Tuc. The chief goals are: (1) to address key questions about the binaries found in this massive cluster, including studies of cataclysmic variables (CVs), low-mass X-ray binaries (LMXBs), millisecond pulsars (MSPs) and chromospherically active binaries, and (2) to study a dynamically important but thus far neglected class of binaries, containing subgiant and giant stars. We plan to make the most extensive analysis to date of long-term variability in globular cluster binaries, including searches for dwarf nova outbursts, high and low states and periodic variations for CVs; study accretion rate changes for LMXBs; study active binaries that appear to undergo coronal mass ejections; identify the nature of two binaries that experience incredibly bright X-ray flares; confirm new candidates of rare MSPs with main sequence companions; search for optical IDs of unidentified Chandra sources. This is the richest population of binaries known in any globular cluster and the complete archival dataset is unlikely to be rivaled for many years. These studies will add to our understanding of this important crash-test laboratory and have broader implications for stellar dynamics, stellar and binary evolution and globular cluster evolution.

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Number of investigators: 6

Dataset Summary:

Instrument	No. of Datasets	Retrieval Method	Retrieval Plan
WFPC2	136	DISK	40 datasets/week
ACS	289	DISK	50 datasets/week
STIS	36	DISK	36 datasets/week