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Final Technical Report For NASA Grant NAG-8-288 Continuation of Studies of X-ray Binaries with Ginga

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This report describes the activities at Penn State University supported by NASA Grant NAG-8-288, "Continuation of Studies of X-ray Binaries with Ginga". Initiated at Penn State in May, 1993, the aim of this investigation was to continue studies of X-ray binaries using the archival dataset collected by the Japanese X-ray satellite, *Ginga*. The two principal astrophysical targets of the investigation were the X-ray binaries 4U1700-37 and X0748-676.

The original Principal Investigator for this activity was Dr. Robin Corbet, assisted by his graduate student, Mr. Brian Thomas. In October, 1994 Dr. Corbet left Penn State to assume direction of the XTE Science Operations Center at the Goddard Space Flight Center. Dr. Corbet transferred titular responsibility for his research programs at Penn State to Dr. John Nousek, but retained scientific direction. Mr. Thomas continued to be supported by these funds, but relocated in Jan. 1995, to Goddard to complete his Ph.D. requirements in close contact with Dr. Corbet.

The key goal of the observation of X0748-676 was to study changes in the time of the X-ray eclipses in order to determine the orbital period, which, in turn allows us to infer properities of the system. We attempted to carry out ROSAT observations but both scheduled pointings missed the requested ephemerides to see the eclipses. We were, however, able to use ASCA performance verification phase data to undertake our intended scientific goal and the combined ASCA/Ginga data were published as:

"Is the changing orbital period of EXO 0748-676 evidence for a triple system?", R.H.D. Corbet, K. Asai, T. Dotani, & F. Nagase, 1994, Astrophys. J., 436, L15.

4U1700-37 was observed by *Ginga* on two occasions. Mr. Thomas has conducted spectral and temporal extractions of these data. These data have been folded on the orbital period and the variation of low energy absorption and high energy iron line emission studied.

Mr. Thomas has continued working on the soft excess of EXO 0748-676 as a principal component of his Ph.D. thesis. This work is being directed in detail by Dr. Corbet, with Dr. Nousek as the chair of Mr. Thomas's thesis committee.