

Optical and X-ray variability in the active CGCG 077-102 NED02 galaxy

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Abstract

Supermassive black holes (SMBH) are known to play an essential role during the evolution of their galaxy host due to the close connection between their properties, such as the well-known scaling relations between the SMBH mass with their hosts and the active galactic nucleus activity, which turn its study essential to understand the formation and evolution of galaxies. In this work, we used the spectrograph MISTRAL to obtain the optical spectra of the galaxy pair CGCG 077-102 localized within the Abell 2063 cluster. We used Chandra and XMM-Newton archival data to derive the X-ray spectral shape and variability. In order to study the optical variability of CGCG 077-102 NED02, we used the Zwicky Transient Facility (ZTF) time-domain survey to get light curves in the g and r bands. Our optical spectra results show a Seyfert classification for the galaxy CGCG 077-102 NED02, while we confirmed the passive state of its companion CGCG 077-102 NED01. The optical light curve (g -band) shows significant variability and is well described by a damped random walk (DRW) model, with the best-fitted damping timescale parameter $\tau_{\text{DRW}} = 30^{+28}_{-12}$ days. In future works, we will characterize the spectral variability of CGCG 077-102 NED02 and search for quasi-periodic oscillation (QPOs) in the X-ray flux with our proposed MISTRAL and CHANDRA observations. Doubtless, this study will be fundamental to shed light on the origin and evolution of AGNs and their hosts.