



- RAY ASTRONOMY 2019

Current Challenges and New Frontiers in the Next Decade

8-13 September 2019
CNR/INAF Research Area, Bologna, Italy

Contribution ID: 104

Type: **Poster**

CG X-1: AN ECLIPSING WOLF-RAYET ULX IN THE CIRCINUS GALAXY

Friday, 13 September 2019 15:50 (2 minutes)

Compact Wolf-Rayet X-ray binaries with orbital periods of less than a day are a rare class of sources, probing a short-lived (few 10^5 yr) but key evolutionary stage of binary systems. They emerge from a common envelope phase and (if they survive the second SN explosion) they form double compact objects that can merge via gravitational decay in less than a Gyr. We studied the candidate Wolf-Rayet X-ray binary CG X-1 in the Circinus galaxy, using 20 years of Chandra and XMM-Newton data. CG X-1 is an eclipsing source and one of the most luminous ULXs in the local universe (peak $L_X = 3 \times 10^{40}$ erg/s at a distance of 4.2 Mpc). We phase connected the lightcurves in the archival data and derived a period of $(25,970.0 \pm 0.1)$ s and a period derivative $\dot{P}/P = (10.2 \pm 4.6) \times 10^{-7} \text{ yr}^{-1}$. The intriguing dipping and eclipsing behavior of CG X-1 is different from the orbital modulations seen in other classes of X-ray binaries. We suggest that such lightcurves are a defining property of this class of super-Eddington sources, in which both the primary and the secondary launch dense, fast outflows with similar kinetic power. We propose a model for the asymmetric dips and occultations, based on partial covering by Compton-thick clouds. We speculate that the main occulting material is dense, shocked wind between black hole and donor star, and in a bow shock ahead of the black hole.

Topic

Compact and diffuse sources in galaxies and in the Galactic Center

Affiliation

National Astronomical Observatories Of China (NAOC)

Primary authors: Prof. SORIA, Roberto (UCAS); Ms QIU, Yanli (National Astronomical Observatories Of China (NAOC))

Co-authors: Prof. LIU, Jifeng (NAOC); Dr WANG, Song (NAOC)

Presenter: Ms QIU, Yanli (National Astronomical Observatories Of China (NAOC))

Session Classification: POSTER SESSION