

Contribution ID: 173 Type: Parallel Talk

Broadband X-ray Study of the Galactic Microquasar W50/SS433, a Galactic PeVatron Candidate

Wednesday 10 August 2022 16:50 (20 minutes)

W50/SS433 is a complex and fascinating system that represents an important test bed for many astrophysical processes. Powered by the microquasar SS 433, the W50 nebula —classified as a supernova remnant with an unusual double-lobed morphology reminiscent of a Manatee —has been proposed to be a Galactic PeVatron candidate; a scenario that has been recently revived with the detection of very high energy TeV emission with HAWC. We present the first NuSTAR and XMM-Newton observations of the inner eastern lobe of W50, combined with archival Chandra and XMM-Newton observations spanning various regions across the eastern lobe. We resolve and characterize hard non-thermal X-ray emission detected up to 30 keV, originating from a knotty, few-arcminute size, head region located ~29 pc east of SS 433, and constrain its photon index to 1.58+/-0.05 (0.5-30 keV). The index gradually steepens away from SS 433 and all the way out to the radio ear (at ~96 pc east of SS 433) where soft thermal X-ray emission dominates. The unusually hard index and blobby structure seen from the 'head' of the eastern jet is similar to what is observed in pulsar wind nebulae as well as in extragalactic AGN jets, and challenges classical particle acceleration processes. We conclude with an outlook on upcoming and future modelling and observational studies of this system that continues to puzzle and fascinate a diverse range of researchers even more than 40 years into its discovery.

Collaboration name

W50 Collaboration

Author: MAC INTYRE, Brydyn (University of Manitoba, Department of Physics and Astronomy)

Co-authors: Dr SAFI_HARB, Samar (University of Manitoba, Department of Physics and Astronomy); ZHANG, Shuo (Bard College Physics Program); POPE, Isaac (Columbia Astrophysics Laboratory); ZHANG, Shuhan (Columbia Astrophysics Laboratory); SAFFOLD, Nathan (Fermi National Accelerator Laboratory); MORI, Kaya (Columbia Astrophysics Laboratory); GOTTHELF, Eric (Columbia Astrophysics Laboratory); AHARONIAN, Felix (Dublin Institute for Advanced Studies, Max-Planck-Institute for Nuclear Physics); BAND, Matthew (University of Manitoba, Department of Physics & Astronomy); FANG, Ke (Department of Physics, Wisconsin IceCube Particle Astrophysics Center, University of Wisconsin); HAILEY, Chuck (Dublin Institute for Advanced Studies); NYNKA, Melania (Kavli Institute For Astrophysics and Space Research, Massachusetts Institute of Technology); RHO, Chang Dong (University of Seoul)

Presenter: MAC INTYRE, Brydyn (University of Manitoba, Department of Physics and Astronomy)

Session Classification: Galactic Sources

Track Classification: Galactic Sources