Institute for Space Weather Sciences Colloquium

Thursday, 15th of Feb 2024, 1pm ET

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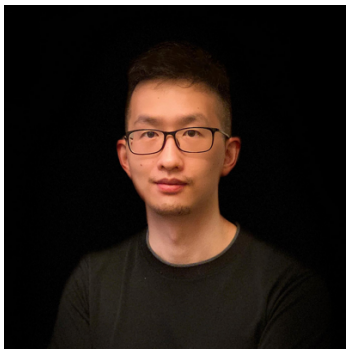
Long-Lasting Aurora-like Radio Emission Above a Sunspot and Implications for Solar–Stellar Connection

Planetary radio aurorae are typically characterized by highly polarized, intense radio bursts. These emissions are generally attributed to electron cyclotron maser (ECM) emission from energetic electrons in regions with converging magnetic fields, such as planetary polar areas. Similar radio emissions have been observed in magnetically active low-mass stars and brown dwarfs, often prompting analogous interpretations. In this talk, we detail our observations of long-lasting solar radio bursts with high brightness temperature, wide bandwidth, and high circular polarization fraction akin to these auroral and exo-auroral radio emissions, albeit two to three orders of magnitude weaker than those on certain low-mass stars. Notably, long-lasting radio emissions originate above a sunspot with a strong, converging magnetic field. Our spatial, spectral, and temporal analysis suggest that the morphology and frequency dispersion of the source align with ECM emissions, likely driven by energetic electrons from recurring nearby solar flares. These observations provide new insights into the nature of intense solar radio bursts and suggest a potential model for understanding aurora-like radio emissions in other flare stars with significant starspots.



Dr. Sijie Yu earned his Bachelor's in Geophysics at the University of Science and Technology of China in 2010 and obtained his Ph.D. in Astrophysics from the University of the Chinese Academy of Sciences in 2015. He joined the NJIT in 2016 and currently serves as an associate research professor at the New Jersey Institute of Technology (NJIT). Dr. Yu is a member of the Expanded Owens Valley Solar Array (EOVSA) team, focusing on solar radio observations using ground-based facilities like the EOVSA and the Very Large Array (VLA). His expertise centers on radio observations of solar phenomena, including solar flares, coronal mass ejections, jets, and other transient and long-duration solar events at radio wavelengths.