Monitoring nearly 4000 nearby stellar systems for radio exoplanets with the OVRO-LWA

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Recent results from our own solar system demonstrate the importance of not only stellar magnetic activity, but also the critical importance of planetary magnetic field strength, in determining the conditions for planetary habitability. The detection of planetary radio emission from objects beyond the solar system will provide the first direct measurements of exoplanetary magnetic field strengths, as well as provide insight on the degree to which those magnetospheres can shield exoplanet atmospheres against the surrounding space weather environment. But despite observations spanning nearly 4 decades, previous searches for direct detection of exoplanetary radio emission have resulted in non-detections. However, these were limited by a number of factors, including limited access to sensitive telescopes operating below 100 MHz and the restriction that such observations are typically only a few hours in duration, thereby insensitive to the long-term variability of planetary radio emission. Particularly, short-duration observations are insensitive to rare brightening events associated with coronal mass ejection events, similar to what we see in our own solar system, where Earth's auroral radio emission can increase by orders of magnitude during strong geomagnetic storms. What is needed are wide-field, long-duration surveys at frequencies below 100 MHz, with the capability of monitoring thousands of objects simultaneously, in order to detect exoplanetary radio emission.

I will describe ongoing efforts with the Owens Valley Radio Observatory Long Wavelength Array (OVRO-LWA) to search for auroral radio emission from exoplanets by targeting all known systems out to 25 pc. The OVRO-LWA is a low frequency dipole array operating below 100 MHz, capable of imaging the entire viewable hemisphere at high cadence across 60 MHz of bandwidth. I will discuss our current survey with the OVRO-LWA in Stokes I and V, as well as the role that OVRO-LWA exoplanet and stellar radio emission monitoring can play in informing and assessing planetary habitability alongside space missions like TESS and JWST.