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Exo-space Weather on Late-type Stars: Impacts on Habitability of Exo-planets

Abstract

The study of exoplanets and their potential habitability is a burgeoning field of study to which recent space-based missions (e.g., Kepler, TESS) as well as substantial ground-based resources have been devoted. An important aspect to exoplanetary habitability is the space weather environment that a given exoplanet experiences during the course of its evolution The term “space weather” refers to an array of phenomena that can disturb the interplanetary medium (IPM) and/or affect the planet and near-planet environment. particular important are ionizing radiation and hard particle radiation driven by flares and coronal mass ejections. These drivers result in magnetic storms (for those planets with magnetospheres), changes in the planetary ionosphere, atmospheric heating and erosion, and irradiation of the surface that can, in turn, affect the suitability of a planet for the emergence and maintenance of life. Coherent radio bursts are potentially effective tracers of space weather drivers. In addition, auroral (coherent cyclotron maser emission) is an effective probe of the stellar magnetic environment.
This proposal requests 2x6 hrs to observe the flare star binary L726-8AB and Proxima Centauri, the nearest star and one that is orbited by a planet in the habitable zone. We propose to use MeerKAT in the UHF band to form dynamic spectra of radio bursts as tracers of possible space weather drivers and, in the case of L726-8B (UV Ceti), auroral emission as a probe of the stellar magnetic field. We will also search for possible interaction between the planet and the star in Prox Cen.