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Source regions of solar radio bursts: Exploring Udaipur-CALLISTO observations

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The radio emission of a solar flare is often called a radio burst to emphasize the brief, energetic, and eruptive characteristics of the underlying energy release process. During such outbursts, the Sun's radio emission can increase up to a million times normal intensity in just a few seconds. The striking emission during a solar radio burst can outshine the entire Sun at radio wavelengths.

This poster aims to explore the source regions of solar radio bursts observed from the Udaipur-CALLISTO radio spectrograph. The CALLISTO is essentially a Compound Astronomical Low cost Low frequency Instrument for Spectroscopy and Transportable Observatory. The instrument natively operates between 45 and 870 MHz with a frequency resolution of 62.5 KHz. The CALLISTO has proven to be a valuable tool for the observations of solar eruptive phenomena in radio wavelengths and real time monitoring of solar origins of space weather. In this work, we review the observations of solar radio bursts obtained from Udaipur-CALLISTO from September 2018 to present. We have a complete data archive of the Udaipur-CALLISTO observations since its installation which is available at https://www.prl.res.in/~ecallisto/. From our observations, we have identified various categories of radio bursts showing different structures like type I, type II, type III, type IV, type V, type VI. We provide a catalog of the well observed solar radio bursts detected by Udaipur-CALLISTO which includes information of associated flares/Coronal Mass Ejections (CMEs) and source active regions at the Sun. These radio bursts were found to be associated with a variety of eruptive activities viz. flares, jets, rotating surges, CMEs, post-flare coronal loops, etc. In this poster, we highlight some remarkable observations and identify the complex magnetic field and plasma structures in the solar atmosphere associated with them. For a detailed investigation, we have performed coronal magnetic field modeling to understand the cause of their onset. Multi-wavelength imaging of a few representative cases are also shown.