Multi-Wavelength Investigations of Solar Activity
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Multi-spectral characterization of solar gamma ray events radio emission. Study case July 14, 2000.

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Abstract. Solar sporadic radio emission takes place in a wide range of time scales; from milliseconds to days. Researches have been conduced mainly to explain the behavior of radio emission in specific time scales and lately to millisecond spikes research has been devoted a lot of papers.

In this work we pay attention to the characteristics of millisecond spikes in relation to the general activity in which they are included, processes with very different time scales.

1. Data processing and results

Radio polarimeter observations in 237, 327, 408, 610, 1420 and 2695 MHz with a digitalization rate of 100 Hz were provided by the Trieste Astronomical Observatory (OAT). Some complementary data were obtained from open sources in Internet (Goes X-R, SOHO images, etc.) Analyzed data intervals were selected in different evolutionary stages and locations in the R vs. L circular polarization diagrams of the whole event. Once an interval was selected it was processed in all frequencies.

Considering the event has two main activity periods, the interval between them diminishes with decreasing frequency. To judge on the flux spectrum of the activity is difficult because of the appearance of peaks not noticed in all frequencies. The R vs. L circular polarization diagrams (see Fig. 1) show the event goes from a simple linear relationship pointing to a homogeneous source in 2695 MHz to a complex structure dominated by three main branches over which the spike activity takes places (noticeable clear in 610 MHz).

The power spectra of 2000 data samples of selected intervals were calculated for L and R components and the temporal evolution of the power of the fluctuations resume. In any of the selected samples there is no evidence for a significant contribution of spikes to the overall energy release.

Considering the importance of circular polarization to analyze the generation mechanism (Mosunov A.N. and Charikov Yu. E., 1995, Astron. Zhurnal, **72**, 911), individual spikes well identified in different intervals were used to measure spike profiles and no significant difference between rise and fall characteristic times with the evolutionary stage of the event found. Probably a higher resolution need.

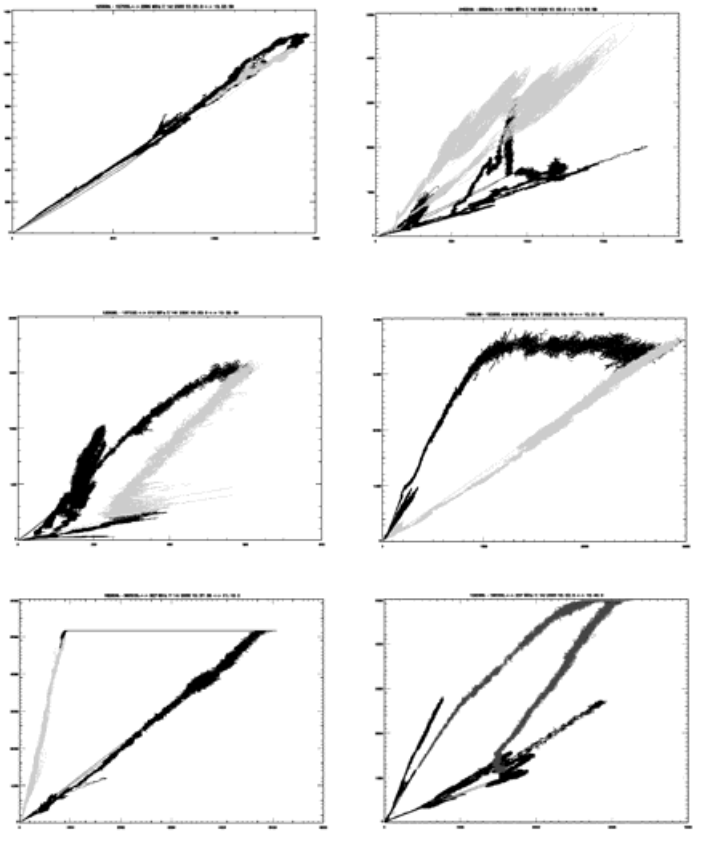

Figure 1. Polarization diagrams - up to down, from left to right, 2695, 1420, 610, 408, 327 and 237 MHz. In the lower corona (2695 MHz) the diagram is simple, but in 1420 MHz it is possible to see a much more complex structure. The initial linear branch (lower in black) with a superimposed structure related to the appearance of a source (mainly right polarized) and in gray the section related to a second activity period not visible on 2965 MHz. In 408 and 327 MHz the structure appears to be quite similar (saturated register limits the comparison), and in 237 MHz the maximum of the event is marked in red. The 610 MHz diagram (note it resembles more the 237 MHz than the 408 MHz diagram shows clearly that the spike activity conserves the characteristics of the "initial" source.

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