Time and Space Distribution of Discrete Energetic Releases in Millimeter-wave Solar Bursts

J.-P. Raulin[1], P. Kaufmann[1], R. Olivieri[1], E. Correia[1], V.S. Makhmutov [2], A. Magun[3]

[1] CRAAE-NUCATE/UNICAMP, R. Roxo Moreira, 1752, Campinas, SP, 13083-592, Brasil

[2] P.N. Lebedev Physical Institute, Leninsky Prospect 53, 117924 Moscow, Russia

[3] Institute of Applied Physics, University of Bern, Sidlestrasse 5, CH-3012 Bern, Switzerland

Observations of solar bursts using the multiple-beam technique define unambiguously the fast time structures present in the flux time profiles, providing, at the same time, their spatial positions. A method was developed to identify these structures and was used in the analysis of two solar events observed at 48 GHz. The bursts' energy content at different time intervals was found to be directly proportional to the number of structures in the same intervals, confirming earlier findings that the microwave burst emission is quantized in energy. The discrete structures are found to be spatially scattered, exhibiting angular separations of up to 25 arcseconds. The results favor models of plasma instabilities that produce multiple discrete elementary energy injections scattered in space and time.