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Spectral Fine Structures of Solar Radio Bursts and the Related Plasma Processes

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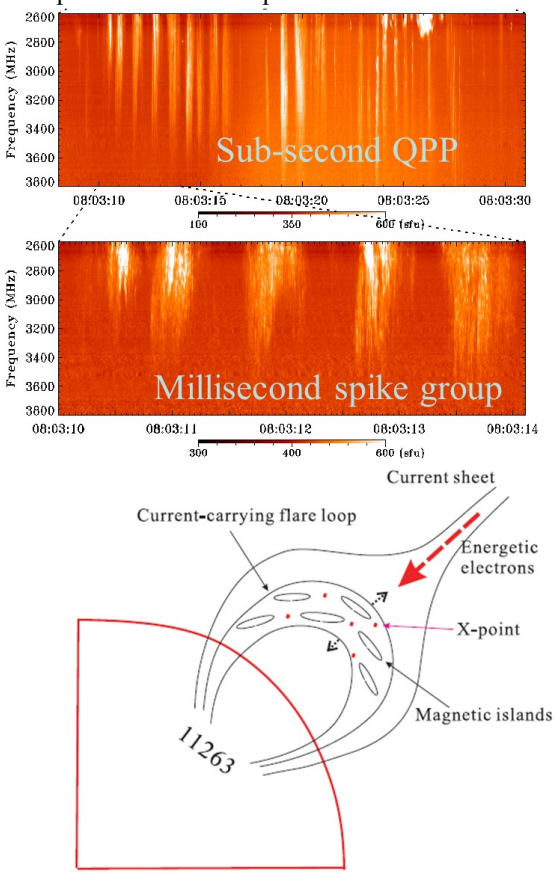
Solar radio bursts are always showing abundant of spectral fine structures from the observations of broadband frequency range with sub-millisecond timescales, such as the fast broadband quasi-periodic pulsations (QPP)[1], zebra pattern structures (ZP)[2], fibers, patches, spikes, and dots. Even the solar radio Type II and Type III bursts are also frequently containing many small scale tiny bursts, including spikes, dots, and even narrow-band type III bursts, etc. These spectral fine structures should be related to the electron acceleration and propagations in the source region of solar eruptions (including solar flares, coronal mass ejections, and eruptive filaments, etc.)[3], and these processes are always connected to some plasma instabilities in the solar magnetic field background, such as loss-cone instability in coronal loops, electron cyclotron maser instability in strong magnetic fields, and other plasma processes[4]. This talk will present a summary of the recent observational results of spectral fine structures in solar radio bursts obtained by several Chinese telescopes and discuss theoretical progress.

Figure 1 Microwave quasi-periodic pulsations with super fine structures in the early phase of a powerful solar flare, and the possible formation process.



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