



RFI detection system upgrade for the QTT site

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The proposed 110m fully movable radio telescope (Qi Tai radio Telescope, QTT) in Xinjiang province of china has a frequency range from 150 MHz to 115 GHz [1], which is extremely sensitive to picking up weak signals from the universe. Due to its large caliber, it is vulnerable to interference from other services. Transient RFI (Radio Frequency Interference) has a growing impact on radio astronomy observations. Such RFI is usually generated by devices like mechanical relays, fluorescent lighting or AC machines, which is broadband and intermittent [2, 3]. Effective RFI data can provide important basis for electromagnetic compatibility design, interference elimination strategy and spectrum management for the QTT site.

We have developed a high sensitivity automatic radio environment monitoring system for RFI detection and signal characteristic analyzation [4], and have done a long-term spectrum monitoring for the QTT site by using a quasi-real-time measured method [5]. However, the existing radio environment monitoring system cannot fully reflect the spectrum characteristics of the transient RFI. In order to improve the time-resolution of broadband spectra with the commercial spectrum analyzer and realize real-time data procession and transmission, we are trying to develop a real-time radio environment measurement system for the transient RFI detection.

Firstly, we analyzed the influential factors of the measurement performance of the spectrum analyzer theoretically, and then analyzed the influence of different parameter configurations on the measurement performance alone with a large number of tests, on which a high real-time measurement parameter configuration strategy was proposed. In addition, in order to reduce the amount of data and improve the computing efficiency of CPU, we used the multi-threaded parallel processing technology and ring buffer to improve the efficiency of data storage and process. What's more, the statistical results of spectral sequences can be live updated on the software interface during RFI detecting. The upgrade RFI detection system was applied to the QTT site, and we need to further investigate how to effectively process and analyze the new RFI data in the future work.

References

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