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Research on accelerated methods for real-time processing of astronomical signals

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The proposal of "Dynamic Universe" has brought about higher requirements for astronomical observation in terms of time resolution, observation bandwidth, and frequency coverage. This means that the data volume of astronomical observations will further increase tremendously, which will also bring great challenges to the current astronomical data storage and processing. For the huge amount of astronomical data, it becomes extremely important to process and analyze the data quickly and feed back the results. Real-time processing not only provides fast feedback of data results but also reduces data storage pressure. And the computation speed is one of the important factors to determine the real-time processing capability, higher computation speed can implement more complex algorithms, and thus obtain higher time resolution. In this paper, the dispersion algorithm will represent the commonly used processing algorithm for real-time acceleration study. Perform acceleration studies using new GPU architectures and new computational units, and optimize computational methods in algorithms to find the best acceleration path. And try to use the principle of matched filtering to disperse the baseband data. To improve the real-time computational efficiency of classical dispersion algorithms, to increase the computational speed of baseband signal dispersion algorithms and to evaluate the computational resources required to reach real-time. This work helps to find higher temporal resolution and shorter duration pulse signals, and also provides some reference value for future research on real-time acceleration of algorithms.

References

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