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Multi-channel photometer for the optical measurements in the near space

In this study, the phenomena in the ionospheric plasma by the method of impact of high-power high-frequency electromagnetic waves using a different mode relatively long–up to several minutes, and the impact by short pulses – millisecond, tens of milliseconds is explained. In the first case, the most visible of heating effect is observed in the red lines of atomic oxygen (630 nm). This effect is well registered using a CCD camera. Short flashes by impact of short pulses of radio waves are observed in the green line of atomic oxygen (557.7 nm). The CCD camera has no enough speed here and the photometer based on a photomultiplier in the photon counting mode might be used. In order to get the most information in the optical wavelength in the heating experiments, we have developed a high-speed four-channel photometer with precise timing of samples. Four channels for the four photometry lines – above mentioned red and green line, and additional blue (427.8 nm, nitrogen) and infrared lines (OH) were realized. Additional requirements are the capability to control the photometer remotely and it should be maximum compact, because it will be mounted on the telescope. So, the main part of the photometer – digital block is implemented on a multi-core microcontroller of the XMOS Company. The photon counter, time module and the server are fulfilled on a microcontroller, as a console (client) using a PC or laptop. Due to its functionality, the developed device also can be used for astronomical observations.

Biography

Dmitry Kulikov has received the Specialist degree in Radio Physics and Electronics from the Kazan Federal University, Kazan, Russia, in 2012. Since 2015, he has been a MS student at the Department of Radio Electronics, the Kazan Federal University. His research interests include the development of digital equipment using the micro-controllers. His Master's work is the development the multi-channel photometer control block based on the XMOS multicore microcontroller.

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