A TV MULTICHANNEL PHOTON COUNTER

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A TV multichannel photon counter (MPC) (Fig. 1), designed at the Institute of Atmospheric Optics for recording weak spectra, was built based on an image-converter tube with two microchannel plates (MCP) positioned in a chevron arrangement, a supervidicon LI-702-3 tube, and an AI-1074 pulse analyzer. A block diagram of the MPC is shown in Fig. 2.

The image-converter tube used has a multialkali photocathode. The electron-optical amplification is 0.9–1.1 and the resolution is 21 line pairs/mm at the centre in static regime.

The dc voltage on the MCP assembly is set by the resistance divider and is equal to ≃ 500 V. A pulsed voltage (strobe pulses), formed by the thyratron generator. Is superimposed on the dc voltage. An LI-702-3 supervidicon tube, operating in the TV standard, is used to read the photoelectron scintillations from the screen of the image converter tube. This makes it possible to read the scintillations efficiently through two "Gelios-44-2" objectives O_1 and O_2. The signal from the output of the video-channel is fed through the interface unit to the AI-1024 pulseanalyzer, which operates in the mode of counting in time intervals. The accumulated information can be fed into an "Elektronika-60" computer.

FIG. 1. Exterior view of the MPC.

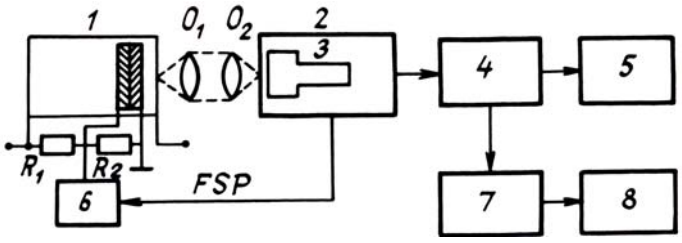

FIG. 2. Block diagram of MPC: 1) brightness amplifier; 2) closed-circuit TV unit; 3) LI-702-3; 4) interface unit; 5) video-control unit; 6) thyratron generator; 7) AI-1024 pulse analyzer; 8) PDP4-002 plotting X-Y potentiometer; R1 and R2 is resistance divider; FSP are frame synchronizing pulses; O_1 and O_2 are "Gelios-44" objectives.

BASIC CHARACTERISTICS OF MPC

The spectral range is 0.4–0.9 μm; the working diameter of the photocathode is 12 μm; the theoretical photon counting efficiency is ≃ 5%; there are 35 counting channels; the width of the strobe pulse is 120 ns; the intensity of the noise counts is 10^5 counts /($cm^2 \cdot s$); and, the repetition frequency of the strobe pulses is 12.5 Hz.

The multichannel photon counter developed was used to record weak fluorescence spectra of inorganic substances excited by pulsed laser radiation.

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