

REGISTRATION OF CONVERSION ELECTRONS IN A WIDE RANGE OF ENERGIES BY THE DETECTION SYSTEM “Si PLANAR DETECTOR - METAL Gd CONVERTER”

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The registration possibility of conversion electrons is investigated in a wide range of electrons energies by the detecting system "planar uncooled silicon detector - metal gadolinium converter". Conversion electrons are generated when thermal neutrons are captured by a metallic gadolinium converter.

The results of experimental studies of registration of conversion electrons in the spectrometric mode in the energy range of 30 - 200 keV are presented. To ensure the possibility of recording low-energy electrons and obtaining the maximum data acquisition rate, single-channel planar detectors with an active area of 4 to 100 mm² are used, and the electronics of the spectrometric system are optimized.

The measurements were performed using a single-channel and two-channel spectrometric system. The two-channel spectrometric system automatically subtracts the background radiation to obtain a real energy distribution of conversion electrons in case of difficult background conditions.

Single-channel and two-channel spectrometric systems have low intrinsic background characteristics, which makes it possible to record low-intensity fields of thermal neutrons in an automatic mode for a long time.

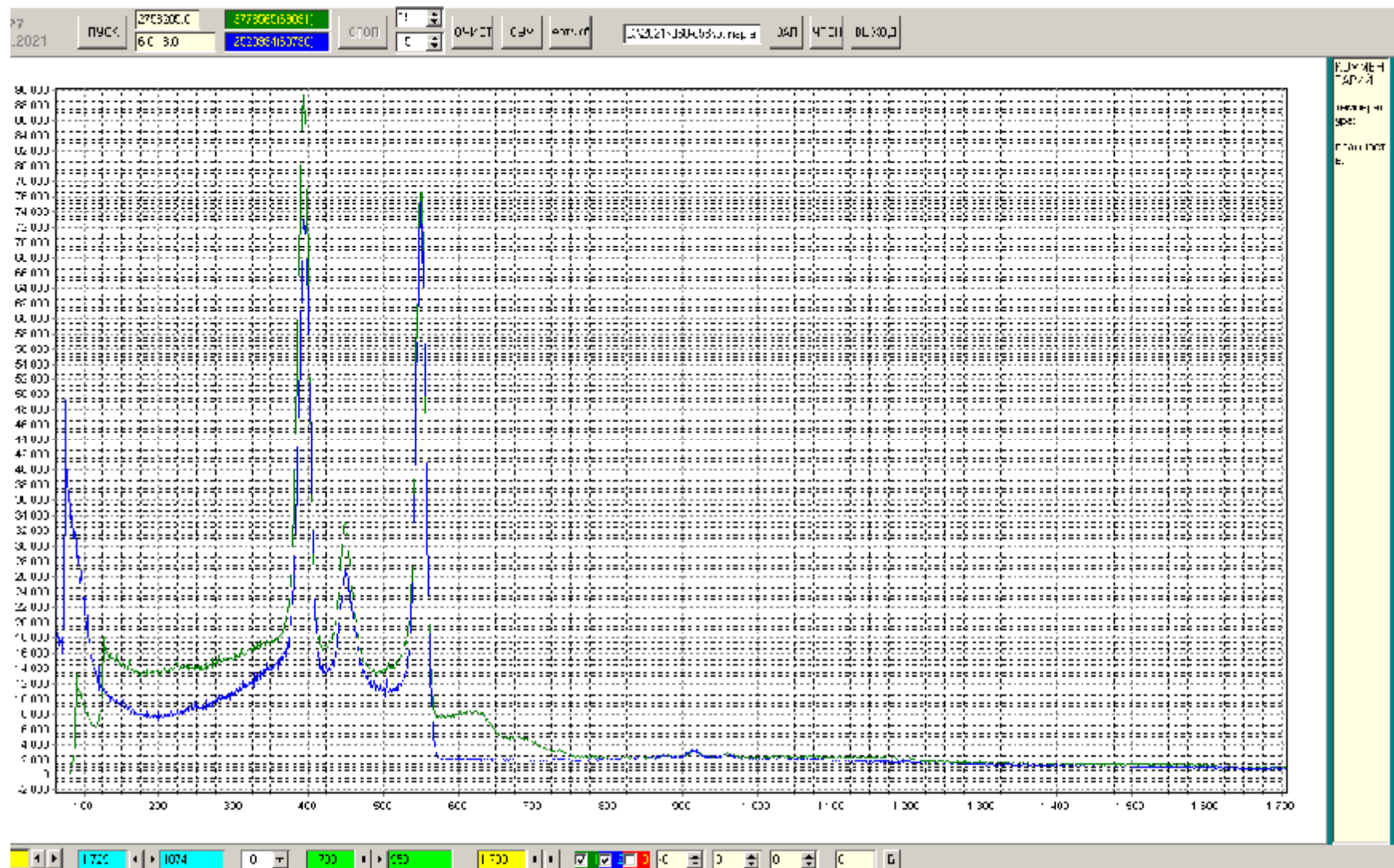


Fig. 1. Photo from the computer screen of the general view of the spectrum set with the windows of the control program for the two-channel spectrometric system for registering thermal neutrons. Detector with an active area of 2x2 mm². Green curve - channel: silicon detector surface close to the Gd converter. Blue curve - channel: between the surface of the silicon detector and the Gd converter there is a polyethylene gasket that absorbs conversion electrons.

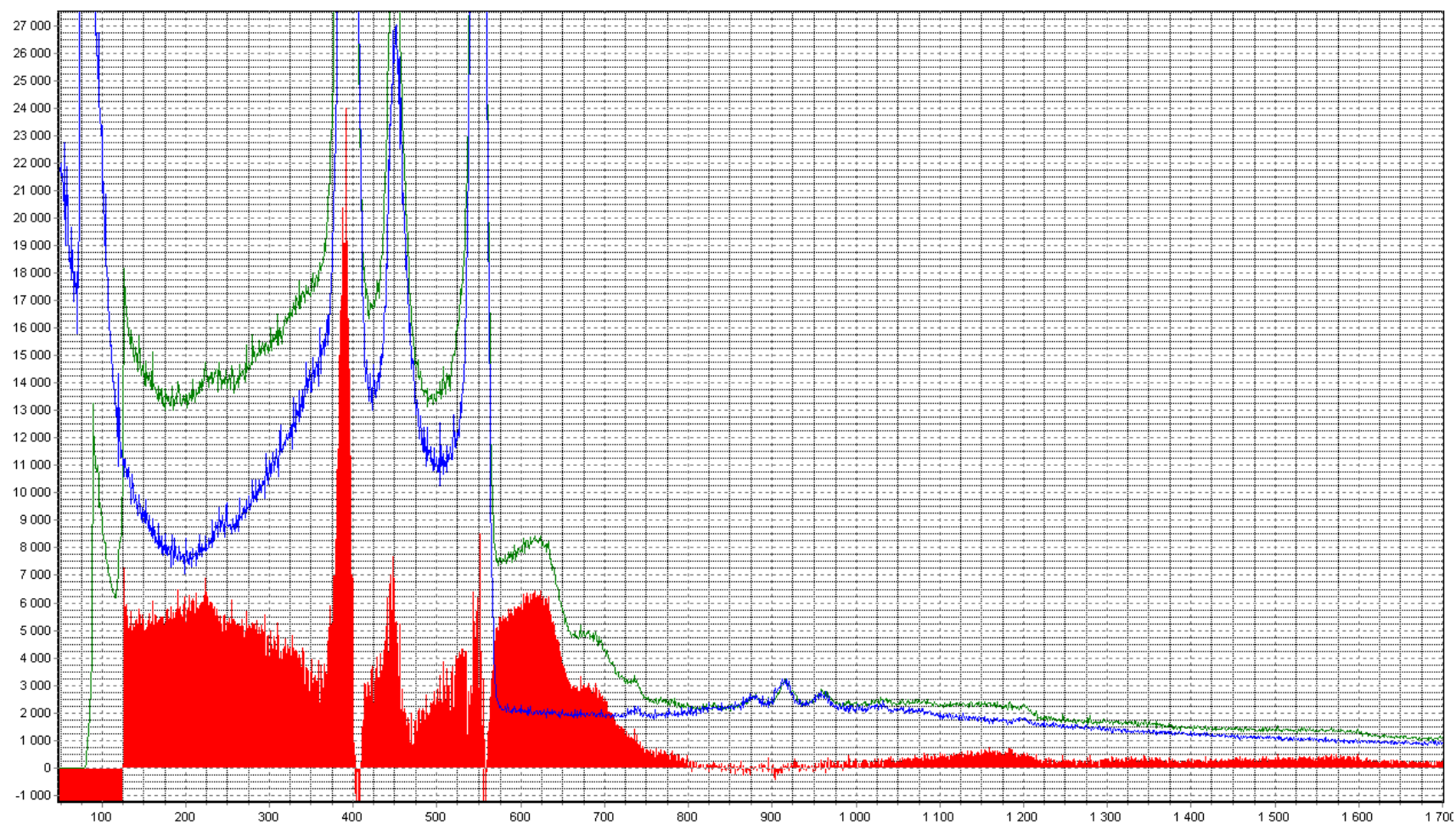


Fig. 2. Photo from the computer screen of the spectrum set during registration of thermal neutrons by the two-channel spectrometric system "planar uncooled silicon detector - metal gadolinium converter". The green and blue curves are the same as in Fig. 1. Red spectrum - the spectrum of conversion electrons obtained by automatic subtraction of the green and blue spectra. Detectors with an active area of 2x2 mm².

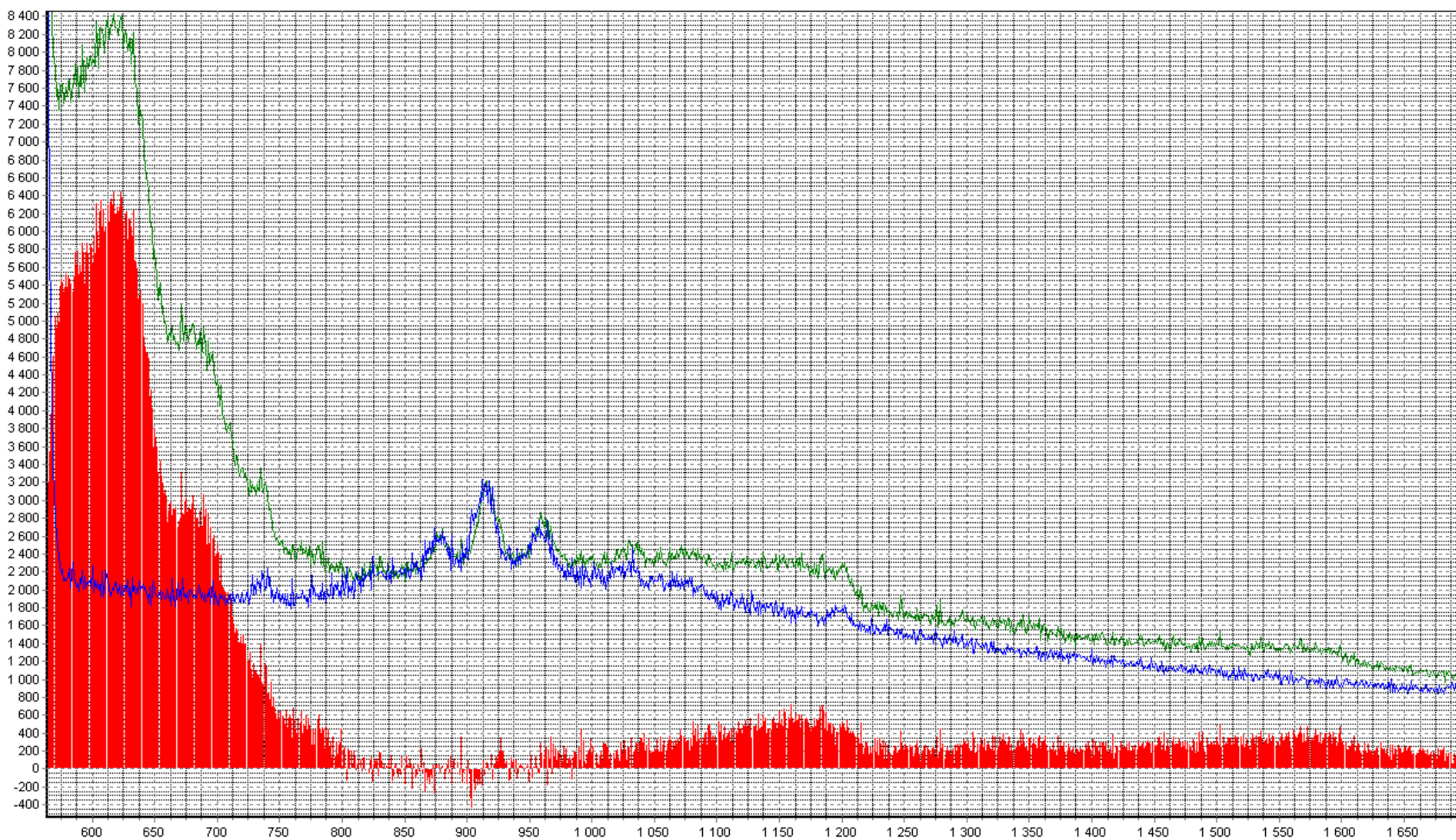


Fig. 3. The enlarged part of the spectrum from Fig. 2. Detectors with an active area of 2x2 mm². Green curve - channel: silicon detector surface close to the Gd converter. Blue curve - channel: between the surface of the silicon detector and the Gd converter there is a polyethylene gasket that absorbs conversion electrons. Red spectrum - the spectrum of conversion electrons obtained by automatic subtraction of the green and blue spectra.

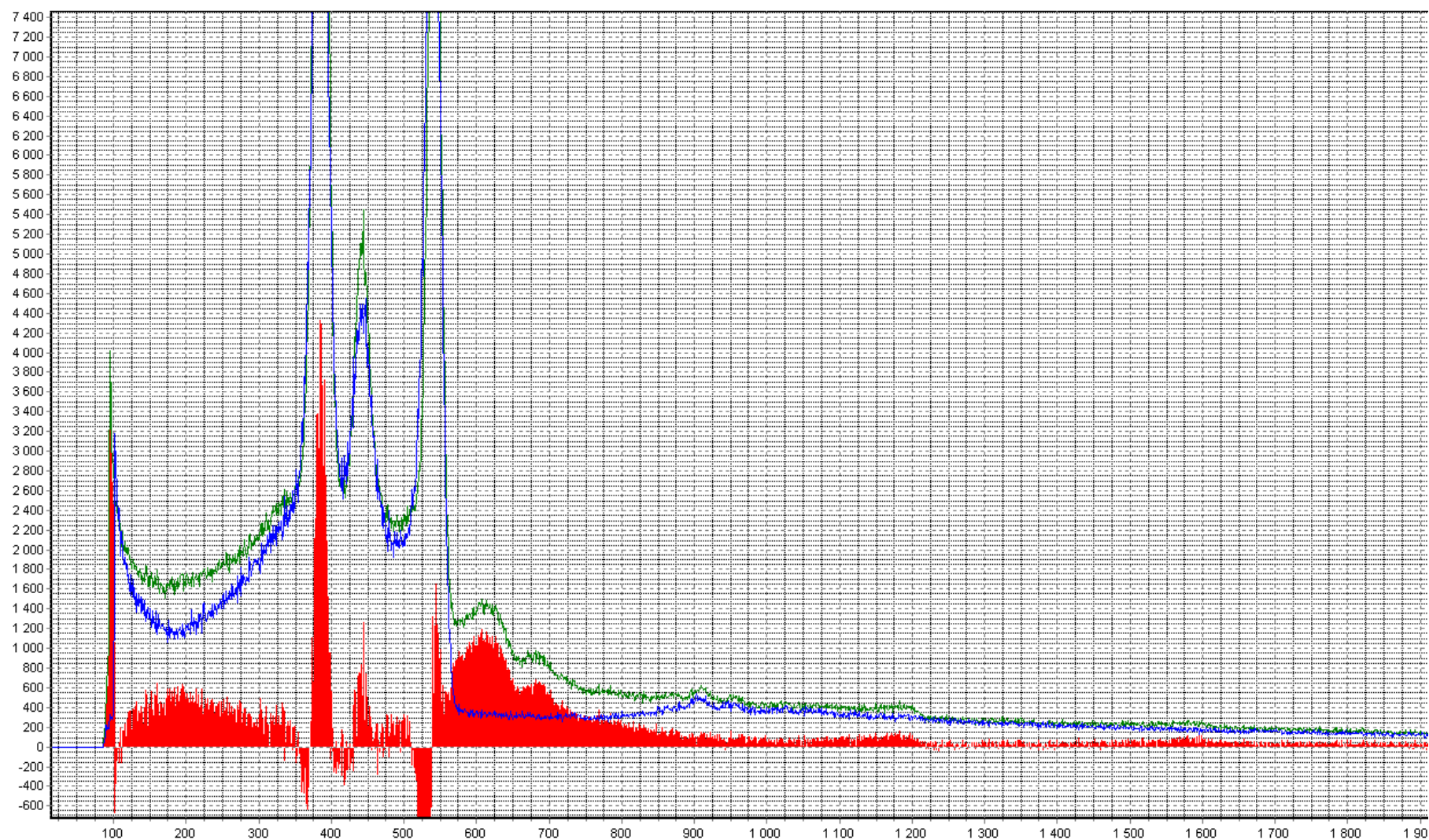


Fig. 4. Photo from the computer screen of the spectrum set during registration of thermal neutrons by the two-channel spectrometric system "planar uncooled silicon detector - metal gadolinium converter". Detectors with an active area of 6x6 mm². The green and blue curves are the same as in Fig. 1. Red spectrum - the spectrum of conversion electrons obtained by automatic subtraction of the green and blue spectra.

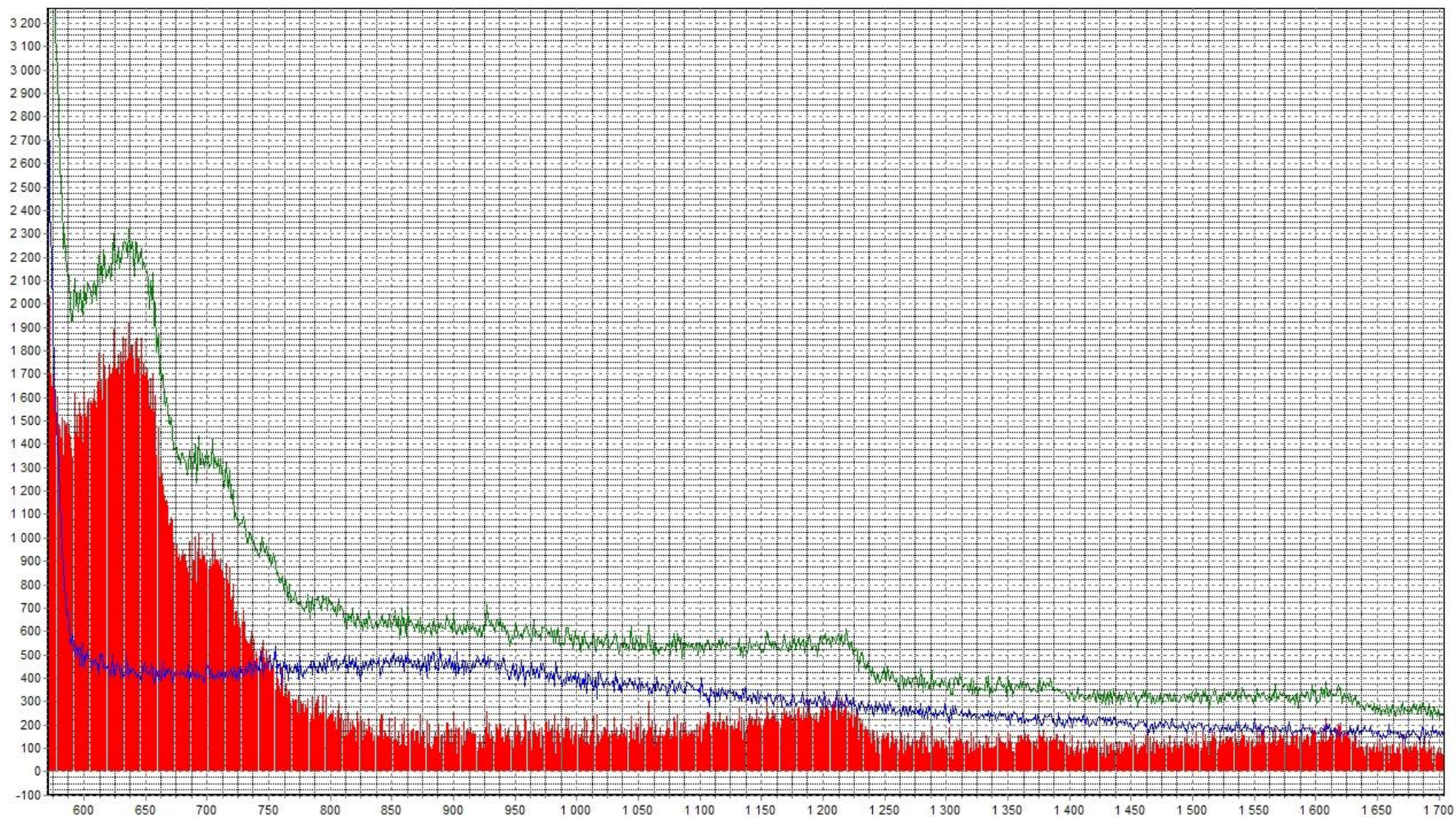


Fig. 5. The enlarged part of the spectrum from Fig. 4. Detectors with an active area of 6x6 mm². Green curve - channel: silicon detector surface close to the Gd converter. Blue curve - channel: between the surface of the silicon detector and the Gd converter there is a polyethylene gasket that absorbs conversion electrons. Red spectrum - the spectrum of conversion electrons obtained by automatic subtraction of the green and blue spectra.