SILICON PHOTODIODE AS POSITION SENSITIVE AND ENERGY CHARGED PARTICLES DETECTOR

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This is a continuation of the research on the use of silicon photodiodes for the detection and spectrometry of nuclear radiation.

Si photodiode with Schottky barrier, 18.7x18.7 mm^2 area, was tested as a position sensitive charged particles energy detector. It was found that both the position detection in two dimensions and energy detection are possible and satisfactory.

In such semiconductor components the position of the particle is determined by the rise time of the pulse at the output of preamplifier. For the type of photodiodes used the rise time in the range of 0.1–0.2 μs was found.

The photodiode used is intended for the position sensitive light beam detection, where the obtained charge is much larger than one obtained by 5.48 MeV alpha particle from the ^{241}Am source. However, our experiments show that using a proper charge sensitive preamplifier one can obtain both the position and the energy signals with acceptable signal to noise ratio. Obtained position resolution was better then 0.2 mm, while the energy resolution (for ^{241}Am) was 52 keV.

Fig. 1 demonstrates two dimensional position detection obtained by placing a mask shaped in the form of the capital letter K between the ^{241}Am source and the position sensitive photodiode detector. It has to be noted that so far only one dimensional semiconductor charged particle detector is commercially available.

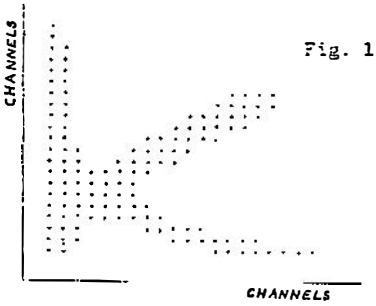

Fig. 1. The mask of capital letter K on two-dimensional 64x64 channels display. Size of the letter: height 7 mm; width 6 mm; width of the line 0.5 mm.