

Novel Large Aperture EBCCD

A novel large aperture electron bombardment charge coupled device (EBCCD) has been developed. The diameter of its photocathode is 10 cm and it is the first EBCCD with such a large aperture.

Its gain shows good linearity as a function of applied voltage up to -12 kV, where the gain is 2400.

The spatial resolution was measured using ladder pattern charts. It is better than 2 line pairs / mm, which corresponds to 3.5 times the CCD pixel size. The spatial resolution was also measured with a copper foil pattern on a fluorescent screen irradiated with X-rays (14 keV and 18 keV) and a 60 keV gamma-ray from an americium source. The result was consistent with the measurement using ladder pattern charts.

The output signal as a function of input light intensity shows better linearity than that of image intensifier tubes (IIT) as expected.

We could detect cosmic rays passing through a scintillating fiber block and a plastic scintillator as a demonstration for a practical use in particle physics experiments. In addition to the cosmic ray detection, there is a possibility to detect neutrons by this EBCCD with a plastic scintillator block.

This kind of large aperture EBCCD can, for example, be used as an image sensor for a detector with a large number of readout channels and is expected to be additionally applied to other physics experiments.

Summary (Additional text describing your work. Can be pasted here or give an URL to a PDF document):

http://ppwww.phys.sci.kobe-u.ac.jp/~suzuki/vci2010/summary_for_VCI2010.pdf

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