SIMPLE GAMMA RAY DIRECTION FINDER

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Body of Abstract: Most detectors for ambient gamma radiation are required to have isotropic response to any incident photons to measure ambient dose equivalent or personal dose equivalent. Directional dose equivalent is usually measured only for beta rays. However, directional information is sometimes useful especially for searching contamination or missing sources and identifying an object that contributes the highest dose at the point of interest. Several types of detectors could be designed for that purpose. One of the simplest detectors was developed. It was found that this detector is capable to identify the direction from which higher flux of radiation is delivered. The detector system consists of 3”x3” NaI(Tl) scintillator, a lead shield and software. The lead shield has a cylindrical shape with triangular window and covers the scintillator for operation. The countings are carried out four times for one set of measurement at one location. At each counting the position of the shield over the scintillator is rotated 90 degrees along the axis of the scintillator. Four energy spectra are obtained by the series of countings. Four count rates at a special region of interest in the spectra are used in the software for determining the direction of dominant incident gamma rays. With the total measuring time of 10 to 20 minutes the direction of dominant incident gamma rays can be identified with a relatively good precision although it depends on the difference of relative source intensities. The disadvantages of the present simple gamma ray direction finder are follows: 1) It requires four time countings, 2) it can provide only one dominant incident angle, and 3) it can scan only two dimensions, such as a horizontal plane.