

The INTRINSIC ENERGY RESOLUTION of a SCINTILLATION DETECTOR

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At present, the intrinsic energy resolution of a scintillation detector is understood by many authors differently. The terms of existing formulae for the energy resolution, on which the intrinsic energy resolution of the scintillation detector is determined, differ not only in their names, but also in the physical meaning of the processes they take into account. The main drawback of all existing theories of scintillation spectrometers is the unjustified introduction of various terms in the formula for the energy resolution, without their connection with the specific characteristics of the scintillation detector, which does not allow correct determining the intrinsic energy resolution of a scintillation detector. The intrinsic energy resolution of a scintillation detector should correctly be defined as the irreducible limit that can be reached when all the parameters of the detector reach their limit values and their fluctuations are absent. Based on the microscopic standard theory of scintillation detectors, it is shown that the intrinsic energy resolution is determined by the nonlinearity of the light output, and the fluctuations in the number of electron-hole pairs.

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