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Linearity of a scintillation crystals response

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The results of the study of the specific light output from the energy of X-rays and gamma quanta in the range from 1.5 to 662 keV for scintillation crystals NaI (Tl), CsI (Na), CsI (Tl), Bi₄Ge₃O₁₂, CdWO₄, ZnWO₄, Y₃Al₅O₁₂: Ce, CaF₂ (Eu), LSO, YAlO₃: Ce. The obtained dependences have a nonlinear form with pronounced minima in the region of the K and L edges of the absorption of the elements that make up the scintillators. When X-ray and gamma quanta are recorded in the energy range from 1 to hundreds of keV, a strong change in the specific ionization losses of the produced photoelectrons dE/dx occurs in the scintillation crystal, there are K and L jumps in the crystal absorption cross section. All this has a significant effect on the light output of scintillators. The possibility of reducing the nonlinearity of the response of scintillators during the detection of gamma radiation is shown.

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