RadiographicAnalysisofaX -RaySemiconductorDetectorwithaDigitalSensor fortheDeterminationofItsEfficiency

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PosterSession: ***TH-CXH-02*** PosterSession:IDiagnosticPhysics,MedicalIm aging,andImage Processing -ProjectionImaging/QualityAssurance/Ultrasound

Track: 01DiagnosticPhysics,MedicalImaging,andImageProcessing

Inordertocompletelycharacterizephotonbeamsemittedbyan X -raytube,onemusttohaveknowledgeofthe irenergyspectra.This characterizationcanbemadeutilizingspectrometersbasedonsiliconphotodiodes,whicharemorepracticalandlessexpensivethangermanium detectors. Forthisobjective,itisnecessarytocorrectthemeasuredspectraforthecha ngewithphotonenergyofthedetectortotalefficiency, whichdependsonthephotodiodewindowthickness,amongotherfactors.Thepresentworkdescribestheevaluationoftheunknownborosilicate glasswindowthicknessofaHamamatsuS3071PINphotodiod e,usingradiographicimagesobtainedwithaX -raysensitiveCCDsensor,utilized in dental radiography. With the help of a dedicated software, it was possible to make a graphical analysis of the contrast of several images produced through the irradiation of the isolated photodiode with a X -ray beam, at several sets of tube potential, current- time product and additional filtration. The most sharp images were utilized to determine the detector window thickness, which average value was 0.41 ?0.01mm, corresponding to 9.1 ?0.3 image pixels. With such value, it was corrected the energy spectra of the radiation emitted from radioactive sources of ^{133}Ba and ^{241}Am. It was obtained the relative photon intensities, for the ^{241}Am, as 0.058 for I(26.345keV)/I(59. 537keV) through the corrected spectrum, against 0.056 from the literature data; for ^{133}Ba, we obtained respectively 4.2 against 4.4 for I(30.973 keV)/I(34.987+36.005 keV).

Thisresearchwaspartiallysupported byFAPESP.

TRABALHO APRESENTADO NO: World Congress on Medical Physics and Biomedical, Chicago – 2000. (temos CD-ROM na servidora)