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TÍTULO X-RAY BEAM CHARACTERIZATION USING A SILICON PHOTODIODE

TITLE X-RAY BEAM CHARACTERIZATION USING A SILICON PHOTODIODE

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**Resumo:** A silicon PIN photodiode was used in order to registrate spectra of radiation beams used on test procedures where well-defined radiation conditions are required. These tests are related to experimental evaluation of diagnostic X-ray equipments and protective materials of the Medical Diagnostic X-ray Laboratory of the IEE/USP. The beam characterization was performed by matching the first and second half-value layer (HVL) of a three-phase generator specially designed to laboratorial applications to specified 1st and 2nd HVL's of other laboratories (NIST, PTB). This characterization is important in order to achieve spectral conformance with radiation emitters of these laboratories and to allow intercomparison of test results. A first order approximation of 1st and 2nd HVL's values of the test procedures follow recommendations of IEC1267(1994) standard. This calculation makes use of a modified formulation of Archer model for fitting a parametrical equation to experimental attenuation data of polyenergetic radiation beams. Each spectra used on the metrologically accredited test procedures of the Laboratory were measured by a Siemens SFH206k silicon photodiode coupled to an amplifier system and a multichannel analyzer. The spectrometer was calibrated using the x- and g-rays of  $^{241}\text{Am}$ ,  $^{133}\text{Ba}$ ,  $^{152}\text{Eu}$  and  $^{109}\text{Cd}$  radioactive sources. The raw data have been corrected by using a stripping procedure which includes the correction for full energy efficiency and secondary fluorescence. A better estimation of the filters needed to match to the values of the other laboratories were made in two parts: first by computer extracting the HVL's from measured spectra and by comparison of their values to calculated HVL's from a semiempirical model to generate x-ray spectra (TBC model); second by calculating the additional filter needed to obtain the same HVL values. The use of computer calculation to estimate additional filtration shows results with a good

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