Secondary Standard Dosimetry Laboratory at INFLPR

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Abstract

National Institute for Laser, Plasma and Radiation Physics (INFLPR) has constructed a High Energy Secondary Standard Dosimetry Laboratory SSDL–STARDOOR – for performing dosimetric calibrations according to ISO IEC SR/EN 17025:2005 standards. This is outfitted with UNIDOS Secondary Standard Dosimeter from PTW (Freiburg Physikalisch-Technische Werksttaten) calibrated at the PTB-Braunschweig (German Federal Institute of Physics and Metrology). A radiation beam of the quality of Q used by our laboratory as calibration source are provided by INFLPR 7 MeV electron beam linear accelerator mounted in our facility.

Keywords: *secondary standard dosimetry laboratory, high energy, calibration.*

Introduction

Nowadays there are more and more linear accelerator equipments used in radiation therapy practice due to their technical characteristics. Approach to clinical condition trough calibration to a high energy beam will improve quality of dosimetric chain used in routine dosimetry calibration in a radiotherapy laboratory.

Description of SSDL–STARDOOR form INFLPR

SSDL-STARDOOR is endowed with: a) a UNIDOS Secondary Standard Dosimeter from PTW and ionization chambers calibrated at PTB, for calibrations and b) MULTIDATA EuroStandard Dosimetry System compounded by: EuroStandard 3D Realtime Dosimetry System, Universal Waterphantom, Transport / Storage Cart, Electrometer, Notebook, Printer, In-air Scanning Frame and RTD Software Version 5.2 to perform absorbed dose distribution in 1D, 2D and 3D measured in water, air and film dosimetry [1, 2]. SSDL-STARDOOR has three principal aims: calibration of dosimetric equipment for third type laboratories, calibration of photon and electron beams and testing of radiation beam characteristics. Dosimetric system from our laboratory has working procedures with methods for calibrations in wide range of energy for photons in 5 keV – 50 MeV region and electrons in 0.50 MeV - 50 MeV region from an electromagnetic spectrum. Also STARDOOR permit the measurement of ambient dose equivalent [3, 5] and personal dose equivalent [4, 5] according to specialized working procedures. For future purposes our laboratory foresights to perform absorbed dose measurements for neutrons, protons and ions generated by RF classical accelerators in present

and in the future - by the laser-driven plasma wakefield accelerators and laser – target interaction in relativistic regime [$1 < a < 100$, $a = |e|E/m_0\omega c = 4.8\ (\lambda/w)\ \sqrt{P(TW)}$] or in ultra-relativistic regime [$10^2 < a < 10^5$, $a = 152\ (\lambda/w)\ \sqrt{P(PW)}$; 1 PW = 10^3 TW = 10^{15} W]. This paper is a detailed presentation of the quantities, equipments, ranges, best uncertainties, techniques and reference standards.

Conclusions

SSDL-STARDOOR is offering calibration services for photon and electron beams, ionizing chambers and portable dosimetric instrumentation employed in various domains: education, research, industry, radiotherapy, radiation diagnostic, health physics / radiation protection and others.

References

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