

# Simulation of a laboratory for the radiation detectors calibration

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Quality assurance programs in diagnostic radiology, as in other areas, rely on the calibration of the radiation detectors. As part of a quality assurance program, in this work, we evaluated a calibration laboratory employing Monte Carlo simulation. We used the simulation code Monte Carlo N-Particle eXtended (MCNPX) [1] to evaluate the calibration laboratory of radiation detectors at IFBA – Technological Park, called LABPROSAUD, that employs a x-ray GE SEIFERT Isovolt 160 M2 [2]. The validation methodology was carried out with the air kerma simulation, using a Farmer<sup>®</sup> Chamber Type 30010 Classical therapy ion chamber. This dosimeter was designed for absolute dosimetry in diagnostic-energy photon, electron and photon beams (0.6cm<sup>3</sup>) [3]. We evaluated the air kerma for different energy beams: 50, 60, 70, 80, 90, 100 and 120 keV, in order to determine the conversion coefficients (CC) [4] for the air kerma rate (mGy/min), at 1 m from the x-ray tube focus. The CC values were evaluated comparing the simulated and experimental results for different source-focus distances of 1.5 and 2.0 m. The differences were all below 5%, and all uncertainties were considered acceptable. With these results we may evaluate new methodologies for calibration purposes, by using Monte Carlo simulation.

**Keywords:** Monte Carlo simulation, Dosimetry, Computer Tomography

**Acknowledgment:** IFBA, LABPROSAUD, FAPEMIG (Grants Nos. APQ-03049-15 and APQ-02934-15) and CNPq (Grants Nos. 421603/2016-0, 420699/2016-3 and 168947/2017-0).

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