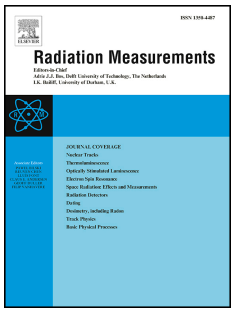
Accepted Manuscript



Experimental determination of the effective point of measurement in electron beams using a commercial scintillation detector

E.A. Simiele, B.R. Smith, W.S. Culberson

PII: S1350-4487(17)30047-1

DOI: 10.1016/j.radmeas.2017.09.009

Reference: RM 5841

To appear in: *Radiation Measurements*

Received Date: 17 January 2017

Revised Date: 20 July 2017

Accepted Date: 30 September 2017

Please cite this article as: Simiele, E.A., Smith, B.R., Culberson, W.S., Experimental determination of the effective point of measurement in electron beams using a commercial scintillation detector, *Radiation Measurements* (2017), doi: 10.1016/j.radmeas.2017.09.009.

Experimental determination of the effective point of measurement in electron beams using a commercial scintillation detector

E. A. Simiele, B. R. Smith, and W. S. Culberson

Department of Medical Physics, School of Medicine and Public Health,University of Wisconsin–Madison, Madison, WI 53705

(Revised October 7, 2017)

Abstract

Purpose: A commercial plastic scintillation detector was used to determine the effective point of measurement (EPOM) of three cylindrical ionization chambers in four clinical electron beams. The experimentally determined EPOM values were compared to Monte Carlo (MC)-calculated EPOM values from the literature. The energy dependence of the EPOM was also investigated.

Methods: Percent depth dose (PDD) curves were measured with an Exradin W1 scintillation detector and were used as a representative PDD to water. Depth dose curve measurements were also acquired with the Exradin A18, A1SL, and A28 cylindrical ionization chambers. To obtain a depth dose to an equivalent chamber volume made of water (DDCVW), the raw ionization chamber depth dose data were corrected by the chamber fluence correction factor and restricted mass collisional stopping power ratio at each measurement depth. A non-linear least squares fitting technique was utilized to