

Institute of Physics Publishing

Monte Carlo Techniques in  
Radiotherapy Delivery  
and Verification: Third McGill  
International Workshop  
2007

Journal of Physics: Conference Series Vol. 102

May 29 – June 1, 2007  
Montreal, Quebec, Canada

Printed from e-media with permission by:

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571  
[www.proceedings.com](http://www.proceedings.com)

ISBN: 978-1-60560-241-7

Some format issues inherent in the e-media version may also appear in this print version.

Copyright (2007) by the Institute of Physics Publishing.

All rights reserved.

For permission requests, please contact the Institute of Physics Publishing at the address below.

Institute of Physics Publishing  
Dirac House, Temple Back  
Bristol BS1 6BE UK

**Tel** +44 (0)117 929 7481  
**Fax** +44 (0)117 929 4318

Institute of Physics Publishing

Monte Carlo Techniques in Radiotherapy Delivery and  
Verification: Third McGill International Workshop  
2007

## TABLE OF CONTENTS

<b>Monte Carlo Dose Calculations for Phantoms with Hip Prostheses</b> .....	1
<i>M Bazalova, C Coolens, F Cury, P Childs, L Beaulieu, F Verhaegen</i>	
<b>Monte Carlo Simulations of Ripple Filters Designed for Proton and Carbon Ion Beams in Hadrontherapy with Active Scanning Technique</b> .....	9
<i>F Bourhaleb, A Attili, R Cirio, P Cirrone, F Marchetto, M Donetti, M A Garella, S Giordanengo, N Givchchi, S Iliescu, A La Rosa, J Pardo, A Pecka, C Peroni</i>	
<b>A Graphical User Interface for Calculation of 3D Dose Distribution Using Monte Carlo Simulations</b> .....	18
<i>J C L Chow, M K K Leung</i>	
<b>A Flexible Monte Carlo Tool for Patient Or Phantom Specific Calculations: Comparison with Preliminary Validation Measurements</b> .....	24
<i>S Davidson, J Cui, D Followill, G Ibbott, J Deasy</i>	
<b>Monte Carlo Code Comparison of Dose Delivery Prediction for Microbeam Radiation Therapy</b> .....	30
<i>M De Felici, E A Siegbahn, J Spiga, A L Hanson, R Felici, C Ferrero, A Tartari, M Gambaccini, J Keyriläinen, E Bräuer-Krisch, P Randaccio, A Bravin</i>	
<b>Evaluation of Patient Dose Using a Virtual CT Scanner: Applications to 4DCT Simulation and Kilovoltage Cone-beam Imaging</b> .....	36
<i>J J DeMarco, M F McNitt-Gray, C H Cagnon, E Angel, N Agazaryan, M Zankl</i>	
<b>Stream Processors: a New Platform for Monte Carlo Calculations</b> .....	46
<i>P Després, J Rinkel, B H Hasegawa, S Prevrhal</i>	
<b>A 4D Treatment Planning Tool for the Evaluation of Motion Effects on Lung Cancer Treatments</b> .....	52
<i>M Ding, F Newman, L Gaspar, B Kavanagh, K Stuhr, D Raben, J S Li, C-M Ma</i>	
<b>Geant4 and Fano Cavity Test: Where Are We?</b> .....	58
<i>S Elles, V N Ivanchenko, M Maire, L Urban</i>	
<b>Comparison of Conventional and Monte Carlo Dose Calculations for Prostate Treatments</b> .....	65
<i>D Fraser, C Mark, F Cury, A Chang, F Verhaegen</i>	
<b>Monte Carlo Iodine Brachytherapy Dosimetry: Study for a Clinical Application</b> .....	72
<i>C Furstoss, B Reniers, E Poon, M D'Amours, J F Carrier, L Beaulieu, J F Williamson, F Verhaegen</i>	
<b>Application of the MCNP5 Code to the Modeling of Vaginal and Intra-uterine Applicators Used in Intracavitary Brachytherapy: a First Approach</b> .....	80
<i>I Gerardy, J Rodenas, M Van Dycke, S Gallardo, F Tondeur</i>	
<b>A Comparison of Dose Warping Methods for 4D Monte Carlo Dose Calculations in Lung</b> .....	86
<i>E Heath, J Seco, Z Wu, G C Sharp, H Paganetti, J Seuntjens</i>	

<b>Efficient Photon Transport in Positron Emission Tomography Simulations Using VMC++</b> .....	93
<i>I Kawrakow, K Mitev, G Gerganov, J Madzhunkov, A Kirov</i>	
<b>A Method to Reduce the Statistical Uncertainty Caused by High-energy Cutoffs in Monte Carlo Treatment Planning</b> .....	99
<i>J S Li, C-M Ma</i>	
<b>Implementation of Monte Carlo Dose Calculation for CyberKnife Treatment Planning</b> .....	104
<i>C-M Ma, J S Li, J Deng, J Fan</i>	
<b>Fast Monte Carlo Calculation of Scatter Corrections for CBCT Images</b> .....	114
<i>E Mainegra-Hing, I Kawrakow</i>	
<b>BrachyGUI: an Adjunct to an Accelerated Monte Carlo Photon Transport Code for Patient-specific Brachytherapy Dose Calculations and Analysis</b> .....	120
<i>E Poon, Y Le, J F Williamson, F Verhaegen</i>	
<b>A Simple Monte Carlo Based Optimisation Model to Determine Image Contrast in an Imaging System</b> .....	128
<i>D A Roberts, V N Hansen, J Seco, M G Thompson, P M Evans</i>	
<b>The Effect of Statistical Noise on IMRT Plan Quality and Convergence for MC-based and MC-correction-based Optimized Treatment Plans</b> .....	133
<i>J V Siebers</i>	
<b>Monte Carlo Calculation of Dose to Water of a <sup>106</sup>Ru COB-type Ophthalmic Plaque</b> .....	141
<i>J Šolc</i>	
<b>Analytical Model of the Binary Multileaf Collimator of Tomotherapy for Monte Carlo Simulations</b> .....	147
<i>E Sterpin, F Salvat, G H Olivera, S Vynckier</i>	
<b>Modelling Ionization Chamber Response to Nonstandard Beam Configurations</b> .....	155
<i>L Tantot, J Seuntjens</i>	
<b>A Multiple-source Photon Beam Model and Its Commissioning Process for VMC++ Monte Carlo Code</b> .....	162
<i>L Tillikainen, S Siljamäki</i>	
<b>Experimental Verification of a Monte Carlo-based MLC Simulation Model for IMRT Dose Calculations in Heterogeneous Media</b> .....	168
<i>N Tyagi, B H Curran, P L Roberson, J M Moran, E Acosta, B A Fraass</i>	
<b>Surface Dosimetry in a CT Scanner Using MOSFET Detectors and Monte Carlo Simulations</b> .....	176
<i>F Verhaegen, M Lemire, A Hallil, G Hegyi</i>	
<b>Monte Carlo Based Verification of a Beam Model Used in a Treatment Planning System</b> .....	183
<i>E Wieslander, T Knöös</i>	
<b>Author Index</b>	