

- WE-C-BRB-8** [**A GPU/CUDA Based Monte Carlo Code for Proton Transport: Preliminary Results of Proton Depth Dose in Water**](#) - L Su*, T Liu, A Ding, X Xu, Rensselaer Polytechnic Inst., Troy, NY
- WE-C-BRB-2** [**A Monte Carlo Feasibility Study for Calculating Dose Perturbations in Patient Geometries Due to Homogenous Magnetic Fields From MRIgRT**](#) - Y Yang*, B Bednarz, University of Wisconsin, MADISON, WI
- TU-C-BRB-4** [**A Monte Carlo-Based Small Animal Dosimetry Platform for Pre-Clinical Trials: Proof of Concept**](#) - B Bednarz*, A Besemer, Y Yang, University of Wisconsin, MADISON, WI
- SU-E-T-498** [**A Preliminary Monte Carlo Simulation Study of the Varian TrueBeam Linear Accelerator**](#) - D Johnson*, Y Chen, E Schnell, S Ahmad, University of Oklahoma Health Sciences Center, Oklahoma City, OK
- SU-E-T-302** [**A Simulation Study with Geant4 Investigating the Secondary Prompt Gamma Emissions From Incident 40 MeV Protons Onto Various Materials**](#) - A lau*, Y Chen, S Ahmad, Oklahoma Univ. Health Science Ctr., Oklahoma City, OK
- SU-E-J-80** [**A Simulation Study with Geant4 On the Yields of Positron-Emitting Nuclei \(10C, 11C, and 15O\) Induced by Protons and Carbon Ions**](#) - A lau*, Y Chen, S Ahmad, University of Oklahoma Health Sciences Center, Oklahoma City, OK
- WE-C-BRB-7** [**Benchmarking of the TOPAS Monte Carlo System Against Phantom Dose Measurements in Proton Therapy**](#) - M Testa*, J Schuemann, H Paganetti, Massachusetts General Hospital, Boston, MA
- MO-F-213AB-4** [**Biological Effect of Dose Shadowing by Fiducial Markers in Spot Scanning Proton Therapy with a Limited Number of Fields**](#) - T Matsuura^{1*}, K Maeda¹, K Sutherland¹, T Takayanagi², S Shimizu³, S Takao¹, H Nihongi¹, C Toramatsu¹, N Miyamoto¹, Y Nagamine⁴, R Fujimoto², K Umegaki³, H Shirato³, (1) Department of Medical Physics, Hokkaido University Graduate School of Medicine, Japan, (2)Hitachi, Ltd., Hitachi Research Laboratory, Japan, (3) Department of Radiation Medicine, Hokkaido University Graduate School of Medicine, Japan, (4)Hitachi, Ltd., Hitachi Works, Japan

SU-E-T-472

Characterization of the Very High Energy Electrons, 150 - 250 MeV (VHEE) Beam Generated by ALPHA-X Laser Wakefield Accelerator Beam Line for Utilization in Monte Carlo Simulation for Biomedical Experiment Planning - V Moskvina^{1*}, A Subiel², C Desrosiers¹, M Wiggins², M Maryanski³, M Mendonca¹, M Boyd⁴, A Sorensen⁴, S Cipiccia², R Issac², G Welsh², E Brunetti², C Aniculaesei², D A Jaroszynski², (1) Department of Radiation Oncology, Indiana University- School of Medicine, Indianapolis, IN, (2) SILIS, Department of Physics, University of Strathclyde, Glasgow, UK, (3) MGS Research, Inc., Madison, CT, (4) SIPBS, University of Strathclyde, Glasgow, (5) Cyclotron Operations, IU Health Protons Therapy Center, Bloomington, IN

SU-E-I-97

Characterizing the Modulation Transfer Function (MTF) of Proton Radiography - J Seco^{1*}, M Oumano², N Depauw³, M Dias⁴, R Teixeira⁴, (1) Mass General Hospital; Harvard Medical, Boston, MA, (2) University of Massachusetts at Boston, Boston, MA, (3) Massachusetts General Hospital, Boston, MA, (4) University of Lisbon, Lisbon, Portugal

WE-C-BRB-6

Clinical Impact of Uncertainties in the Mean Excitation Energy of Human Tissues During Proton Therapy - A Besemer^{1*}, H Paganetti², B Bednarz¹, (1) Department of Medical Physics, Wisconsin Institutes for Medical Research, University of Wisconsin, Madison, WI, (2) Department of Radiation Oncology, Massachusetts General Hospital and Harvard Medical School, Boston, MA

SU-E-T-5

Comparing DNA Strand Break Yields for Photons Under Different Irradiation Conditions with Geant4-DNA - P Pater^{1*}, M Bernal², I El Naqa¹, J Seuntjens¹, (1) McGill University, Montreal, QC, (2) Instituto de Física Gleb Wataghin, Campinas, Brasil

WE-C-217BCD-11

Coupled Radiative and Optical Geant4 Simulation of MV EPIDs Based On Thick Pixelated Scintillating Crystals - D Constantin^{1*}, M Sun², E Abel², J Star-Lack², R Fahrig¹, (1) Stanford University, Stanford, CA, (2) Varian Medical Systems, Palo Alto, CA

SU-E-T-60

Development and Validation of a TOPAS Model of a Spot Scanning Proton Therapy Nozzle - D Granville^{1*}, M H Chequers¹, K Suzuki², G O Sawakuchi¹, (1) Carleton University, Ottawa, ON, (2) The University of Texas MD Anderson Cancer Center, Houston, TX

- WE-C-BRB-9** [Development of a GPU-Based Monte Carlo Dose Calculation Package for Proton Radiotherapy](#) - X Jia^{1*}, J Schuemann², H Paganetti², S Jiang¹, (1) University of California, San Diego, La Jolla, CA, (2) Massachusetts General Hospital, Boston, MA
- TU-C-BRB-12** [Dose Enhancement Effect of Golden Nanoparticles in a Realistic Voxellized Cell Phantom for Proton Radiation: A Simulation Study with GEANT4](#) - Y Chen*, S Ahmad, University of Oklahoma Health Sciences Center, Oklahoma City, OK
- SU-E-T-506** [Dosimetric Study for Shallow-Seated Tumor Using Passive/active Scanning Proton Beam](#) - C Toramatsu*, T Matsuura, H Nihongi, S Takao, N Miyamoto, S Shimizu, R Kinoshita, K Umegaki, H Shirato,
- TU-G-BRA-4** [Emission Guided Radiation Therapy: A Simulation Study of Lung Cancer Treatment with Automatic Tumor Tracking Using a 4D Digital Patient Model](#) - Q Fan^{1*}, A Nanduri², L Zhu¹, S Mazin²,(1) Nuclear & Radiological Engineering and Medical Physics Programs, Georgia Institute of Technology, Atlanta, GA, (2) Reflexion Medical, Burlingame, CA
- TU-A-BRA-6** [EPID Operation in a Bi-Directional MRI-Linac System: A Monte Carlo Study](#) - B. M. Oborn^{1,2*}, P Metcalfe², S Crozier³, M. Bailey^{1,2}, P Keall⁴, (1) Illawarra Cancer Care Centre, Wollongong, NSW Australia,(2) University of Wollongong, Wollongong, NSW Australia,(3) University of Queensland, Brisbane, QLD Australia, (4) University of Sydney, Sydney, NSW Australia.
- SU-E-J-66** [Evaluation of Proton Induced X-Ray Fluorescence From Gold Fiducial Markers for In-Vivo Determination of Proton Range and Energy](#) - Brian Tonner^{1*}, Zuofeng Li², Derek Tishler³, (1) Moffitt Cancer Center, Tampa, FL, (2) University of Florida, Jacksonville, FL, (3) University of Central Florida, Orlando, FL
- SU-E-I-111** [Evaluation of the Analytical Scattering Models of 1\) Lynch-Dahl 2\) Highland and 3\) Rossi for Proton Beams and Comparison with GEANT4 Monte Carlo Simulations as a Prerequisite for Proton Radiography Applications for Patients](#) - M Raytchev^{1*}, S Safai², J Seco¹, (1) Mass General Hospital; Harvard Medical, Boston, MA, (2) Paul Scherrer Institute, Villigen - PSI, Switzerland

- SU-E-I-93** **External Beam Radiation Cherenkov Emission in Tissue Used for Tissue Oxygen Sensing** - R Zhang^{1*}, S Kanick², S Vinogradov³, T Esipova⁴, B Pogue⁵, (1) ,(2) Dartmouth College, Hanover, NH, (3) University of Pennsylvania, ,(4) University of Pennsylvania, ,(5) Dartmouth College, Hanover, NH
- SU-E-I-94** **External Beam Radiation Cherenkov Emission in Tissue Used for Tissue Oxygen Sensing** - R Zhang^{1*}, S Kanick², S Vinogradov³, T Esipova⁴, B Pogue⁵, (1) ,(2) Dartmouth College, Hanover, NH, (3) University of Pennsylvania, ,(4) University of Pennsylvania, ,(5) Dartmouth College, Hanover, NH
- MO-F-BRB-4** **Fast Estimation of Secondary Particle Therapy Dose Using a Modified Track Repeating Method** - R Keyes^{1,2*}, D Maes², S Luan², (1) New Mexico Cancer Center, Albuquerque, NM, (2) University of New Mexico, Albuquerque, NM
- TH-C-BRB-8** **Four-Dimensional Monte Carlo Simulations of Lung Cancer Patients Treated with Proton Beam Scanning to Assess Interplay Effects** - C Grassberger^{1 2*}, J Shackleford¹, G Sharp¹, H Paganetti¹, (1) Massachusetts General Hospital, Boston, MA, (2) Centre for Proton Radiotherapy, Paul Scherrer Institute, Villigen-PSI, Switzerland
- SU-E-T-478** **Geometrical Splitting Technique to Improve the Computational Efficiency in Monte Carlo Calculations for Proton Therapy** - J Ramos-Mendez^{1*}, J Perl², B Faddegon³, H Paganetti⁴, (1) Benérita Universidad Autónoma de Puebla, Puebla, México, (2) Stanford Linear Accelerator Center, Menlo Park, CA, (3) UC San Francisco, San Francisco, CA, (4) Massachusetts General Hospital, Boston, MA
- SU-E-T-610** **Impact of Variable Beam Spot Size On Treatment Time in Particle Therapy** - D Riofrio^{1*}, S Sellner², G Cabal², R Keyes³, M Holzscheiter¹, O Jaekel⁴, S Luan¹, (1) University of New Mexico, Albuquerque, New Mexico, (2) The German Cancer Research Center (DKFZ), Heidelberg, Germany,(3) New Mexico Cancer Center, ALBUQUERQUE, NM, (4) Heidelberg University Hospital, Heidelberg, Germany
- SU-E-T-22** **Is the Residual Range a Universal Quantity to Specify the Quality of Modulated Proton Beams?** - D Granville*, M Chequers, G Sawakuchi, Carleton University, Ottawa, ON

- SU-E-T-234** **[LET Measurement Using Nuclear Emulsion and Monte Carlo Simulation for Proton Beam](#)** - J Shin^{1*}, S Cho², S Park³, S Lee⁴, J Kwak⁵, S Kim⁶, K Morishima⁷, (1) National Cancer Center, Goyang, Gyeonggi-do, (2) National Cancer Center, Seoul, (3) National Cancer Center, Goyang, Gyeonggi-do, (4) National Cancer Center, GOYANG-SI, (5) Asan Medical Center, (6) Pusan National University, (7) Nagoya University,
- SU-E-T-11** **[LINAC Dose Profiling Using Cherenkov Emission Imaging](#)** - A Glaser^{1*}, D McClatchy¹, S Davis¹, D Gladstone², B Pogue^{1,2,3}, (1) Thayer School of Engineering, Dartmouth College, Hanover, NH, (2) Norris Cotton Cancer Center, Dartmouth-Hitchcock Medical Center, Lebanon, NH, (3) Department of Physics and Astronomy, Dartmouth College, Hanover, NH
- MO-F-BRB-2** **[Macro Monte Carlo for Proton Dose Calculation in Different Materials](#)** - MK Fix^{*}, D Frei, W Volken, EJ Born, D Aebbersold, P Manser, Division of Medical Radiation Physics and Department of Radiation Oncology, Inselspital, Bern University Hospital, and University of Bern, Switzerland
- SU-E-T-467** **[Monte Carlo Dosimetric Study of the New Flexisource Co-60 High Dose Rate Source](#)** - J Vijande^{1*}, D Granero², J Perez-Calatayud³, F Ballester¹, (1) University of Valencia, Valencia, Spain, (2) ERESA-Hospital General Universitario, Valencia, Spain, (3) Hospital La Fe, Valencia, Spain
- SU-E-T-300** **[Monte Carlo Simulation of Single-Plane Magnetically Focused Narrow Proton Beams](#)** - G McAuley^{*}, S Barnes, A Wroe, J Slater, Loma Linda University, Loma Linda, CA
- SU-E-T-10** **[Monte Carlo Study of the Dose Enhancement Factor \(DEF\) for Gold Nano-Particle \(GNP\) On the Cellular Level](#)** - M Zhang^{1*}, S Qin², B Haffty¹, N Yue¹, (1) The Cancer Institute of New Jersey, New Brunswick, NJ, (2) The First Affiliated Hospital of Soochow University, Suzhou, Jiangsu, China
- SU-E-T-475** **[Nano-Dosimetric Track Structure Scoring Including Biological Modeling with TOPAS-NBio](#)** - J Schuemann^{1*}, (1) Massachusetts General Hospital, Boston, MA

- SU-E-T-316** [**New Design of the Valencia Applicators to Reduce Radiation Leakage**](#) - D Granero^{1*}, J Vijande², J Perez-Calatayud^{3,4}, J Richart⁴, F Ballester², (1) ERESA-Hospital General Universitario, Valencia, Spain, (2) University of Valencia, Burjassot, Spain, (3) Hospital La Fe, Valencia, Spain, (4) Hospital Clinica Benidorm, Benidorm, Spain
- TH-C-213AB-12** [**On the Importance of Heterogeneous Calculation in Brachytherapy: A Radiobiological Point of View**](#) - H Afsharpour^{1*}, F Verhaegen², L Beaulieu³, (1) Centre Hospitalier Univ de Quebec, Quebec, QC (2) Maastriclinic, Maastricht
- SU-E-T-296** [**Optimization of the Energy Selection System with Varying Magnetic Field for Laser-Accelerated Proton Beams**](#) - D Kim^{1*}, S Yoo², W Cho¹, M Kim¹, J Jung¹, S Lee³, T Suh¹ (1) Department of Biomedical Engineering and Research Institute of Biomedical Engineering, The Catholic University of Korea, Seoul,(2) CHA Bundang Medical Center, CHA University, Seongnam,(3) Proton Therapy Center, National Cancer Center, Gyeonggi-do
- SU-E-T-500** [**Pencil-Beam Versus Monte Carlo Based Dose Calculation for Proton Therapy Patients with Complex Geometries. Clinical Use of the TOPAS Monte Carlo System**](#) - J Schuemann^{1*}, J Shin², J Perl³, C Grassberger¹, J Verburg¹, B Faddegon², H Paganetti¹, (1) Massachusetts General Hospital, Boston, MA, (2) UC San Francisco, San Francisco, CA, (3) Stanford Linear Accelerator Center, Menlo Park, CA
- SU-E-T-473** [**Performance Assessment of the TOPAS Tool for Particle Simulation for Proton Therapy Applications**](#) - J Perl^{1*}, J Shin², J Schuemann³, B Faddegon⁴, H Paganetti⁵, (1) SLAC National Accelerator Laboratory, Menlo Park, CA, (2) UCSF, San Francisco, CA, (3) MGH, BOSTON, MA, (4) UC San Francisco, San Francisco, CA, (5) Massachusetts General Hospital, Boston, MA
- MO-F-213AB-3** [**Potential Reduction in Out-Of-Field Dose in Pencil Beam Scanning Proton Therapy Through Use of a Patient-Specific Aperture**](#) - S Dowdell^{1,2*}, B Clasié¹, N Depauw^{1,2}, P Metcalfe², A Rosenfeld², H Kooy¹, J Flanz¹, H Paganetti¹, (1) Massachusetts General Hospital & Harvard Medical School, Boston, MA (2) University of Wollongong, Wollongong, NSW, Australia

- SU-E-T-282** **[Preliminary Simulation Study for 3 Dimensional Dose Delivery in Carbon Beam Active Scanning System of KHIMA](#)** - C Kim^{*}, H Kim, T Yang, G Han, H Lee, H Jang, J Kim, D Park, S Hong, Korea Institute of Radiological & Medical Science, Seoul, 75 Nowon-gu
- SU-E-T-232** **[Proton Source Modeling for Geant4 Monte Carlo Simulations](#)** - S Barnes^{1*}, G McAuley¹, A Wroe², J Slater¹, (1) Loma Linda University, Loma Linda, CA, (2) Loma Linda University Medical Center, Loma Linda, CA
- WE-C-217BCD-8** **[Rapid Monte Carlo Simulations of DQE\(f\) of Scintillator-Based Detectors](#)** - J Star-Lack^{1*}, E Abel¹, D Constantin², R Fahrig², M Sun¹, (1) Varian Medical Systems, Palo Alto, CA, (2) Stanford University, Stanford, CA.
- SU-E-T-146** **[Reference Dosimetry for Protons and Light-Ion Beams Based On Graphite Calorimetry](#)** - S. Rossomme^{1,2*}, H. Palmans², R. Thomas², N. Lee², M. Bailey², D. Shipley², L. Al-Sulaiti^{2,3}, P. Cirrone⁴, F. Romano^{4,5}, A. Kacperek⁶, D. Bertrand⁷, S. Vynckier^{1,8}, (1) Molecular Imaging and Experimental Radiotherapy Department, Catholic University of Louvain, Brussels, Belgium (2) Division of Acoustics and Ionising Radiation, National Physical Laboratory, Teddington, UK (3) University of Surrey, Guildford, UK (4) Laboratori Nazionali del Sud, Istituto Nazionale di Fisica Nucleare, Catania, Italy (5) Centro Studi e Ricerche e Museo Storico della Fisica "E. Fermi", Roma, Italy (6) Douglas Cyclotron, Clatterbridge Centre of Oncology, Wirral, UK (7) Ion Beam Application s.a., Louvain-la-Neuve, Belgium,(8) Cliniques Universitaires Saint-Luc, Brussels, Belgium
- TU-E-BRA-5** **[Reverse Geometry Imaging with MV Detector for Improved Image Resolution](#)** - A Ganguly^{1*}, E Abel², M Sun³, R Fahrig⁴, G Virshup⁵, J Star-Lack⁶, (1) Varian Medical Systems Inc., Palo Alto, CA, (2) Varian Medical Systems Inc., Palo Alto, CA,(3) Varian Medical Systems Inc., Palo Alto, CA, (4) Stanford University, Stanford, CA, (5) Varian Medical Systems Inc., Palo Alto, CA, (6) Varian Medical Systems Inc., Palo Alto, CA,
- MO-A-213AB-10** **[Scattering System Optimization for Proton Therapy](#)** - A Wroe^{1*}, R Schulte¹, S Barnes², G McAuley², J D Slater¹, J M Slater², (1) Loma Linda University Medical Center, Loma Linda, CA, (2) Loma Linda University, Loma Linda, CA

- SU-E-T-281** [Secondary Light-Ions in Carbon-Ion Therapy: A GEANT4 Simulation of LET and Dose Contributions](#) - D Johnson*, Y Chen, S Ahmad, University of Oklahoma Health Sciences Center, Oklahoma City, OK
- SU-E-I-109** [Sensitivity Analysis of An Electronic Portal Imaging Device Monte Carlo Model to Variations in Optical Transport Parameters](#) - S Blake¹, P Vial^{2*}, L Holloway², A McNamara¹, P Greer^{3,4}, Z Kuncic¹, (1) The University of Sydney, Sydney, NSW, Australia (2) Liverpool and Macarthur Cancer Therapy Centres, NSW, Australia (3) Newcastle Mater Hospital, Newcastle, NSW, Australia, (4) University of Newcastle, Newcastle, NSW, Australia
- SU-E-T-161** [SOBP Beam Analysis Using Light Output of Scintillation Plate Acquired by CCD Camera](#) - S Cho¹, S Lee^{1*}, J Shin¹, B Min¹, K Chung¹, D Shin¹, Y Lim¹, S Park², (1) Proton Therapy Center, National Cancer Center, Gyeonggi-do, (2) McLaren Regional Medical Center, FLINT, MI
- MO-G-BRA-6** [Three-Stage Compton Camera Image Resolution Losses Due Detector Effects](#) - D Mackin^{1*}, J Polf², S Peterson³, S Beddar¹, (1) MD Anderson Cancer Center, Houston, TX, (2) Oklahoma State University, Stillwater, OK, (3) University of Cape Town, Capetown, ZA, South Africa
- SU-E-T-91** [Validation of Geant4 Physics for Ionization Chamber Calculations in Radiotherapy Photon Beams](#) - M H Chequers*, G O Sawakuchi, Carleton University, Ottawa, ON
- MO-A-213AB-6** [Validation of Nuclear Reaction Models to Simulate Proton Therapy Range Verification Using Prompt Gamma-Rays](#) - J Verburg*, H Shih, J Seco, Massachusetts General Hospital and Harvard Medical School, Boston, MA
- SU-E-I-77** [X-Ray Coherent Scatter Diffraction Pattern Modeling in GEANT4](#) - A Kapadia^{1*}, E Samei¹, B Harrawood¹, P Sahbaee², A Chawla³, Z Tan³, D Brady³, (1) Duke University Medical Center, Durham, NC, (2) N.C. State University, Raleigh, NC, (3) Duke University, Durham, NC.
- SU-C-217A-4** [Patient-Specific Dosimetry for CT Examinations in the Pediatric Population](#) - D Carver*, S Kost, J Clark, R Price, D Pickens, M Stabin, Vanderbilt Medical Center, Nashville, TN