15th International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine

2–6 June 2019 Philadelphia, PA, USA



The 15th International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine

Conference Committee

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Welcome/Introduction

The 15th International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine will be held June 2-6, 2019 on the campus of the University of Pennsylvania, Philadelphia, PA, USA.

Fully3D is a workshop-style conference focusing on algorithmic and computational methods for reconstruction of multi-dimensional data sets typically acquired using CT, PET, or SPECT. It is well known for bringing together experts in the field in an informal setting for greater depth of discussion on issues pertaining to reconstruction. The fact that nearly all recent major advances in image reconstruction have been first presented at the Fully3D meeting emphasizes the high relevance of this meeting.

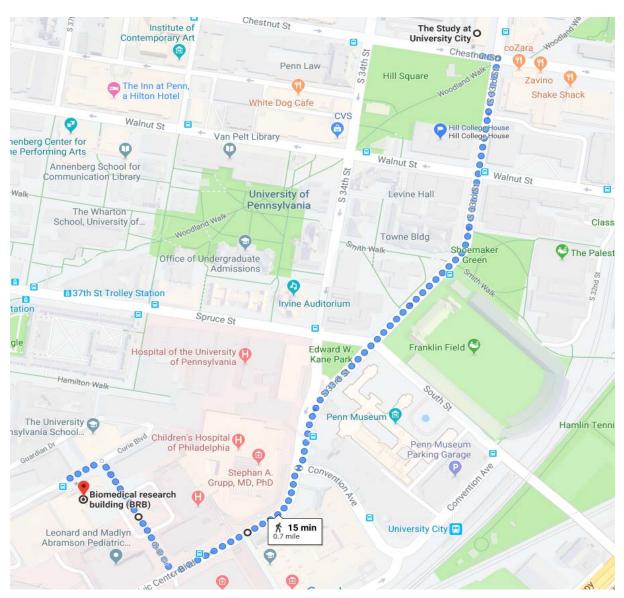
We would like to thank the many cooperative participants, who submitted very high-quality abstracts and uploaded the final versions for this volume on time, the many reviewers that are listed in the organizing committee, who provided insightful and timely reviews, our corporate sponsors, and the personnel at SPIE for their extensive cooperation and accommodation in putting this together. We would also like to thank Dr. Stephen Moore, who has advised on the conference, Dr. Peter Noël, who advised on program decisions related to CT, and Drs. Paul Gravel and Yusheng Li, who provided extensive assistance in putting the program together.

Scott D. Metzler, General Chair Samuel Matej, Program Chair

MondayTuesdayWednesdayCT-2:DL-2: Within PETCT-4: SpectralDCorrectionsReconstructionCTCTCorrectionsReconstructionCTCTCorrectionsReconstructionCTCTKeynote 1Keynote 2EM-2: SPECTQPoster Fast ForwardGroup PhotoPoster Fast ForwardCTInuchLunchLunchLunchLunchIcTPoster Fast ForwardCT-3:Poster Fast ForwardCTIctPoster Fast ForwardGroup PhotoPoster Fast ForwardCTInuchLunchLunchLunchLunchIctPoster Fast ForwardCT-3:Poster Fast ForwardCTIctPoster Fast ForwardGroup PhotoPoster Fast ForwardCTInuchLunchLunchLunchLunchLunchIctPoster SPoster SPoster SPoster SPoster SIctPoster SOther TopicsPoster SDiter TopicsIveEM-1: PETCoffee BreakOther TopicsAwards						
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RegistrationLunchLunchWelcomeCT-3:WelcomePosters 1NelcomePosters 1DL-1: Within CTReconstructionNeconstructionPosters 1Coffee BreakCoffee BreakCT-1: IterativeEM-1: PETReconstructionReconstruction	12:15		Poster Fast Forward	Group Photo	Poster Fast Forward	CT&F3D Previews
Welcome DL-1: Within CT ReconstructionCT-3: ReconstructionDL-1: Within CT 	13:30	Registration	Lunch	Lunch	Lunch	
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CT-1: Iterative EM-1: PET Reconstruction Reconstruction	16:00		Coffee Break	Coffee Break	Coffee Break	
	18:00		EM-1: PET Reconstruction		Other Topics Awards	

Conference Schedule

Conference Dinner 19:00-23:00 Posters Open 19:30-22:00 Posters Open 19:30-22:00 Conference Reception 18:30-20:30



Walking Map The Study to BRB via 33rd Street and Osler Circle

DIRECTIONS FROM THE STUDY TO BRB:

- Turn Right onto S 33rd St
- Continue onto Civic Center Blvd
- Turn Right onto Osler Circle
- Revolving entrance doors to BRB are located to the Right of Au Bon Pain

BIOMEDICAL RESEARCH BUILDING:

421 Curie Blvd, Philadelphia, PA 19104

THE STUDY AT UNIVERSITY CITY

20 S 33rd St, Philadelphia, PA 19104

PENN MUSEUM

3260 South St, Philadelphia, PA 19104

Social and Other Events

Conference Reception:

The conference reception will be held on Sunday evening 18:30-20:30 at the Penn Museum, which is located at 33rd and South Street.

Conference Dinner:

The conference dinner will be held at The Waterworks on Wednesday evening 19:00-22:00. Buses will leave from the conference hotel beginning at 18:30. Buses will return guests to the hotel with the last bus departing at 22:45.

Evening Poster Viewing:

Posters will be open to attendees on Monday and Tuesday evening 19:30-22:00.

Free Afternoon:

We have designated the second half of Tuesday afternoon as open for those who wish to visit sites in the city without missing a session.

15th International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine

Scientific Program Overview:

Sund	ay, June 2, 2019	
F3D	Welcome	13:30-13:50
DL-1	Deep Learning within CT Reconstruction	13:50-15:30
CT-1	Iterative Reconstruction in CT	16:00-18:00
Mond	lay, June 3, 2019	
CT-2	CT Corrections	8:30-10:10
K-1	Keynote 1	10:40-11:40
PF-1	Poster Fast Forward 1	11:40-12:15
P-1	Poster Session 1	13:30-15:30
EM-1	PET Reconstruction	16:00-18:00
	lay, June 4, 2019	
DL-2	Deep Learning within PET Reconstruction	8:30-10:10
K-2	Keynote 2	10:40-12:00
CT-3	CT Reconstruction and Imaging	13:30-15:30
Wedr	nesday, June 5, 2019	
CT-4	Spectral CT / Material Decomposition	8:30-10:10
EM-2	SPECT Imaging	10:40-11:40
PF-2	Poster Fast Forward 2	11:40-12:15
P-2	Poster Session 2	13:30-15:30
ΟΤ	Other Novel Applications and Approaches	16:00-17:20
Thur	sday, June 6, 2019	
DL-3	Deep Learning for Image Denoising and Characterization	8:30-10:10
EM-3	Quantitative Methods in PET	10:40-12:00
F3D	Future Fully 3D and CT meetings & Conference Closing	12:00-12:20

Scientific Program:

Sunday, June 2, 2019

F3D	Welcome	13:30-13:50
DL-1	Deep Learning within CT Reconstruction	13:50-15:30
CT-1	Iterative Reconstruction in CT	16:00-18:00

F3D	Welcome	13:30-13:50
DL-1	Deep Learning within CT Reconstruction Marc Kachelrieß , DKFZ (Germany) Ruben De Man , Stonybrook University (USA)	13:50-15:30

DL-1.1: A Hierarchical Approach to Deep Learning and Its Application to Tomographic Reconstruction

Lin Fu and Bruno De Man GE Global Research, Niskayuna, NY, USA

DL-1.2: Quality-Guided Deep Reinforcement Learning for Parameter Tuning in Iterative CT Reconstruction

<u>Chenyang Shen</u>^{a,b,c}, Min-Yu Tsai^{a,b,c}, Yesenia Gonzalez^{a,b,c}, Liyuan Chen^{b,c}, Steve B. Jiang^{b,c}, Xun Jia^{a,b,c}

^aiTORCH Laboratory, University of Texas Southwestern Medical Center, Dallas, TX, USA

^bMAIA Laboratory, University of Texas Southwestern Medical Center, Dallas, TX, USA

^cDepartment of Radiation Oncology, University of Texas Southwestern Medical Center, Dallas, TX, USA

DL-1.3: A Machine Learning Approach to Construct a Tissue-Specific Texture Prior from Previous Full-Dose CT for Bayesian Reconstruction of Current Ultralow-Dose CT Images <u>Yongfeng Gao^a</u>, Jiaxing Tan^a, Yongyi Shi^a, Siming Lu^{a,b}, Zhengrong Liang^{a,b} *^aDepartment of Radiology, State University of New York, Stony Brook, NY, USA ^bDepartment of BME, State University of New York, Stony Brook, NY, USA*

DL-1.4: Low-dose CT Reconstruction Assisted by a Global CT Image Manifold Prior

<u>Chenyang Shen</u>^{a,b,c}, Guoyang Ma^{a,b,c,d}, Xun Jia^{a,b,c} ^a*iTORCH Laboratory, University of Texas Southwestern Medical Center, Dallas, TX, USA* ^bMAIA Laboratory, University of Texas Southwestern Medical Center, Dallas, TX, USA ^cDepartment of Radiation Oncology, University of Texas Southwestern Medical Center, Dallas, TX, USA ^dWestwood High School, Austin, TX, USA

DL-1.5: Learned Primal-Dual Reconstruction for Dual Energy Computed Tomography with Reduced Dose

Dufan Wu^a, Kyungsang Kim^a, Mannudeep K. Kalra^b, Bruno De Man^c, Quanzheng Li^a ^aMassachusetts General Hospital and Harvard Medical School, Gordon Center for Medical Imaging, Boston, USA ^bMassachusetts General Hospital and Harvard Medical School, Department of Radiology, Boston, MA, USA ^cGE Global Research, Niskayuna, NY, USA

Sunday

16:00-18:00

CT-1 Iterative Reconstruction in CT

Xiaochuan Pan, University of Chicago (USA) Yusheng Li, University of Pennsylvania (USA)

CT-1.1: Statistical Iterative Reconstruction for Spectral Phase Contrast CT

Korbinian Mechlem^{a,b}, Thorsten Sellerer^a, Julia Herzen^a, Franz Pfeiffer^{a,b,c} ^aDpt. of Physics and Munich School of BioEng., Technical University of Munich, Garching, Germany ^bDpt. of Diagnostic and Interventional Radiology, Technical University of Munich, Munich, Germany ^cInstitute for Advanced Study, Technical University of Munich, Garching, Germany

CT-1.2: Application of Proximal Alternating Linearized Minimization (PALM) and inertial PALM to dynamic 3D CT

<u>Nargiza Djurabekova</u>^a, David Hawkes^a, Guy Long^b, Andrew Goldberg^{a,c}, Marta Betcke^a ^aUniversity College, London, UK ^bCurvebeam, UK ^cRNOH NHS Trust, UK

CT-1.3: Convergence Criterion for MBIR Based on the Local Noise-Power Spectrum: Theory and Implementation in a Framework for Accelerated 3D Image Reconstruction with a Morphological Pyramid

A. Sisniega^a, J.W. Stayman^a, S. Capostagno^a, C.R. Weiss^b, T. Ehtiati^c, J.H. Siewerdsen^{a,b}

^aDepartment of Biomedical Engineering, Johns Hopkins University, Baltimore, MD, USA

^bRussell H. Morgan Department of Radiology, Johns Hopkins University, Baltimore, MD, USA

^cSiemens Medical Solutions USA, Inc., Imaging & Therapy Systems, Hoffman Estates, IL, USA

CT-1.4: Contrast-medium Anisotropy-aware Tensor Total Variation Model for Robust Cerebral Perfusion CT Reconstruction with Weak Radiation: a preliminary study

<u>Yuanke Zhang</u>^{a,b}, Dong Zeng^a, Sui Li^a, Yuting Liao^a, Zhaoying Bian^a, Yongbo Wang^a, Ji He^a, Xiao Jia^a, Deyu Meng^c, Hongbing Lu^b, Jianhua Ma^a

^aSouthern Medical University, School of Biomedical Engineering, Guangzhou, China

^bFourth Military Medical University, School of Biomedical Engineering, Xi'an, China

^cXi'an Jiaotong University, School of Mathematics and Statistics, Xi'an, China

CT-1.5: Clinical Study of Soft-Tissue Contrast Resolution in Cone-Beam CT of the Head Using Multi-Resolution PWLS with Multi-Motion Correction and an Electronic Noise Model

<u>P. Wu</u>^a, A. Sisniega^a, J. W. Stayman^a, W. Zbijewski^a, D. Foos^b, X. Wang^b, N. Aygun^b, R. Stevens^d, J.H. Siewerdsen^{a,c}

^aDepartment of Biomedical Engineering, Johns Hopkins University, Baltimore, MD, USA

^bCarestream Health, Rochester, NY, USA

^cDepartment of Radiology, Johns Hopkins University, Baltimore, MD, USA

^dDepartment of Anesthesiology and Critical Care Medicine, Johns Hopkins University, Baltimore, MD, USA

CT-1.6: Adaptive Smoothing Algorithms for MBIR in CT Applications

Jingyan Xu^a, Frederic Noo^b ^aJohns Hopkins University, Baltimore, MD ^bUniversity of Utah, Salt Lake City, UT

Monday

8:30-10:10

Monday, June 3, 2019

CT Corrections	8:30-10:10
Keynote 1	10:40-11:40
Poster Fast Forward 1	11:40-12:15
Poster Session 1	13:30-15:30
PET Reconstruction	16:00-18:00
	Keynote 1 Poster Fast Forward 1 Poster Session 1

CT-2 CT Corrections

J. Webster Stayman, Johns Hopkins University (USA) Zijia Guo, University of Utah (USA)

CT-2.1: Motion Gradients for Epipolar Consistency

<u>Alexander Preuhs</u>^a, Michael Manhart^b, Elisabeth Hoppe^a, Markus Kowarschik^b, Andreas Maier^a

^aPattern Recognition Lab, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany ^bSiemens Healthcare GmbH, Forchheim, Germany

CT-2.2: A Motion Estimation and Compensation Algorithm for 4D CBCT of the Abdomen

<u>Seongjin Yoon</u>^a, Alexander Katsevich^{a,b}, Michael Frenkel^a, Peter Munro^c, Pascal Paysan^c, Dieter Seghers^c, Adam Strzelecki^c

^aiTomography Corp., Texas Medical Center Innovation Institute, Houston, TX, USA

^bUniversity of Central Florida, Mathematics Department, Orlando, FL, USA

^cVarian Medical Systems Imaging Laboratory, Daettwil, Switzerland

CT-2.3: A Preliminary Study on Explicit Compensation for the Non-Linear-Partial-Volume Effect in CT

Xin Liu^{a,b}, Buxin Chen^a, Zheng Zhang^a, Dan Xia^a, Emil Y. Sidky^a, <u>Xiaochuan Pan</u>^{a,c} ^aDepartment of Radiology, The University of Chicago, Chicago, IL, USA ^bKey Laboratory of Optoelectronic Devices and Systems of Ministry of Education and Guangdong Province, College of Optoelectronic Engineering, Shenzhen University, Shenzhen, Guangdong, China ^cDepartment of Radiation and Cellular Oncology, The University of Chicago, Chicago, IL, USA

CT-2.4: Reduction of Irregular View-Sampling Artifacts in a Stationary Gantry CT Scanner

<u>Alexander Katsevich</u>^{a,b}, Seongjin Yoon^a, Michael Frenkel^a, Ed Morton^c, William Thompson^c

^aiTomography Corp., Texas Medical Center Innovation Institute, Houston, TX, USA

^bUniversity of Central Florida, Mathematics Department, Orlando, FL, USA

^cRapiscan Systems, Torrance, CA, USA

CT-2.5: Reduction of Metal Artefacts in CBCT Caused by Needles Crossing the FOV Border

<u>Dirk Schäfer</u>^a, Christian Haase^a, William van der Sterren^b, Michael Grass^a

^aPhilips Research Hamburg, Hamburg, Germany

^b*Philips Healthcare, Best, The Netherlands*

Monday

10:40-11:40

K-1 Keynote 1

Fully3D Tensor Tomography

Grant Gullberg, PhD Department of Radiology and Biomedical Imaging, University of California, San Francisco, CA, USA

PF-1 Poster Fast Forward 1

P-1 Poster Session 1 13:30-Scott Metzler, University of Pennsylvania (USA) Jianan Cui, Massachusetts General Hospital (USA) and Zhejiang University (China)

P-1.1: Analysis of Scatter Artifacts in Cone-Beam CT Due to Scattered Radiation of Metallic Objects

Domenico Iuso, Robert Frysch, <u>Tim Pfeiffer</u>, Georg Rose Otto von Guericke University, Institute for Medical Engineering, Magdeburg, Germany

P-1.2: CTL: Modular Open-source C++-Library for CT-Simulations

<u>Tim Pfeiffer</u>, Robert Frysch, Richard N. K. Bismark, Georg Rose Otto von Guericke University Magdeburg, Institute for Medical Engineering, Magdeburg, Germany

P-1.3: Photon-Counting CBCT Iterative Reconstruction for Adaptive Proton Therapy Takashi Yamaguchi

Sumitomo Heavy Industries, Ltd., Yokosuka, Kanagawa, Japan

P-1.4: A Fast Gradient-Based Algorithm for Image Reconstruction in Inverse Geometry CT Architecture with Sparse Distributed Sources

<u>Frédéric Jolivet</u>, Clarisse Fournier, Andrea Brambilla CEA, LETI, Univ. Grenoble Alpes, MINATEC Campus, Grenoble, France

P-1.5: Clipping-Induced Bias Correction for Low-Dose CT Imaging

Kevin M. Brown Philips Healthcare, Cleveland, OH, USA

P-1.6: Multislice Anthropomorphic Model Observer for Detectability Evaluation on Breast Cone Beam CT Images

<u>Minah Han</u>, Jongduk Baek School of Integrated Technology and Yonsei Institute of Convergence Technology, Yonsei University, Incheon, South Korea

P-1.7: Low Dose Photon Counting CT Reconstruction Bias Reduction with Multi-Energy Alternating Minimization Algorithm

Jingwei Lu^a, Shuangyue Zhang^a, <u>David G. Politte</u>^b, Joseph A. O'Sullivan^a

^aWashington University in St. Louis, Department of Electrical and Systems Engineering, St. Louis, MO, USA ^bWashington University School of Medicine, Electronic Radiology Laboratory, Mallinckrodt Institute of Radiology, St. Louis, MO, USA

11:40-12:15

13:30-15:30

P-1.8: Noise Reduction in Photon-Counting CT Using Frequency-Dependent Optimal Weighting Mats Perssona^b, Norbert J. Pelc^{a,b,c}

^aDepartment of Bioengineering, Stanford University, Stanford, CA, USA

^bDepartment of Radiology, Stanford University, Stanford, CA, USA

^cDepartment of Electrical Engineering, Stanford University, Stanford, CA, USA

P-1.9: Reduction of Beam Hardening Induced Metal Artifacts Using Consistency Conditions

Shiras Abdurahman, Robert Frysch, Georg Rose Institute for Medical Engineering and Research Campus STIMULATE, Magdeburg, Germany

P-1.10: Beam Hardening Correction Using Pair-Wise Fan Beam Consistency Conditions

Shiras Abdurahman, Robert Frysch, Georg Rose Institute for Medical Engineering and Research Campus STIMULATE, Magdeburg, Germany.

P-1.11: Bone Sparsity Model for Computed Tomography Image Reconstruction

<u>Emil Y. Sidky</u>^a, Holly L. Stewart^b, Christopher E. Kawcak^b, C. Wayne McIlwraith^b, Martine C. Duff^e, Xiaochuan Pan^a

^aThe University of Chicago, Department of Radiology, Chicago IL, USA ^bColorado State University, Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Fort Collins, CO, USA ^cSavannah River National Laboratory, Aiken, SC, USA

P-1.12: Edge-Masked CT Image Reconstruction from Limited Data

<u>Victor Churchill</u>, Anne Gelb Dartmouth College, Department of Mathematics, Hanover, NH, USA

P-1.13: Real-Time GPU Implementation of a Weighted Filtered Back-Projection Algorithm for Stationary Gantry CT Reconstruction

William Thompson^a, Edward Morton^a, Alexander Katsevich^{b,c}, Seongjin Yoon^b, Michael Frenkel^b ^aRapiscan Systems, Torrance, CA, USA

^biTomography Corp., Texas Medical Center Innovation Institute, Houston, TX, USA ^cUniversity of Central Florida, Mathematics Department, Orlando, FL, USA

P-1.14: Toward Quantitative Short-Scan Cone Beam CT Using FDK with Equal Weighting and Image Domain Shading Correction

Linxi Shi^a, Lei Zhu^b, Adam Wang^a

^aDepartment of Radiology, Stanford University, Stanford, CA, USA ^bDepartment of Engineering and Applied Physics, University of Science and Technology of China, Hefei, China

P-1.15: Double-Helix Trajectory for Image Guided Radiation Therapy: Geometry and Image Reconstruction

Zhicong Yu, Chuanyong Bai, Daniel Gagnon Imaging Technologies, Accuray Incorporated, Solon, OH, USA

P-1.16: Combination of CT Motion Simulation and Deep Convolutional Neural Networks with Transfer Learning to Recover Agatston Scores

<u>Thomas Wesley Holmes</u>, Kevin Ma, Amir Pourmorteza Emory University, Department of Radiology and Imaging Sciences, Atlanta, GA, USA

P-1.17: A Sinogram Inpainting Method Based on Generative Adversarial Network for Limitedangle Computed Tomography

Ziheng Li, Wenkun Zhang, Linyuan Wang, Ailong Cai, Ningning Liang, Bin Yan, Lei Li National Digital Switching System Engineering & Technological Research Centre, Zhengzhou, Henan, China

P-1.18: Bone Induced Artifacts Elimination using Two-Step Convolutional Neural Network

<u>Bin Su</u>, Yanyan Liu, Yifeng Jiang, Jianwei Fu, Guotao Quan United Imaging Healthcare, Shanghai, China

P-1.19: A Deep Learning Approach for Dual-Energy CT Imaging Using Single-Energy CT Data Wei Zhao^a, Tianling Lv^b, Yang Chen^b, Lei Xing^a

^aStanford University, Department of Radiation Oncology, Stanford, CA, USA ^bSoutheast University, Department of Computer Science and Engineering, Nanjing, China

P-1.20: Learned Digital Subtraction Angiography (Deep DSA): Method and Application to Lower Extremities

Elias Eulig^a, Joscha Maier^a, Michael Knaup^a, Thomas Koenig^b, Klaus Hörndler^b, and Marc Kachelrieß^a ^aGerman Cancer Research Center (DKFZ), X-Ray Imaging and Computed Tomography, Heidelberg, Germany ^bZiem Imaging GmbH, Nürnberg, Germany

P-1.21: Low-Dose Cerebral CT Perfusion Restoration via Non-Local Convolution Neural Network: Initial Study

Sui Li^{a,b}, Dong Zeng^{a,b}, Zhaoying Bian^{a,b}, Jianhua Ma^{a,b}

^aSouthern Medical University, School of Biomedical Engineering, Guangzhou, China ^bSouthern Medical University, Key Lab. of Medical Radiation Imaging & Detection Technology, Guangzhou, China

P-1.22: Direct Image Reconstruction from Raw Measurement Data Using an Encoding Transform Refinement-and-Scaling Neural Network

William Whiteley^{a,b}, Jens Gregor^a

^aThe University of Tennessee, Knoxville, Tennessee, USA ^bSiemens Molecular Imaging, Knoxville, Tennessee, USA

P-1.23: A Hybrid Ring Artifact Reduction Algorithm Based on CNN in CT Images

Shaojie Chang, Xi Chen, Jiayu Duan, and Xuanqin Mou Xi'an Jiaotong University, Institute of Image Processing and Pattern Recognition, Xi'an, Shaanxi, China

P-1.24: GCC-Based Extrapolation of Truncated CBCT Data with Dimensionality-Reduced Extrapolation Models

<u>Daniel Punzet</u>^{a,b}, Robert Frysch^{a,b}, Tim Pfeiffer^{a,b}, Oliver Beuing^{b,c}, Georg Rose^{a,b} ^aOtto von Guericke University Magdeburg, Institute for Medical Engineering, Magdeburg, Germany ^bForschungscampus STIMULATE, Magdeburg, Germany ^cUniversity Hospital Magdeburg, Institute for Neuroradiology, Magdeburg, Germany

P-1.25: Non-uniformity Correction for Photon-counting Detectors Using Double GANs Wei Fang^{a,b}, <u>Liang Li</u>^{a,b}, Zhiqiang Chen^{a,b}

^aDepartment of Engineering Physics, Tsinghua University, Beijing, China ^bKey Laboratory of Particle & Radiation Imaging (Tsinghua University), Ministry of Education, Beijing, China

P-1.26: Synthesize Monochromatic Images in Spectral CT by Dual-Domain Deep Learning Chuqing Feng^{a,b}, Kejun Kang^{a,b}, Yuxiang Xing^{a,b}

^aDepartment of Engineering Physics, Tsinghua University, Beijing, China ^bKey Laboratory of Particle & Radiation Imaging (Tsinghua University), Ministry of Education, Beijing, China

P-1.27: Green's One-Step-Late Algorithm Does Not Work for SPECT with Attenuation Correction Larry Zeng^{a,b}

^aWeber State University, Department of Radiology, Ogden, UT, USA ^bUniversity of Utah, Salt Lake City, UT, USA

P-1.28: Superiterative Image Reconstruction in PET

Pablo Galve^a, Jose Manuel Udias^{a,b}, Alejandro Lopez-Montes^a, Joaquin L. Herraiz^{a,b} ^aComplutense University of Madrid, Faculty of Physical Sci., Nuclear Physics Group and IPARCOS, Madrid, Spain ^bHealth Research Institute of the Hospital Clínico San Carlos (IdISSC), Madrid, Spain.

P-1.29: Reconstruction Performance for Long Axial Field-of-View PET Scanners with Large Axial Gaps

<u>Margaret E. Daube-Witherspoon</u>^a, Varsha Viswanath^b, Suleman Surti^a, Joel S. Karp^a ^aUniversity of Pennsylvania, Department of Radiology, Philadelphia, PA, USA ^bUniversity of Pennsylvania, School of Engineering and Applied Sciences, Philadelphia, PA, USA

P-1.30: Versatile Regularisation Toolkit for Iterative Image Reconstruction with Proximal Splitting Algorithms

<u>Daniil Kazantsev</u>^a, Edoardo Pasca^b, Mark Basham^a, Martin Turner^b, Matthias J. Ehrhardt^c, Kris Thielemans^d, Benjamin A. Thomas^d, Evgueni Ovtchinnikov^b, Philip J. Withers^e, Alun W. Ashton^a ^aDiamond Light Source Ltd., Scientific Software Dep., Diamond House, Harwell Sci. & Innov. Campus, Didcot, UK ^bScientific Computing Department, STFC, Rutherford Appleton Laboratory, Didcot, UK ^cInstitute for Mathematical Innovation, University of Bath, Bath, UK ^dInstitute of Nuclear Medicine, UCL, London, UK ^eThe Manchester X-Ray Imaging Facility, School of Materials, The University of Manchester, UK

P-1.31: Multi-Streaming and Multi-GPU Optimization for a Matched Pair of Projector and Backprojector

Nicolas Georgin^a, Camille Chapdelaine^{a,b}, <u>Nicolas Gac</u>^b, Ali Mohammad-Djafari^c, Estelle Parra^a Safran Tech, Signal and Information Technologies Department, Magny-Les-Hameaux, France ^bLaboratoire des signaux et systèmes, CNRS, CentraleSupélec-Univ Paris Saclay, Gif-sur-Yvette, France ^cInternational Science Consulting & Training, France

P-1.32: Bulk Motion Detection and Correction Using List-Mode Data for Cardiac PET Imaging

Tao Sun, Yoann Petibon, Paul Han, Chao Ma, Sally J. W. Kim, Nathaniel M. Alpert, Georges El Fakhri, Jinsong Ouyang

Gordon Center for Medical Imaging, Department of Radiology, Massachusetts General Hospital, Boston, MA, USA Department of Radiology, Harvard Medical School, Boston, MA, USA

EM-1 PET Reconstruction

16:00-18:00

Georges El Fakhri, Harvard Medical School, Massachusetts General Hospital (USA) **Zhaoheng Xie**, University of California, Davis (USA)

EM-1.1: Simultaneous Micro-PET Imaging of F-18 and I-124 with Correction for Triple-Random Coincidences

Stephen C. Moore, Srilalan Krishnamoorthy, Eric Blankemeyer, Sean D. Carlin, Joel S. Karp, Scott D. Metzler

University of Pennsylvania, Physics & Instrumentation Group, Department of Radiology, Philadelphia, PA, USA

EM-1.2: Application of the Pseudoinverse for Real-Time 3D PET Image Reconstruction <u>Alejandro López-Montes</u>^a, Pablo Galve^b, Jose Manuel Udias^{a,b}, Joaquin L. Herraiz^{a,b}

^aComplutense University of Madrid, Faculty of Physical Sciences, Nuclear Physics Group and IPARCOS, CEI Moncloa, Madrid, Spain

^bHealth Research Institute of the Hospital Clínico San Carlos (IdISSC), Madrid, Spain

EM-1.3: Non-TOF Fourier-Based Analytic Reconstruction from TOF Histo-Projections for High Resolution TOF Scanners

Vladimir Y. Panin^a and Samuel Matej^b

^aSiemens Medical Solutions USA, Knoxville, TN, USA ^bUniversity of Pennsylvania, Philadelphia, PA, USA

EM-1.4: Preliminary Investigation of Optimization-Based Image Reconstruction for TOF PET with Sparse Configurations

Zheng Zhang^a, Buxin Chen^a, Amy E. Perkins^b, Chien-Min Kao^a, Emil Y. Sidky^a, Ravindra M. Manjeshwar^b, Xiaochuan Pan^{a,c}

^aDepartment of Radiology, The University of Chicago, Chicago, IL, USA ^bPhilips Healthcare, USA, Cleveland, OH, USA ^cDepartment of Radiation & Cellular Oncology, The University of Chicago, Chicago, IL, USA

EM-1.5: Rapid Construction of System Response Matrix Based on Geometric Symmetries for a Quad-head PET System

Jian Cheng, Fanzhen Meng, Yu Shi, Ye Mao, Chenfeng Li, Jimin Liang, <u>Shouping Zhu</u> Engineering Research Center of Molecular and Neuro Imaging of Ministry of Education, and School of Life Science and Technology, Xidian University, Xi'an, China

EM-1.6: Extension of the Emission EM Look-Alike Algorithms to Bayesian Algorithms Larry Zeng^{a,b}

^aWeber State University, Department of Radiology, Ogden, UT, USA ^bUniversity of Utah, Salt Lake City, UT, USA

8:30-10:10

Tuesday, June 4, 2019

DL-2	Deep Learning within PET Reconstruction	8:30-10:10
K-2	Keynote 2	10:40-12:00
CT-3	CT Reconstruction and Imaging	13:30-15:30

DL-2 Deep Learning within PET Reconstruction Johan Nuyts, KU Leuven (Belgium) Arkadiusz Sitek, IBM Watson Health Imaging (USA)

A)

DL-2.1: MAPEM-Net: An Unrolled Neural Network for Fully 3D PET Image Reconstruction <u>Kuang Gong</u>^a, Dufan Wu^a, Kyungsang Kim^a, Jaewon Yang^b, Tao Sun^a, Georges El Fakhri^a, Youngho Seo^b, Quanzheng Li^{a*}

^aGordon Center for Medical Imaging, Massachusetts General Hospital and Harvard Med. School, Boston, MA USA ^bPhysics Research Laboratory, Department of Radiology and Biomedical Imaging, University of California, San Francisco, CA, USA

DL-2.2: Generative Adversarial Networks Based Regularized Image Reconstruction for PET Zhaoheng Xie, Reheman Baikejiang, Kuang Gong, Xuezhu Zhang, Jinyi Qi Department of Biomedical Engineering, University of California, Davis, CA, USA

DL-2.3: Motion Correction of Respiratory-gated PET Image Using Deep Learning Based Image Registration Framework

<u>Tiantian Li</u>^a, Mengxi Zhang^a, Wenyuan Qi^b, Evren Asma^b, Jinyi Qi^a ^aDepartment of Biomedical Engineering, University of California, Davis, USA ^bCanon Medical Research USA, Inc., Vernon Hills, IL, USA

DL-2.4: Direct Patlak Reconstruction from Dynamic PET Using Unsupervised Deep Learning <u>Kuang Gong</u>^a, Ciprian Catana^b, Jinyi Qi^c, Quanzheng Li^a

^aGordon Center for Medical Imaging, Massachusetts General Hospital and Harvard Med. School, Boston, MA USA ^bMartinos Center for Biomedical Imaging, Department of Radiology, Massachusetts General Hospital and Harvard Medical School, Boston, MA, USA

^cDepartment of Biomedical Engineering, University of California, Davis, Davis, CA, USA

DL-2.5: On the Impact of Input Feature Selection in Deep Scatter Estimation for Positron Emission Tomography

Yannick Berker, Marc Kachelrieß German Cancer Research Center (DKFZ), Heidelberg, Germany

K-2 Keynote 2

Challenges in Clinical CT

Harold Litt, MD University of Pennsylvania, Philadelphia, PA, USA

Oncologic Applications of 3D PET

David Mankoff, MD, PhD University of Pennsylvania, Philadelphia, PA, USA

CT-3 CT Reconstruction and Imaging

13:30-15:30

Tobias Lasser, Technical University of Munich (Germany) **Grace Gang**, Johns Hopkins University (USA)

CT-3.1: Theoretically-Exact Filtered-Backprojection Reconstruction from Real Data on the Line-Ellipse-Line Trajectory

Zijia Guo^{a,c}, Günter Lauritsch^b, Andreas Maier^c, Frédéric Noo^a ^aDept. of Radiology, University of Utah, Salt Lake City, Utah, USA ^bSiemens Healthcare, GmbH, Forchheim, Germany ^cPattern Recognition Lab, University of Erlangen-Nu rnberg, Germany

CT-3.2: Optimization of Cone-Beam CT Scan Orbits for Cervical Spine Imaging

<u>Chumin Zhao</u>^a, Magdalena Herbst^b, Sebastian Vogt^b, Ludwig Ritschl^b, Steffen Kappler^b, Jefferey H. Siewerdsen^{a,c}, Wojciech Zbijewski^a ^aDepartment of Biomedical Engineering, Johns Hopkins University, Baltimore, MD, USA

^bSiemens Healthineers, Forchheim, Germany

^cRussell H. Morgan Department of Radiology, Johns Hopkins University, Baltimore, MD, USA

CT-3.3: Low Frequency Recovery in 16cm Coverage Axial Multi-Detector Computed Tomography

<u>Stanislav Zabic</u>^a, ZhicongYu^a, WenjingCao^b, LuWang^b ^aUIH America, Inc., ASDC, Cleveland, Ohio, USA, *Formerly ^bUnited Imaging Healthcare, Shanghai, China

CT-3.4: Performance Analysis for Nonlinear Tomographic Data Processing

<u>Grace J. Gang</u>, Xueqi Guo, J. Webster Stayman Johns Hopkins University, Department of Biomedical Engineering, Baltimore, MD, USA

CT-3.5: Simulating Lower-Dose Scans from an Available CT Scan Masoud Elhamiasl, Johan Nuyts

Nuclear Medicine and Molecular Imaging, Department of Imaging and Pathology, KU Leuven, Leuven, Belgium

CT-3.6: Optimized Conversion from CT Numbers to Proton Relative Stopping Power Based on Proton Radiography and Scatter Corrected Cone-Beam CT Images <u>Nils Krah</u>, Simon Rit *University Lyon, CREATIS, Lyon, France*

10:40-12:00

8:30-10:10

Wednesday, June 5, 2019

CT-4	Spectral CT / Material Decomposition	8:30-10:10
EM-2	SPECT Imaging	10:40-11:40
PF-2	Poster Fast Forward 2	11:40-12:15
P-2	Poster Session 2	13:30-15:30
ОТ	Other Novel Applications and Approaches	16:00-17:20

CT-4 Spectral CT / Material Decomposition Peter Noël, University of Pennsylvania (USA) Korbinian Mechlem, Technical University of Munich (Germany)

CT-4.1: Local Response Prediction in Model-Based CT Material Decomposition

Wenying Wang, Steven Tilley II, Matthew Tivnan Department of Biomedical Engineering, Johns Hopkins University, Baltimore MD, USA

CT-4.2: Image-domain Multi-Material Decomposition Using a Union of Cross-Material Models Zhipeng Li^a, Saiprasad Ravishankar^b, Yong Long^a

^{*a}University of Michigan – Shanghai Jiao Tong University Joint Institute, Shanghai, China* ^{*b*}Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM, USA</sup>

CT-4.3: Optimized Spatial-Spectral CT for Multi-Material Decomposition

<u>Matthew Tivnan</u>, Wenying Wang, Steven Tilley, Jeffrey H. Siewerdsen, J. Webster Stayman Department of Biomedical Engineering, Johns Hopkins University, 720 Rutland Ave., Baltimore MD, USA

CT-4.4: Photon-Counting Spectral CT with De-noised Principal Component Analysis Huiqiao Xie^a, Thomas Thuering^b, Yufei Liu^c, Wenting Long^a, Xiangyang Tang^a

^aDepartment of radiology and imaging sciences, Emory University School of Medicine, Atlanta, GA, US ^bDECTRIS Ltd., Switzerland ^cSinoVision Technologies (Beijing) Co. Ltd., Beijing, China

CT-4.5: Known-Component Model-Based Material Decomposition for Dual Energy Imaging of Bone Composition in the Presence of Metal Hardware

<u>S. Z. Liu</u>, S. Tilley, Q. Cao, J. H. Siewerdsen, J. W. Stayman, W. Zbijewski *Department of Biomedical Engineering, Johns Hopkins University, Baltimore, MD, USA*

EM-2 SPECT Imaging

10:40-11:40

Michel Defrise, Vrije Universiteit Brussel (Belgium) Paul Gravel, University of Pennsylvania (USA)

EM-2.1: Investigation of a Monte Carlo Simulation and an Analytic-Based Approach for Modeling the System Response for Clinical ¹²³I Brain SPECT Imaging

<u>Benjamin Auer</u>^a, Navid Zeraatkar^a, Jan De Beenhouwer^b, Kesava Kalluri^a, Philip H. Kuo^c, Lars R. Furenlid^c, and Michael A. King^a

^aUniversity of Massachusetts Medical School, Department of Radiology, Worcester, MA, USA ^bUniversity of Antwerp, imec-VisionLab, Antwerp, Belgium

^cUniversity of Arizona, Department of Medical Imaging, Tucson, AZ, USA

EM-2.2: Preliminary Investigation of AdaptiSPECT-C Designs with Square or Square and Hexagonal Detectors Employing Direct and Oblique Apertures

Kesava Kalluri^a, Navid Zeraatkar^a, Benjamin Auer^a, Philip H. Kuo^b, Lars R. Furenlid^b, Michael A. King^a ^aUniversity of Massachusetts Medical School, Department of Radiology, Worcester, MA, USA ^bUniversity of Arizona, College of Optical Sciences, Tucson, AZ, USA

EM-2.3: GPU-Accelerated Generic Analytic Simulation and Image Reconstruction Platform for Multi-Pinhole SPECT Systems

<u>Navid Zeraatkar</u>^a, Benjamin Auer^a, Kesava Kalluri^a, Arda Könik^a, Lars R. Furenlid^b, Philip Kuo^b, and Michael A. King^a

^aUniversity of Massachusetts Medical School, Department of Radiology, Worcester, MA, USA ^bUniversity of Arizona, Department of Medical Imaging, Tucson, AZ, USA

PF-2	Poster Fast Forward 2	11:40-12:15
P-2	Poster Session 2	13:30-15:30
	Samuel Matej, University of Pennsylvania (USA)	
	Benjamin Auer, University of Massachusetts Medical School (USA)	

P-2.1: Truncation Artifacts Caused by the Patient Table in Polyenergetic Statistical Reconstruction on Real C-Arm CT Data

Richard N.K. Bismark Georg Rose University of Magdeburg, Institute for Medical Engineering, Magdeburg, Germany

P-2.2: K-Edge Imaging Visualization of Multi-Material Decomposition in CT Using Virtual Mono-Energetic Images

Kevin C. Ma, <u>Thomas W. Holmes</u>, Amir Pourmorteza Emory University, Department of Radiology and Imaging Sciences, Atlanta, GA, USA

P-2.3: Scatter Correction Using Pair-Wise Fan Beam Consistency Conditions

Shiras Abdurahman, Robert Frysch, Georg Rose Institute for Medical Engineering and Research Campus STIMULATE, Magdeburg, Germany

P-2.4: Enhanced Spatial Resolution in Cone Beam X-Ray Luminescence Computed Tomography Using Primal-Dual Newton Conjugate Gradient Method

Peng Gao, Junyan Rong, Tianshuai Liu, Hongbing Lu Fourth Military Medical University, Xi'an, China

P-2.5: Linear Interpolation Based Structure Preserved Metal Artifact Reduction in X-Ray Computed Tomography

Huisu Yoon, <u>Kyoung-Yong Lee</u> Samsung Electronics, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea

P-2.6: Curvature Constraint Based Image Reconstruction for Limited-Angle Computed Tomography

Xiao Xue^{a,b}, <u>Shusen Zhao</u>^{a,b}, Yunsong Zhao^{a,b}, Peng Zhang^{a,b} ^aCapital Normal University, School of Mathematical Sciences, Beijing, China ^bCapital Normal University, Beijing Advanced Innovation Center for Imaging Technology, Beijing, China

P-2.7: Fast Ordered Subsets Chambolle-Pock Algorithm for CT Reconstruction

Xiaojuan Deng^{a,b}, Wenbin Xu^{a,b}, Hongwei Lia^b ^aSchool of Mathematical Sciences, Capital Normal University, Beijing, China ^bBeijing Advanced Innovation Center for Imaging Technology, Capital Normal University, Beijing, China

P-2.8: Attenuation Correction for X-Ray Fluorescence Computed Tomography (XFCT) Utilizing Transmission CT Image

Siyuan Zhang^{a,b}, <u>Liang Li</u>^{a,b}, Zhiqiang Chena^b ^aTsinghua University, Department of Engineering Physics, Beijing, China ^bTsinghua University, Ministry of Education, Key Laboratory of Particle and Radiation imaging, Beijing, China

P-2.9: Multi-Energy Computed Tomography Reconstruction Using an Average Image Induced Low-Rank Tensor Decomposition with Spatial-Spectral Total Variation Regularization

Lisha Yao^{a,b}, Dong Zeng^{a,b}, Zhaoying Bian^{a,b}, <u>Jianhua Ma</u>^{a,b} ^aSouthern Medical University, School of Biomedical Engineering, Guangzhou, China ^bSouthern Medical University, Guangzhou Key Laboratory of Medical Radiation Imaging and Detection Technology, Guangzhou, China

P-2.10: Statistical Iterative Material Image Reconstruction with Patch Based Enhanced 3DTV Regularization for Photon Counting CT

Danyang Li^{a,b}, Sui Li^{a,b}, Dong Zeng^{a,b}, Zhaoying Bian^{a,b}, <u>Jianhua Ma</u>^{a,b} ^aSouthern Medical University, School of Biomedical Engineering, Guangzhou, China ^bSouthern Medical University, Guangzhou Key Laboratory of Medical Radiation Imaging and Detection Technology, Guangzhou, China

P-2.11: Reducing High-Density Object Artifacts with Iterative Image Reconstruction in Digital Tomosynthesis

Hyeongseok Kim^a, Jongha Lee^{a,b}, Seungryong Cho^a

^aKAIST, Department of Nuclear and Quantum Engineering, Daejeon, Republic of Korea ^bSamsung Electronics, Medical Imag. R&D Group, Health & Medical Equip. Business, Suwon, Republic of Korea

P-2.12: Artifacts Reduction Method in 4DCBCT Based on a Weighted Demons Registration Framework

Shaohua Zhi^a, Bangliang Jiang^a, Marc Kachelrieß^b, Xuanqin Mou^a

^aThe Institute of Image Processing and Pattern Recognition, Xi'an Jiaotong University, Xi'an, Shaanxi, China ^bDivision of X-Ray Imaging and CT, German Cancer Research Center (DKFZ), Heidelberg, Germany

P-2.13: A Field of View Based Metal Artifact Reduction Method with the Presence of Data Truncation

Seungwon Choi, Seunghyuk Moon, Jongduk Baek

School of Integrated Technology and Yonsei Institute of Convergence Technology, Yonsei University, Incheon, South Korea

P-2.14: Inverse-Geometry CT with Linearly Distributed Source and Detector: Stationary Configuration and Direct Filtered-Backprojection Reconstruction

Tao Zhang^{a,b}, Yuxiang Xing^{a,b}, <u>Hewei Gao^{a,b}</u>, Zhiqiang Chen^{a,b}, Li Zhang^{a,b} ^aDepartment of Engineering Physics, Tsinghua University, Beijing, China ^bKey Laboratory of Particle & Radiation Imaging (Tsinghua University), Ministry of Education, Beijing, China

P-2.15: Efficient Nullspace-Constrained Modifications of Incompletely Sampled CT Images

Robert Frysch, Sebastian Bannasch, Vojtěch Kulvait, Georg Rose Otto von Guericke University Magdeburg, Institute for Medical Engineering, Magdeburg, Germany

P-2.16: Dynamic Angle Selection for Few-View X-Ray Inspection of CAD Based Objects

<u>Alice Presenti</u>, Jan Sijbers, Jan De Beenhouwer University of Antwerp, imec-Vision Lab, Department of Physics, Antwerp, Belgium

P-2.17: Non-Uniformity Correction for MARS Photon-Counting Detectors

Matthew Getzin^a, Mengzhou Li^a, David Rundle^b, Anthony P. Butler^b, Ge Wang^a ^aRensselaer Polytechnic Institute, Department of Biomedical Engineering, Troy, NY, USA ^bMARS Bioimaging Ltd., Christchurch, NZ

P-2.18: Evaluation of Image Quality of a Deep Learning Image Reconstruction Algorithm

Meghan Yue, Jie Tang, Brian E. Nett, Jiang Hsieh, Roy Nilsen, Jiahua Fan *GE Healthcare, Waukesha, WI, USA*

P-2.19: A Novel Transfer Learning Framework for Low-Dose CT

Hongming Shan, Uwe Kruger, Ge Wang Biomedical Imaging Center, Dep. of Biomedical Engineering, Rensselaer Polytechnic Institute, Troy, NY, USA

P-2.20: Quadratic Autoencoder for Low-Dose CT Denoising

Fenglei Fan, Hongming Shan, <u>Ge Wang</u> Rensselaer Polytechnic Institute, Biomedical Imaging Center, Dep. of Biomedical Engineering, Troy, NY, USA

P-2.21: Reconstructing Interior Transmission Tomographic Images with an Offset-Detector Using Deep Neural Network

Hoyeon Lee, Hyeongseok Kim, Seungryong Cho Korea Advanced Institute of Science and Technology, Dep. of Nuclear and Quantum Engineering, Daejeon, Korea

P-2.22: Information Retrieval in X-Ray Imaging with Grating Interferometry Using Convolution Neural Network

Chengpeng Wu^{a,b}, <u>Yuxiang Xing</u>^{a,b}, Hewei Gao^{a,b}, Li Zhang^{a,b}, Xinbin Li^{a,b}, Shengping Wang^c, Weijun Peng^c

^aTsinghua University, Department of Engineering Physics, Haidian District, Beijing, China

^bKey Laboratory of Particle & Radiation Imaging (Tsinghua University) of Ministry of Education, Beijing, China ^cFudan University Shanghai, Cancer Center, Shanghai, China

P-2.23: A Spatial Information Incorporation Method for Irregular Sampling CT Based on Deep Learning

Zaifeng Šhi^a, Zhongqi Wang^a, Huilong Li^a, Jinzhuo Li^a, Qingjie Cao^b ^aSchool of Microelectronics, Tianjin University, Tianjin China ^bSchool of Mathematical Sciences, Tianjin Normal University, Tianjin, China

P-2.24: Projection Super-resolution Based on Convolutional Neural Network for Computed Tomography

<u>Chao Tang</u>, Wenkun Zhang, Ziheng Li, Ailong Cai, Linyuan Wang, Lei Li, Ningning Liang, Bin Yan *National Digital Switching System Engineering & Technological Research Centre, Henan, China*

P-2.25: Medical (CT) Image Generation with Style

<u>Arjun Krishna</u>, Klaus Mueller Stony Brook University, Computer Science Department, Stony Brook, USA

P-2.26: Awake Preclinical Brain PET Imaging Based on Point Sources

Fernando Arias-Valcayo^a, Joaquín L. Herraiz^{a,b}, <u>P. Galve</u>^a, J. J. Vaquero^{c,d}, M. Desco^d, José M. Udías^{a,b}

^aComplutense University of Madrid, Faculty of Physical Sci., Nuclear Physics Group and IPARCOS, Madrid, Spain ^bHealth Research Institute of the Hospital Clínico San Carlos (IdSSC), Madrid, Spain

^cUniversidad Carlos III de Madrid, Departamento de Bioingeniería e Ingeniería Aerospacial, Madrid, Spain ^dInstituto de Investigación Sanitaria del Hospital Gregorio Marañón, Unidad de Medicina y Cirugía Experimental, Madrid, Spain

P-2.27: EM-ML Algorithm Based on Continuous-to-Continuous Model for PET

<u>Robert Cierniak</u>^a, Piotr Dobosz^a, Andrzej Grzybowski^b ^aCzestochowa University of Technology, Institute of Computational Intelligence, Czestochowa, Poland ^bCzestochowa University of Technology, Institute of Mathematics, Czestochowa, Poland

P-2.28: Parametric Image Estimation Using Residual Simplified Reference Tissue Model

Kyungsang Kim^a, Young Don Son^b, Jong-Hoon Kim^b, Quanzheng Li^a ^aMassachusetts General Hospital and Harvard Medical School, Boston, MA, USA ^bGachon University, Incheon, South Korea

P-2.29: Virtual Clinical Trials Using 3D PET Imaging

Paul E Kinahan^a, Darrin Byrd^a, Kristen Wangerin^b, Mark Muzi^a, Lanell Peterson^a, Brenda Kurland^c, Jennifer Specht^{a,d}, Hannah Linden^{a,d} ^aUniversity of Washington, Seattle, WA, USA ^bGE Healthcare, Waukesha, WI, USA ^cUniversity of Pittsburgh, Seattle, WA, USA ^dSeattle Cancer Care Alliance, Seattle, WA, USA

P-2.30: Fiber Assignment by Continuous Tracking for Parametric Fiber Reinforced Polymer Reconstruction

<u>Tim Elberfeld</u>, Jan De Beenhouwer, Jan Sijbers *imec-VisionLab*, Dept. of Physics, University of Antwerp, Antwerp, Belgium

P-2.31: elsa - An Elegant Framework for Tomographic Reconstruction

Tobias Lasser, Maximilian Hornung, David Frank

Technical University of Munich, Department of Informatics, Computer Aided Medical Procedures, Germany

P-2.32: Spectral CT reconstruction algorithm based on Adaptive tight frame wavelet and total variation

<u>Huihua Kong</u>^{a,b}, Lei Lei^{a,b}, Ping Chen^b

^aSchool of Science, North University of China, Taiyuan, China ^bShanxi Key Laboratory of Signal Capturing & Processing, North University of China, China

P-2.33: Study on Spectral CT Material Decomposition via Deep Learning

Xiaochuan Wu, Peng He, Zourong Long, Pengcheng Li, Biao Wei and <u>Peng Feng</u> *Chongqing University, The Key Lab of Optoelectronic Technology and Systems of the Education Ministry of China, Chongqing, China*

OT Other Novel Applications and Approaches Stephen Moore, University of Pennsylvania (USA) Fatma Terzioglu, University of Chicago (USA) 16:00-17:20

OT-1: Exact Inversion of an Integral Transform Arising in Passive Detection of Gamma-Ray Sources with a Compton Camera

Fatma Terzioglu

University of Chicago, Department of Statistics, Chicago, IL, USA

OT-2: Task-driven Acquisition in Anisotropic X-Ray Dark-Field Tomography

Theodor Cheslerean Boghiu^a, Franz Pfeiffer^{b,c}, Tobias Lasser^a

^aTechnical University of Munich, Dept. of Informatics, Computer Aided Medical Procedures, Germany ^bTechnical University of Munich, Dept. of Physics and School of BioEngineering, Germany ^cTechnical University of Munich, Klinikum rechts der Isar, Dept. of Diagnostic and Interventional Radiol., Germany

OT-3: A Step Toward a Clinically Viable ABI Phase-Contrast Imaging: Double Emission Line Artifacts Correction

Oriol Caudevilla, Wei Zhou, Jovan G Brankov Illinois Institute of Technology, Medical Imaging Research Center, ECE, Chicago, USA

OT-4: Registration Methods for Augmented Reality-Assisted 3D Image-Guided Interventions Brian Park MD, Gregory Nadoski MD, Stephen Hunt MD, PhD, Terence Gade MD, PhD University of Pennsylvania, Penn Image-Guided Interventions Lab, Dept of Radiology, Philadelphia, PA, USA

Thursday

Thursday, June 6, 2019

DL-3	Deep Learning for Image Denoising and Characterization	8:30-10:10
EM-3	Quantitative Methods in PET	10:40-12:00
F3D	Future Fully 3D and CT meetings & Conference Closing	12:00-12:20

DL-3	Deep Learning for Image Denoising and Characterization	8:30-10:10
	Jinyi Qi, University of California, Davis (USA)	
	Yannick Berker, German Cancer Research Center (Germany)	

DL-3.1: Feature aware deep learning CT image reconstruction

<u>Masakazu Matsuura</u>^a, Jian Zhou^a, Naruomi Akino^b, Zhou Yu^a ^aCanon Medical Research USA, Inc., Vernon Hills, IL, USA ^bCanon Medical Systems Corporation, Ohtawara, Tochigi, JAPAN

DL-3.2: Low-dose CT Image Denoising without High-dose Reference Images

<u>Nimu Yuan</u>^{a,b}, Jian Zhou^c, Jinyi Qi^b ^aNortheastern University, Sino-Dutch Biomedical and Information Engineering School Shenyang, China ^bUniversity of California, Davis, Davis, CA, USA ^cCanon Medical Research USA, Vernon Hills, IL, USA

DL-3.3: Deep Learning Based Adaptive Filtering for Projection Data Noise Reduction in X-Ray Computed Tomography

<u>Tzu-Cheng Lee</u>, Jian Zhou, Zhou Yu Canon Medical Research USA, Inc. Vernon Hills, IL, USA

DL-3.4: Population and Individual Information Guided PET Image Denoising Using Deep Neural Network

Jianan Cui^{a,b}, Kuang Gong^c, Ning Guo^c, Chenxi Wu^b, Kyungsang Kim^c, Huafeng Liu^a, Quanzheng Li^c ^aState Key Laboratory of Modern Optical Instrumentation, College of Optical Science and Engineering, Zhejiang University, Hangzhou, China ^bDepartment of Radiology, Massachusetts General Hospital, Boston, MA, USA ^cGordon Center for Medical Imaging, Massachusetts General Hospital and Harvard Med. School, Boston, MA, USA

DL-3.5: Comparison of Deep Learning and Human Observer Performance for Lesion Detection and Characterization

Ruben De Man^a, Grace J. Gang^b, Xin Li^c, Ge Wang,^d ^aStony Brook University, Department of Biochemistry & Cell Biology, Stony Brook, NY, USA ^bJohns Hopkins University, Department of Biomedical Engineering, Baltimore, MD, USA ^cGE Global Research, Radiation Imaging Sciences, Niskayuna, NY, USA ^dRensselaer Polytechnic Institute, Department of Biomedical Engineering, Troy, NY, USA

Thursday

EM-3 Quantitative Methods in PET

10:40-12:00

Margaret Daube-Witherspoon, University of Pennsylvania (USA) **Kuang Gong**, Massachusetts General Hospital (USA)

EM-3.1: A Linear Estimator for Timing Calibration in Time-Of-Flight PET

<u>Michel Defrise</u> Vrije Universiteit Brussel, Department of Nuclear Medicine, Brussels, Belgium

EM-3.2: Joint Reconstruction of Activity and Attenuation with Autonomous Scaling for Time-of-Flight PET

<u>Yusheng Li</u>, Samuel Matej, Joel S. Karp University of Pennsylvania, Physics and Instrumentation Group, Department of Radiology, Philadelphia, PA, USA

EM-3.3: Dynamic PET Imaging with the Generalized Method of Moments

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EM-3.4: Multiresolution Spatiotemporal Mechanical Model of The Heart as a Prior to Constrain the solution for 4D Models of the Heart

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F3D Future Fully 3D and CT meetings & Conference Closing 12:00-12:20

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