

Monday July 9 (HPIR Workshop)

Oral: System design (S. Basu)

- 8:15 - 8:45 B. De Man, R. Nilsen, E. Drapkin: *High Performance Image Reconstruction and Implementation.* p. 13
- 8:45 - 9:15 O. Bockenbach, S. Schuberth, M. Knaup, M. Kachelrieß: *High-Performance 3D Image Reconstruction Platforms; State of the Art, Implications and Compromises.* p. 17
- 9:15 - 9:45 A. Polacin: *Design Consideration on Image Reconstruction System for High-End CT-Scanner.* p. 21

Coffee

Oral: Computing platforms (G. Wang)

- 10:15 - 10:45 B. Heigl, M. Kowarschik: *High-Speed Reconstruction for C-Arm Computed Tomography.* p. 25
- 10:45 - 11:15 H. Scherl, S. Hoppe, G. Lauritsch, W. Eckert, M. Kowarschik, J. Hornegger: *On-the-fly-Reconstruction in Exact Cone-Beam CT using the Cell Broadband Engine Architecture.* p. 29
- 11:15 - 11:45 F. Xu, K. Mueller: *GPU-Acceleration of Attenuation and Scattering Compensation in Emission Computed Tomography.* p. 33

Lunch

Oral: Applications (R. Ning)

- 13:15 - 13:45 M. Schellmann, S. Gorbach: *Comparison of Two Decomposition Strategies for Parallelizing the 3D List-Mode OSEM Algorithm.* p. 37
- 13:45 - 14:15 G. Pratz, G. Chinn, F. Habte, P. Olcott, C. Levin: *Acceleration of Fully 3-D List-Mode OSEM for High-Resolution PET using Graphics Processing Units.* p. 41
- 14:15 - 14:45 M. Knaup, M. Kachelrieß: *Acceleration Techniques for 2D Parallel and 3D Perspective Forward- and Backprojections.* p. 45
- 14:45 - 15:00 Poster Fast Forward: One Minute - One PPT Slide per Poster

Coffee

- 15:15 - 16:15 Poster session
- J. Scheins, H. Herzog: *Optimised System Matrix Compression and Matrix Element Access for Iterative 3D PET Reconstruction Using Non-Rectangular, Rotationally Symmetric Voxel Formations.* p. 49
 - H. Yang, M. Li, K. Koizumi, H. Kudo: *Accelerating Backprojections via CUDA Architecture.* p. 52
 - J. Gregor, T. Benson, G. Bosilca: *Distributed Multi-Core Implementation of SIRT with Application to Cone-Beam Micro-CT.* p. 56
 - E.Y. Sidky, X. Pan: *Few-View, Cone-Beam CT Image Reconstruction by GPU-Accelerated Total Variation Minimization.* p. 60

- M.F. Smith, S. Majewski, R.R. Raylman: *Fully 3D Iterative List-Mode PEM-PET Image Reconstruction on a Multiprocessor Computer.* p. 64
- D. Riabkov, X. Xue, D. Tubbs, A. Cheryauka: *Accelerated Cone-Beam Backprojection using GPU-CPU Hardware.* p. 68
- R. Tita, T.C. Lueth: *Online Iterative Reconstruction with the use of the Graphical Processing Unit (GPU).* p. 72
- M.S. Vaz, M. McLin, A. Ricker: *Current and Next Generation GPUs for Accelerating CT Reconstruction: Quality, Performance, and Tuning.* p. 76

Panel: High performance image reconstruction: current trends and future perspectives

16:15 - 17:30 Samit Basu (GE)
 Olivier Bockenbach (Mercury)
 Marc Kachelrieß (University of Erlangen)
 Klaus Mueller (Stony Brook University)
 Alan Ricker (Barco)

18:00 **Fully 3D 2007 Reception**

Tuesday July 10 (Fully 3D Meeting)

Oral: Exact Reconstruction in CT (M. Defrise, F. Noo)

- 8:15 - 8:45 A. Katsevich, M. Kapralov: *Theoretically Exact FBP Reconstruction Algorithms for two General Classes of Curves.* p. 80
- 8:45 - 9:15 S. Cho, D. Xia, X. Pan: *Exact Image Reconstruction in Reverse Helical Cone-Beam CT.* p. 84
- 9:15 - 9:45 C. Bontus, M. Grass, P. Koken, T. Köhler: *Exact Reconstruction Algorithm for Circular Short-Scan CT Combined with a Helical Segment.* p. 88

Coffee

Oral: PET / SPECT (P. Kinahan, D. Gilland)

- 10:15 - 10:45 T. Yamaya, E. Yoshida, C.F. Lam, A. Konami, T. Obi, H. Murayama: *Implementation of 3D Image Reconstruction with a Pre-computed System Matrix for the jPET-D4.* p. 92
- 10:45 - 11:15 Q. Huang, J. You, G.L. Zeng, G.T. Gullberg: *Exact Reconstruction on PI-lines From Uniformly Attenuated SPECT Projection Data.* p. 96
- 11:15 - 11:45 W. Wang: *Investigation of Local Tomography Property for TOF-PET OS-EM Reconstruction.* p. 100

Lunch

Oral: Iterative Reconstruction in CT (G. Lauritsch, J. Gregor)

- 13:15 - 13:45 C. Neukirchen, S. Hohmann: *An Iterative Approach for Model-Based Tomographic Perfusion Estimation.* p. 104
- 13:45 - 14:15 J. Xu, B.M.W. Tsui: *A Compound Poisson Maximum-Likelihood Iterative Reconstruction Algorithm for X-Ray CT.* p. 108
- 14:15 - 14:45 J.B. Thibault, Z. Yu, K. Sauer, C. Bouman, J. Hsieh: *Correction of Gain Fluctuations in Iterative Tomographic Image Reconstruction.* p. 112

Coffee

Poster (S. Patch, D. Gilland)

15:00 - 15:20 Poster Fast Forward: One Minute - One PPT Slide per Poster

15:20 - 17:30 Poster session

- G. - H. Chen, Z. Qi: *Image Reconstruction for Fan Beam Differential Phase Contrast Computed Tomography.* p. 116
- H. Schöndube, K. Stierstorfer, F. Dennerlein, T.A. White, F. Noo: *Towards an Efficient Two-Step Hilbert Algorithm for Helical Cone-Beam CT.* p. 120
- J. Sunnegårdh, P. - E. Danielsson: *A New Anti-Aliased Projection Operator for Iterative CT Reconstruction.* p. 124
- H. Gao, Y. Xing, L. Zhang, Z. Chen, J. Cheng: *Fast and Robust Edge-Preserving Image Reconstruction for Limited-Angle Tomography.* p. 128
- T. Zhuang, G. - H. Chen: *Noise Performance Study of Cone-Beam FBP Reconstruction Algorithms for Circle-Line Source.* p. 132

- X. Tang, J. Hsieh, P.E. Licato, J. Londt, D. Okerlund: *Helical Cone Beam FBP Algorithm for Reconstruction at Dynamically Variable Pitch using Data Windowing/Weighting.* p. 136
- S.H. Bartling, J. Dinkel, W. Stiller, M. Grasruck, W. Semmler, F. Kiessling: *Implementation of Intrinsic Respiratory Gating in a Small Animal Flat-Panel Based CT.* p. 140
- M.W. Jacobson, J.W. Stayman: *Head Motion Tracking in Cone Beam CT by Tomographic Extraction of Fiducials.* p. 143
- D. Lu, M. Liu, E. Bai, G. Wang: *Analysis of the Bolus Dynamics in a Blood Vessel using the Grangeat Formula.* p. 147
- S.J. LaRoque, E.Y. Sidky, X. Pan: *Image Reconstruction from Sparse Data in Three-Dimensional Echo-Planar Imaging.* p. 151
- I. Reiser, J. Bian, R.M. Nishikawa, E.Y. Sidky, X. Pan: *Comparison of Reconstruction Algorithms for Digital Breast Tomosynthesis.* p. 155
- A. Katsevich, F. Natterer: *Ultrasound Tomography with Sources on a Line.* p. 159
- C. Wietholt, I. - T. Hsiao, C. - T. Chen: *Iterative Reconstruction of Preclinical High Resolution Pinhole SPECT with a Misaligned Detector.* p. 162
- A. Sitek: *Image Reconstruction in Emission Tomography Using Statistical Ensembles.* p. 166
- M. Defrise, C. Vanhove, J. Nuyts: *Refined Geometric Calibration for Pinhole SPECT.* p. 170
- K. Kacperski, B.F. Hutton: *Optimal Parallel Hole Collimator for Cardiac SPECT with Iterative Reconstruction and 3D Resolution Modelling.* p. 174
- B. Zhang, G.L. Zeng: *High-Sensitivity SPECT Imaging Using Large Collimator Holes and Geometric Blurring Compensation.* p. 178
- S. Shcherbinin, A. Celler: *Optimization of 3D Reconstruction Algorithm for $^{99m}\text{Tc}/^{123}\text{I}$ Dual-Isotope Cardiac SPECT.* p. 182
- Y. Yan, G.L. Zeng: *A Post-Processing Method for Scatter Compensation in SPECT.* p. 186
- J.W. Moore, L.R. Furenlid, H.H. Barrett: *FaCT: A Helical-Scan Cone-Beam CT Integrated with a Stationary Multidetector SPECT System.* p. 190

18:00

Dinner

Wednesday July 11 (Fully 3D Meeting)

Oral: PET/SPECT (G.T. Gullberg, I. Buvat)

- 8:15 - 8:45 D.R. Gilland, B.A. Mair: *Improved 3D Motion Estimation for Cardiac Emission Tomography.* p. 193
- 8:45 - 9:15 L. Fu, G. Wang, J. Qi: *Direct Maximum a Posteriori Reconstruction of Patlak Parametric Image for Fully 3D Dynamic PET.* p. 197
- 9:15 - 9:45 J. Dey, B. Feng, K.L. Johnson, J.E. McNamara, P.H. Pretorius, M.A. King: *Respiratory Motion Correction in Cardiac SPECT using Affine and Free-Form Deformation Registration with Temporal and Spatial Constraints.* p. 201

Coffee

Oral: Image Reconstruction in CT (L. Desbat, P.-E. Danielsson)

- 10:15 - 10:45 J. Zhao, Y. Jin, Y. Lu, G. Wang: *A Reconstruction Algorithm for Triple-Source Helical Cone-Beam CT via Filtered Backprojection.* p. 205
- 10:45 - 11:15 S. Hoppe, J. Hornegger, G. Lauritsch, F. Dennerlein, F. Noo: *Truncation Correction for Non-horizontal Filter Lines.* p. 209
- 11:15 - 11:45 D. Xia, S. Cho, X. Pan: *Image Reconstruction for a Reduced Scan in Circular Sinusoidal Cone-beam CT.* p. 213

Lunch

Oral: PET / SPECT (J. Qi, R. Huesman)

- 13:15 - 13:45 S. Moehrs, M. Defrise, N. Belcari, A. Del Guerra: *Multi-Ray Based System Matrix Generation for 3D PET Reconstruction.* p. 217
- 13:45 - 14:15 H. Botterweck, R. Bippus, A. Goedicke, A. Salomon, H. Wiecek: *Quantitative Simultaneous Multiple Isotope SPECT Imaging with Iterative Monte-Carlo Reconstruction.* p. 221
- 14:15 - 14:45 S. Valton, P. Bérard, J. Riendeau, C. Thibaudeau, R. Lecomte, D. Sappey - Marinier, F. Peyrin: *Fan Beam Reconstruction for Non-standard Equiangular Detector with a FBP Formula.* p. 225

Coffee

Poster (M. Defrise, J. Qi)

15:00 - 15:20 Poster Fast Forward: One Minute - One PPT Slide per Poster

15:20 - 17:30 Poster session

- L. Desbat, L. Graton: *Sampling with the Reflected Lattice in Helical Fan Beam CT.* p. 229
- J. You, G.L. Zeng, Q. Huang: *Finite Inversion of the Weighted Hilbert Transform.* p. 233
- J. Sunnegårdh, P. - E. Danielsson: *Regularized Iterative Weighted Filtered Backprojection for Helical Cone-Beam CT.* p. 237
- P.J. La Rivière, P. Vargas: *Optimal Sampling and Interpolation Schemes for 3D X-ray Fluorescence Computed Tomography.* p. 241

- D. Schäfer, U. Jandt, J.D. Carroll, M. Grass: *Motion Compensated Reconstruction for Rotational X-Ray Angiography using 4D Coronary Centerline Models.* p. 245
- U. Jandt, D. Schäfer, M. Grass, V. Rasche: *Automatic Generation of Time Resolved 4D Motion Vector Fields of Coronary Arteries.* p. 249
- J. Hsieh, J. Londt, M. Vass, X. Tang, J. Li, D. Okerlund: *Step-and-shoot Cardiac Imaging with Optimal Temporal Gating and Reconstruction.* p. 253
- I.A. Hein, A.A. Zamyatin, M.D. Silver, S. Nakanishi: *A Weighted Zero-Interlacing based Native-Geometry Flying Focal Spot Data Upsampling Algorithm for Cone-Beam X-Ray CT.* p. 257
- M. Magnusson: *Projection Generation through Voxel Volumes Considering Signal Processing Theory.* p. 261
- L. Zhu, J. Starman, R. Fahrig: *An Efficient Method for Reducing the Axial Intensity drop in Circular Cone-Beam CT.* p. 265
- O. Trofimov: *Cone-beam Reconstruction Algorithm when Source Trajectory is One Circle.* p. 269
- P.-E. Danielsson, J. Sunnegårdh: *Advanced Linear Modeling and Interpolation in CT-Reconstruction.* p. 273
- V.Y. Panin, M. Defrise: *3D TOF PET Forward Projector Based on Axial Consistency Conditions.* p. 277
- J.A. Piatt, G.L. Zeng: *Estimation of Skew-Slit SPECT Acquisition Geometry Using a Single Point Source.* p. 281
- C.F. Lam, T. Yamaya, T. Obi, H. Takahashi, M. Suga, E. Yoshida, N. Inadama, K. Shibuya, F. Nishikido, H. Murayama: *3D PET Image Reconstruction with On-the-fly System Matrix Generation Accelerated by Utilizing Shift and Symmetry Properties.* p. 285
- T. Kobayashi, T. Yamaya, H. Takahashi, K. Kitamura, T. Hasegawa, H. Murayama, M. Suga: *Improvement of PET Image Quality Using DOI and TOF Information.* p. 289
- Q. Tang, J. You, G.L. Zeng, G.T. Gullberg: *Analytical Image Reconstruction for Convergent-beam Non-circular Orbit Attenuation Correction.* p. 293
- J. Gregor, N. Black, J. Wall: *Monte Carlo Study of Scatter and Attenuation Effects in Connection with I-125 Pinhole Imaging of Mice.* p. 297
- L. Zhang, S. Vandenberghe, S. Staelens, S.J. Glick, Y. D'Asseler, I. Lemahieu: *PET Reconstruction with Monte-Carlo Generated System Matrix for Strip Blob.* p. 301
- B.W. Reutter, G.T. Gullberg, R. Boutchko, K. Balakrishnan, E.H. Botvinick, R.H. Huesman: *Regularized Least-Squares SPECT Image Reconstruction using Multiresolution Spatial B-Splines and a Negativity Penalty.* p. 305

Thursday July 12 (Fully 3D Meeting)

Oral: Other Imaging Modalities (S. Patch, B. De Man)

- 8:15 - 8:45 H. Kunze, W. Härer, J. Orman, T. Mertelmeier, K. Stierstorfer: *Filter Determination for Tomosynthesis Aided by Iterative Reconstruction Techniques.* p. 309
- 8:45 - 9:15 K. Champley, M. Defrise, R. Clackdoyle, R.R. Raylman, P.E. Kinahan: *Planogram Rebinning with the Frequency-Distance Relationship.* p. 313
- 8:45 - 9:15 L. Zhang, G. Zhang, Z. Chen, Y. Xing: *An Approximate Reconstruction Method for Dual Energy Computed Tomography.* p. 317

Coffee

Oral: PET/SPECT (F. Beekman, B.M.W. Tsui)

- 10:15 - 10:45 M.A. King, J.E. McNamara, B. Feng, J.G. Martins: *Tracking Patient Motion in 3D in a PET/CT.* p. 321
- 10:45 - 11:15 K. Kitamura, S. Takahashi: *On-the-fly 3D Iterative Reconstruction for Continuous 3D Whole-Body PET.* p. 325
- 11:15 - 11:45 G.L. Zeng, Q. Huang: *Compensating for Collimator Blurring using Rotational and Axial Convolution.* p. 329

Lunch

Oral: Exact Reconstruction in CT (A. Katsevich, K. Taguchi)

- 13:15 - 13:45 A. Katsevich, A.A. Zamyatin, M.D. Silver: *Optimized Reconstruction Algorithm for Helical CT with Fractional Pitch between 1PI and 3PI.* p. 333
- 13:45 - 14:15 A.A. Zamyatin, B.S. Chiang, A. Katsevich, S. Nakanishi: *Filtered Backprojection Algorithm for Circle and Line Reconstruction with Gantry Tilt.* p. 337
- 14:15 - 14:45 R.C. Naidu, B.Ü. Karbeyaz, Z. Ying, S.B. Simanovsky, M.W. Hirsch, D.A. Schafer, C.R. Crawford: *Variable Pitch Tilted Slice Reconstruction using John's Equation.* p. 340

Coffee

Poster (A. Katsevich, B.M.W. Tsui)

- 15:00 - 15:20 Poster Fast Forward: One Minute - One PPT Slide per Poster
- 15:20 - 17:30 Poster session
- A.K. Louis, D. Theis, T. Weber: *Computing Reconstruction Kernels for Circular 3D Cone Beam Tomography.* p. 343
 - F. Dennerlein, F. Noo, H. Schöndube, J. Hornegger, G. Lauritsch: *Cone-Beam Reconstruction on a Circular Short-Scan using the Factorization Approach.* p. 346
 - M. Chakchouk, S. Sevestre - Ghalila, C. Graffigne: *Volume X-Ray Forward Projection using Adaptive Kernel Estimation Framework.* p. 350
 - T. Zhuang, S. Leng, G. - H. Chen: *An Exact Cone-Beam Reconstruction Algorithm for two Concentric Arcs.* p. 354
 - G. Lauritsch, J. Boese, L. Wigström, M. Prümmer, R. Fahrig: *Temporal Resolution in Cardiac C-arm CT in the Presence of Variable Heart Rate* p. 358

- H. Schomberg: *Time-Resolved Cardiac Cone Beam CT.* p. 362
- L. Zhu, J. Starman, R. Fahrig: *The Relationship between the T-FDK Algorithm and the Hu-FDK Algorithm.* p. 366
- T. Schuster: *3D Imaging in Cone Beam Vector Field Tomography.* p. 370
- K.P. Anoop, K. Rajgopal: *Reconstruction from Laterally Truncated Projection Data in Helical Cone-Beam CT.* p. 374
- P. Forthmann, A. Ziegler, T. Köhler, M. Defrise: *PL Sinogram Restoration and ML Reconstruction - A Benchmark.* p. 378
- R. Boutchko, A. Sitek, G.T. Gullberg: *Computed Tomography Reconstruction on Irregularly Distributed Blobs.* p. 382
- J. Bian, H. Zhang, P. Zhang, X. Pan: *A Cone Beam Approach to ROI Imaging with a Detector Smaller than the Imaged Object.* p. 386
- R. Van Holen, S. Vandenberghe, S. Staelens, Y. D'Asseler, I. Lemahieu: *Fast 3D Image Reconstruction for Rotating Slit Collimated Gamma Cameras.* p. 390
- J.E. Ortuño, G. Kontaxakis, J.L. Rubio, P. Guerra, A. Santos: *3D Iterative Reconstruction of High Resolution PET/CT Images using Anatomical Priors and Attenuation Correction.* p. 394
- C. - M. Kao, Y. Dong, Q. Xie, C. - T. Chen: *Image Reconstruction of a Dual-Head Small-Animal PET System by Using Monte-Carlo Computed System Response Matrix.* p. 398
- K. Balakrishnan, B.W. Reutter, R. Boutchko, A.C. Sauve, G.T. Gullberg: *Attenuation Correction of Small-Animal SPECT Data in Clinical SPECT/CT Systems.* p. 402
- P. Aguiar, M. Rafecas, C. Falcón, J. Pavía, D. Ros: *Fully 3D PET Iterative Reconstruction using Pseudo-Wu Raytracer.* p. 405
- H.C. Gifford, A. Lehovich, M.A. King: *A Human-Model Observer for Volumetric Detection Studies.* p. 409
- J.G. Parker, B.A. Mair, D.R. Gilland, M. Mahoney: *Cardiac Emission Tomography with 3D Respiratory Motion Correction.* p. 413
- J. Rinkel, P. Després, S. Prevrhal: *New 3D Fast Exact Ray-Driven Projector.* p. 417

18:00

Dinner

Friday July 13 (Fully 3D Meeting)

Oral: Special Session (X. Pan, M. Kachelrieß)

- 8:15 - 8:45 S.K. Patch: *Pulse Softening in Thermo/Photo/Opto-Acoustic Tomography.* p. 421
- 8:45 - 9:15 G.T. Gullberg, A.I. Veress, A. Sitek, R. Boutchko, B.W. Reutter, R.H. Huesman: *Tomographic Reconstruction of Tracer Kinetics in the Heart using a Spatiotemporal Mechanical Model.* p. 425
- 9:15 - 9:45 A.V. Bronnikov: *Phase-contrast CT: Fundamental Theorem and Reconstruction Algorithms.* p. 429

Coffee

Oral: 4D Imaging in CT (T. Koehler, G. Wang)

- 10:15 - 10:45 K. Taguchi, H. Kudo: *Motion Compensated Fan-Beam Reconstruction for Computed Tomography using Derivative Backprojection Filtering Approach.* p. 433
- 10:45 - 11:15 U. van Stevendaal, C. Lorenz, J. von Berg, M. Grass: *Motion-Compensated Reconstruction in Helical Cardiac CT.* p. 437
- 11:15 - 11:45 J. Wang, H. Lu, T. Li, Z. Liang: *Noise Reduction for Four Dimensional Dynamic Computed Tomography.* p. 441