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**Education:**

- 9/90-6/94 Harvard University, A.B. *magna cum laude* in Physics.
- 9/94-6/95 Cambridge University, Lionel de Jersey-Harvard scholar at Emmanuel College. Worked on conceptual foundations of quantum mechanics in Department of History and Philosophy of Science.
- 1/96-12/00 University of Chicago, Ph.D., Graduate Programs in Medical Physics.

**Academic Appointments:**

- 12/00-7/02 Physicist, Department of Radiology, The University of Chicago
- 7/02-6/04 Instructor, Department of Radiology, The University of Chicago
- 7/04-6/11 Assistant Professor, Department of Radiology, Committee on Medical Physics, and the College, The University of Chicago
- 7/11-pres. Associate Professor (with tenure), Department of Radiology, Committee on Medical Physics, and the College, The University of Chicago

**Honors:**

- 1991 Detur prize for having one of the top 60 first-year grade-point averages, Harvard University
- 1994 Phi Beta Kappa, Harvard University
- 1994 Recipient of Lionel de Jersey-Harvard scholarship to Cambridge University
- 1998 Honorable mention poster award, SPIE Medical Imaging Symposium, "Mathematical equivalence of zero-padding interpolation and circular sampling theorem interpolation with implications for direct Fourier image reconstruction"
- 1999 Graduate scholarship award, IEEE Nuclear and Plasma Sciences Society
- 1999 Student travel award, IEEE Nuclear Science Symposium and Medical Imaging Conference
- 1999 Young investigator award, Future Directions in Nuclear Medicine Physics and Engineering Symposium
- 2000 First prize, Student paper competition, World Congress on Medical Physics and Biomedical Engineering
- 2000 Student travel award, IEEE Nuclear Science Symposium and Medical Imaging Conference
- 2003 Cum laude poster award, SPIE Medical Imaging Symposium, "A New Approach for CT Image Reconstruction with Asymmetric Configuration"
- 2003 Kurt Rossmann award for excellence in teaching, Graduate Programs in Medical Physics, The University of Chicago

- 2004 Schweppe Foundation Career Development Award
- 2005 Cum laude poster award, SPIE Medical Imaging Symposium, "Penalized-likelihood sinogram smoothing for dose reduction in computed tomography"
- 2005 IEEE Young Investigator Medical Imaging Scientist Award, then given every two years to a young investigator within 6 years of the Ph.D. for significant contributions to medical imaging research.
- 2007 Kurt Rossmann award for excellence in teaching, Graduate Programs in Medical Physics, The University of Chicago
- 2016 Kurt Rossmann award for excellence in teaching, Graduate Programs in Medical Physics, The University of Chicago
- 2016 Fellow, Marine Biological Laboratory, Woods Hole, MA
- 2018 Distinguished investigator, Academy for Radiology and Biomedical Imaging Research

### **Leadership roles**

- 2010-present Member, Advanced Photon Source Upgrade Imaging and Coherence advisory panel
- 2012- present Member and Co-chair (since 2014), Research Resource Oversight Committee, University of Chicago BSD
- 2011-2014 Chair, Imaging and microbeam proposal review panel, Advanced Photon Source
- 2009-2013 Member, American Cancer Society Illinois Division Research Advisory Committee
- 2013-present Member, Clinical Cancer and Epidemiology Peer Review panel, American Cancer Society Atlanta, GA
- 2014-2015 Ad hoc review, MEDI and BMIT, National Institutes of Health
- 2014-present Associate Editor, SPIE Journal of Medical Imaging
- 2015-present Marine Biological Laboratory Imaging and Computation Vision Team
- 2016-present Charter member, BMIT-A study section, National Institutes of Health
- 2017-present Associate Editor, IEEE Transactions on Medical Imaging
- 2018-present Associate Editor, IEEE Transactions on Computational Imaging

### **Professional Associations:**

- 1998-present Institute of Electrical and Electronics Engineers (IEEE)
- 2004-present American Association of Physicists in Medicine
- 2005-present Society of Photo-optical Instrumentation Engineers

### **Professional Activity:**

- 1997-present Reviewer, *IEEE Nuclear Science Symposium and Medical Imaging Conference Abstracts*
- 1998-present Reviewer, *IEEE Transactions on Nuclear Science*
- 1998-present Reviewer, *Journal of Nuclear Medicine*
- 1999-present Reviewer, *IEEE Transactions on Medical Imaging*
- 2000-present Reviewer, *Medical Physics*
- 2001-present Reviewer, *IEE Proceedings on Vision, Image and Signal Processing*
- 2002-present Reviewer, *Physics in Medicine and Biology*
- 2005-present Guest associate editor, *International Journal of Biomedical Imaging*
- 2005-present Guest associate editor, *Medical Physics*

- 2005-2007 Short course session organizer and presenter, *Radiological Society of North America*
- 2008-present Session chair, *Radiological Society of North America*
- 2008-present Program Committee, *IEEE Engineering in Medicine and Biology Conference*
- 2009-present Program Committee, *International Meeting on Image Formation in X-Ray Computed Tomography*
- 2011-present Program Committee, *International Symposium on Biomedical Imaging*

**Teaching activity:**

- 1/1994-6/1994 Teaching Assistant, Department of Mathematics, Harvard University
- 9/1996-4/1997 Teaching Assistant, Department of Radiology, University of Chicago
- 9/1996-12/2000 Writing Tutor, College Core Program, University of Chicago
- 2002-present Co-teach Medical Physics 38600: Physics of Medical Imaging I
- 2002-present Co-teach Medical Physics 38700: Physics of Medical Imaging II
- 2002-present Co-teach Medical Physics 34200: Practicum for Physics of Medical Imaging I
- 2002-2012 Co-teach Medical Physics 34300: Practicum for Physics of Medical Imaging II
- 2004-2007 Co-coordinate and co-teach Biological Sciences 29207: Perspectives on Imaging
- 2004-present Coordinate and co-teach Biological Sciences 29326: Introduction to Medical Physics
- Winter 2006 Supervised undergraduate Independent Study (Andrew Huening, HiPSS 29700)
- Spring 2006 Supervised undergraduate HiPSS B.A. thesis of Andrew Huening  
Title: "Photographic Truth in the Age of Digital Manipulation"
- 2008-present Co-teach radiological physics course for Radiology residents
- 2012-present Co-teach Medical Physics 34900: Mathematical Methods for Medical Physics
- Spring 2016 Supervised undergraduate physics BA thesis by Troie Journigan
- 2017-18 Supervised undergraduate BA thesis by Celia Cook
- 2018- Teach Digital Imaging lecture and practicum in MBL course "Optical Microscopy in the Biomedical Sciences"
- 2018- Teach Digital Imaging and Microscopy in the BSD Quantitative Biology Boot camp at MBL

**High-school student mentorship**

- Summer 2010 Alexandra Rojek, Northside College Prep, Project: "Energy Optimization of Synchrotron microCT for High-throughput Phenotyping of Zebrafish" was a national semi-finalist in the Intel STS competition
- Summer 2011 Michelle Kruk, Walter Payton College Prep, Project: "Multiple Energy Micro-CT Using Multi-Layered, Multi-Color Thin Film Scintillators"
- Summer 2012 Kyler Gillespie, King College Prep: "Light field optics for x-ray scintillators"
- Summer 2013 Janet Martin, Marian Catholic, "Multistain x-ray histology"
- Summer 2014 Sidney Trotter, North Lawndale College Prep, "Novel transmission detector for ultrasound breast imaging"

**Past Funding Awards:**

Principal investigators: Patrick La Riviere, Hao Zhang (Northwestern), Yevgenia Kozorovitskiy

(Northwestern)

Title: *Deep Brain Super-resolution Imaging of Neuronal Architecture*

Source: Chicago Biomedical Consortium Catalyst Award

Project period: 9/01/15-8/30/17

Total direct costs: \$200,000

Project role: PI

Principal investigator: Adam Alessio

Title: *Low-Dose Strategies to Enable Clinical Dynamic Perfusion CT for Myocardial Blood*

Source: NIH R01

Project period: 05/01/12-4/30/17

Total direct costs: \$ 210,153 (subcontract)

Project role: Subcontract PI

Principal investigator: Patrick La Rivière

Title: *Tailored Algorithms for Non-Contrast Computed Tomography Using Sinogram Restoration*

Source: NIH R01

Project period: 10/01/08-6/30/15

Total direct costs: \$730,000

Project role: PI

Principal investigator: Keith Cheng, Penn State University

Title: *Web-based Atlas of Zebrafish Microanatomy as a Community Resource*

Source: NIH R24

Project period: 12/01/10-11/30/15

Total direct costs: \$98,172 (subcontract)

Project role: Subcontract PI

Principal investigator: Xiaochuan Pan

Title: *Targeted Imaging in Helical Cone-Beam CT*

Source: NIH R01

Project period: 12/01/10-11/30/15

Total direct costs: \$1,507,400

Project role: Co-I

Principal Investigator: Patrick La Rivière

Title: *High Resolution Large Field of View Ultrasound Breast Imager*

Source: DOD IDEA award

Project period: 06/01/11-05/31/14

Total direct costs: \$374,849

Project role: PI

Principal investigator: Patrick La Rivière and Ling-Jian Meng (Multi-PI)

Title: *X-ray Fluorescence Computed Tomography with Emission Tomography Apertures*

Source: NIH R21

Project period: 12/01/10-11/30/13

Total direct costs: \$275,000

Project role: PI

Principal investigator: Patrick La Rivière

Title: *Molecular probes and techniques for optoacoustic imaging of proteases*

Source: American Cancer Society Research Scholar Grant  
Project period: 5/01/08–4/30/13  
Total direct costs: \$600,000  
Project role: PI

Principal investigator: Patrick La Rivière  
Title: *Novel reconstruction algorithms and optimized acquisition protocols for low-dose helical CT*  
Source: The Louis Block Fund  
Project period: 7/1/03–6/30/04  
Total direct costs: \$25,000  
Project role: PI

Principal investigator: Patrick La Rivière  
Title: *Development of protease-activable imaging agents for in vivo optoacoustic molecular tomography of breast cancer*  
Source: Department of Defense Breast Cancer Concept Awards  
Project period: 09/01/04–08/31/05  
Total direct costs: \$75,000  
Project role: PI

Principal investigator: Patrick La Rivière  
Title: *Development of algorithms for quantitatively accurate image reconstruction of x-ray fluorescence computed tomography*  
Source: The Whitaker Foundation  
Project period: 9/1/03–8/31/06  
Total direct costs: \$196,833  
Project role: PI

Principal investigator: Patrick La Rivière  
Title: *Penalized likelihood sinogram smoothing and restoration approaches for low-dose CT*  
Source: Scheppe Foundation  
Project period: 4/01/05–03/31/08  
Total direct costs: \$100,000  
Project role: PI

Principal investigator: Patrick La Rivière  
Title: *Molecular probes and techniques for optoacoustic imaging of proteases*  
Source: NIH Breast Cancer SPORE Career Development Award  
Project period: 5/01/07–7/30/08  
Total direct costs: \$75,000  
Project role: PI

Principal investigator: Xiaochuan Pan  
Title: *Targeted Imaging in Helical Cone-Beam CT*  
Source: NIH R01  
Project period: 9/1/05–8/31/09  
Total direct costs: \$963,843  
Project role: Co-I

Principal investigator: Jas Sandhu (Santec Systems)

Title: *Mammography-like Ultrasound Breast Imaging*  
Source: NIH SBIR  
Project period: 10/01/08-3/31/10  
Total direct costs: \$15,000 (U of C subcontract)  
Project role: Subcontract PI

Principal investigator: Patrick La Rivière and Francesco De Carlo (Argonne)  
Title: *Development of Fast Direct-Imaging X-Ray Fluorescence Computed Tomography*  
Source: University of Chicago Argonne Seed Grant  
Project period: 10/01/9–9/30/10  
Total direct costs: \$75,000  
Project role: PI

Principal investigator: Dimple Modgil (Graduate student)  
Title: *System Design, Algorithm Development, and Verification for Optoacoustic Molecular Imaging of Protease Expression in Breast Cancer*  
Source: DOD Breast Cancer Research Program Predoctoral Award  
Project period: 7/1/08–9/30/11  
Total direct costs: \$90,000  
Project role: Mentor

**Current Funding Awards:**

Principal Investigator: Patrick La Riviere, Ling Jian-Meng, Yi Lu (MPI with UIUC)  
Title: *Broadband X-ray Fluorescence Emission Tomography*  
Source: NIH R01  
Project period: 4/1/2018 – 3/31/2022  
Total direct costs: \$ 1,603,060  
Project role: PI (25% effort)

Principal investigator: Patrick La Rivière and Ling-Jian Meng (Multi-PI)  
Title: *Development of a benchtop x-ray fluorescence tomography system using a novel geometry*  
Source: NIH R01  
Project period: 06/01/14–5/30/19  
Total direct costs: \$ 1,661,806  
Project role: Contact PI (25% effort)

Principal investigator: Patrick La Rivière  
Title: *Research in Spectral CT*  
Source: Toshiba Medical Research Institute  
Project period: 06/01/12-present  
Total direct costs: \$100,000 per year  
Project role: PI (5% effort)

Principal investigator: Keith Cheng (Penn State)  
Title: *Groundwork for a Synchrotron MicroCT Imaging Resource for Biology (SMIRB)*  
Source: NIH  
Project period: 4/1/2015 – 3/31/2019  
Total direct costs: \$151,299 (subcontract)

Role: Subcontract PI (7.25% effort)

Principal Investigator: William Green, Chin-tu Chen, Jogesh Mukerhjee (MPI)  
Title: *PET imaging of  $\alpha 4\beta 2$  nicotinic receptor upregulation and smoking cessation*  
Source: NIH R01DA044760  
Project period: 07/1/17-06/30/22  
Total direct costs: \$2,410,863  
Role: Co-investigator (5% effort)

Principal investigator: Rudolf Oldenbourg (MBL)  
Title: *Instantaneous 3D imaging of cells and tissues using polarized light microscopy*  
Source: NIH RO1GM114274  
Project period: 09/01/16-03/31/9  
Total direct costs: \$69,710 (subcontract)  
Role: Subcontract PI (2% effort)

Principal investigator: Patrick La Rivière (UChicago) and Alan Kastengren (Argonne)  
Title: Development of plenoptic x-ray microscopy for dynamic imaging  
Source: UChicago-Argonne strategic collaborative initiative seed grant  
Project period: 7/1/2017-6/30/2018  
Total direct costs: \$75,000  
Project role: PI

Principal investigator: Patrick La Rivière and Sean Foxley (UChicago); Doga Gursoy and Naranayan Kasthuri (Argonne)  
Title: Whole mouse brain microCT for validation and improvement of diffusion-tensor MRI  
Source: UChicago-Argonne collaborative research funding  
Project period: 7/1/2017-6/30/2018  
Total direct costs: \$100,000  
Project role: PI

**Pending Funding Awards:**

Principal investigator: Patrick La Riviere and Rodney Wiersma (MPI)  
Title: Enhanced megavoltage imaging for radiotherapy by light-field imaging of scintillators  
Source: NIH R21  
Total costs: \$275,000 direct  
Project period: 5/1/19-4/30/21  
Project role: PI (10% effort)  
Status: Under review

Principal investigator: Steve Kron, Mark Lingen, Sam Volchenbom  
Title: Tumor Immune Microenvironment Atlas Research Center (TIMARC)  
Source: NIH HTAN program (U2C)  
Total costs: 11,249,973.00  
Project period: 9/1/18-8/31/23  
Project role: Co-investigator (6% effort)  
Status: Under review

Principal investigator: Rudolf Oldenbourg (MBL)  
Title: *3D imaging of cells and tissues using polarized light microscopy*

Source: NIH R01  
Project period: 4/1/19-3/30/23  
Total costs: 428,695  
Project role: Co-investigator (15% effort)  
Status: Under review

### Patents Granted

1. US Patent **6,272,200**, *Fourier and spline-based reconstruction of helical CT images*, X. Pan and **P. J. La Riviere**, Priority date: Jul 28, 1999, **Publication date:** Aug 7, 2001.
2. US Patent **9,437,016**, *Image Domain Pansharpening Method And System For Spectral CT With Large Pixel Energy Discriminating Detectors*. David Rigie and Patrick La Riviere (U of Chicago), Adam Petschke (Toshiba), **Priority date:** August 7, 2013. **Publication date:** Sept 6, 2016.
3. US Patent **9,513,233**, *Color x-ray histology for multi-stained biologic sample*, **P. J. La Riviere**, Yuxin Steve Wang, Darin Clark, Keith Cheng. **Priority date:** October 28, 2011. **Publication date:** Dec 6, 2016.
4. US Patent **9,672,638**, David Rigie and Patrick La Riviere (U of Chicago), Adam Petschke (Toshiba), *Spectral x-ray computed tomography reconstruction using a vectorial total variation*. **Priority date:** Jun 16, 2014. **Publication date:** June 6, 2017.

### Patents Filed

1. US Patent publication 20150043796. David Rigie and Patrick La Riviere (U of Chicago), Adam Petschke and Yuexing Zhang (Toshiba), *Sinogram(Data) Domain Pansharpening Method And System For Spectral CT*. **Filed:** August 7, 2013. **Publication date:** February 12, 2015.

## Bibliography

### Books

1. Anastasio, M. and **La Riviere, P.J.**, eds., *Emerging Imaging Technologies in Medicine*, Taylor-Francis-CRC, 2012.

### Original Peer-Reviewed Journal Articles

1. **La Rivière, P. J.**, Pan, X., and Penney, B. C., "Ideal-observer analysis of lesion detectability in planar, conventional SPECT, and dedicated SPECT scintimammography using effective multi-dimensional smoothing," *IEEE Trans. Nucl. Sci.*, **45**, pp. 1273-1279, 1998.
2. **La Rivière, P. J.** and Pan, X. "Spline-based inverse Radon transform in two and three dimensions," *IEEE Trans. Nucl. Sci.*, **45**, pp. 2224-2231, 1998.
3. Kao, C.-M., Pan, X., Anastasio, M., and **La Rivière, P. J.**, "A Fourier-based optimal recovery approach for anti-aliasing interpolation," *Optical Engineering*, **38**, pp. 2041-2044, 1999.
4. **La Rivière, P. J.** and Pan, X., "Few-view tomography using roughness-penalized nonparametric regression and periodic spline interpolation," *IEEE Trans. Nucl. Sci.*, **46**, pp. 1121-1128, 1999.
5. **La Rivière, P. J.** and Pan, X., "Noise properties of periodic interpolation methods with implications for few-view tomography," *IEEE Trans. Nucl. Sci.*, **46**, pp. 639-645, 1999.
6. **La Rivière, P. J.** and Pan, X., "Nonparametric regression sinogram smoothing using a roughness penalized Poisson likelihood objective function," *IEEE Trans. Med. Imag.*, **19**, pp.



773-786, 2000.

7. **La Rivière, P. J.**, Pan, X., Gilland, D., Kao, C.-M., Chang, W., and Jaszczak, R., "Transmission image reconstruction and redundant information in SPECT with asymmetric fan-beam collimation," *IEEE Trans. Nucl. Sci.*, **48**, pp. 1357–1363, 2001.
8. **La Rivière, P. J.** and Pan, X., "Fourier-based approach for interpolation in single-slice helical CT," *Med. Phys.*, **28**, pp. 381–392, 2001.
9. **La Rivière, P. J.** and Pan, X., "Longitudinal aliasing in multi-slice helical computed tomography: sampling and cone-beam effects," *IEEE Trans. Med. Imag.*, **21**, pp. 1366–1373, 2002.
10. **La Rivière, P. J.** and Pan, X., "Anti-aliasing weighting functions for single-slice helical CT," *IEEE Trans. Med. Imag.*, **21**, pp. 978–990, 2002.
11. **La Rivière, P. J.** and Pan, X., "Pitch dependence of longitudinal sampling and aliasing effects in multi-slice helical computed tomography (CT)," *Phys. Med. Biol.*, **47**, pp. 2797–2810, 2002.
12. **La Rivière, P. J.** and Pan, X., "Favorable noise uniformity properties of Fourier-based interpolation and reconstruction approaches in single-slice helical CT," *Med. Phys.*, **29**, pp. 943–951, 2002.
13. **La Rivière, P. J.** and Pan, X., "Interlaced interpolation weighting functions for multi-slice helical CT," *Optical Engineering*, **42**, pp. 3461–3470, 2003.
14. Armato, S. G., Altman, M. B., and **La Rivière, P. J.**, "Automated detection of lung nodules in CT scans: Effect of image reconstruction algorithm," *Med. Phys.*, **30**, pp. 461–472, 2003.
15. **La Rivière, P. J.** and Pan, X., "Sampling and aliasing consequences of quarter-detector offset use in helical CT," *IEEE Trans. Med. Imag.*, **23**, pp. 738–749, 2004.
16. **La Rivière, P. J.**, "Approximate analytic reconstruction in X-ray fluorescence computed tomography," *Phys. Med. Biol.*, **49**, pp. 2391–2406, 2004.
17. Dachman, A. H., Schumm, P., Heckel, B., Yoshida, H., and **La Rivière, P. J.**, "The effect of reconstruction algorithm on conspicuity of polyps in CT colonography," *Am. J. Roentgenol.*, **183**, pp. 1349–1352, 2004.
18. **La Rivière, P. J.** and Billmire, D. M., "Reduction of noise-induced streak artifacts in x-ray computed tomography through spline-based penalized-likelihood sinogram smoothing," *IEEE Trans. Med. Imag.*, **24**, pp. 105–111, 2005.
19. **La Rivière, P. J.**, "Penalized-likelihood sinogram smoothing for low-dose CT," *Med. Phys.*, **32**, pp. 1676–1683, 2005.
20. **La Rivière, P. J.**, Zhang, J., and Anastasio, M., "Image reconstruction in optoacoustic tomography for dispersive acoustic media," *Optics Letters*, **31**, pp. 781–783, 2006.
21. **La Rivière, P. J.**, and Billmire, D. M., and Vargas, P. A., and Rivers, M. and Sutton, S., "Penalized-likelihood image reconstruction for X-ray fluorescence computed tomography," *Optical Engineering*, **45**, 077005 (10 pages), 2006.
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55. Modgil, D., Rigie, D., Wang, Y., Xiao, X., Vargas, P., and **La Riviere, P.J.**, "Material identification in x-ray microscopy and micro CT using multi-layer, multi-color scintillation detectors," *Phys. Med. Biol.* **60** (2015) 8025–8045 ; doi:10.1088/0031-9155/60/20/8025. PMID: PMC4666511.
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62. Day K.J., **La Rivière P.J.**, Chandler T., Bindokas V.P., Ferrier N.J. and Glick B.S., “Improved deconvolution of very weak confocal signals,” *F1000Research* 2017, 6:787 (doi: 10.12688/f1000research.11773.2). PMID: PMC5553083.

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65. Chandler, T., Mehta, S., Shroff, H., Oldenbourg, R., **La Riviere, P.J.**, “Single-molecule orientation determination with multiview polarized illumination: modeling and microscope design,” *Opt. Express* 25, 31309-31325 (2017). PMID: PMC5682293

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67. Ni, K., Lan, G., Chan, C., Quigley, B., Lu, K., Aung, T., Guo, N., **La Riviere, P.J.**, Weichselbaum, R.R. and Lin, W., 2018, “Nanoscale metal-organic frameworks enhance radiotherapy to potentiate checkpoint blockade immunotherapy,” *Nature Communications*, 9(1), p.2351. PMID: PMC6003951.

#### **Original Peer-Reviewed Journal Articles under review**

1. Ding, Y., Vanselow, D.J., Yakovlev, M.A., Katz, S. R., Lin, A. Y., Clark, D. P., Vargas, P., Xin, X., Copper, J.E., Canfield, V.A., Ang, K.C., Wang, Y., Xiao, X., De Carlo, F., van Rossum, D.B., **La Riviere, P. J.**, and Cheng, K. C., “Three-Dimensional Histology of Whole Zebrafish by Sub-Micron Synchrotron X-ray Micro-Tomography,” submitted to *Science* (2018).

#### **Original Peer-Reviewed Journal Articles in development**

1. **La Rivière, P. J.**, Vargas, P., Clark, D., Rojek, A.E., Xin. X., Xiao, X., De Carlo, F., Rivers, M., Kindlmann, G., and Cheng, K., "Multi-stain x-ray histology by multi-energy computed tomography." (Will be submitted pending outcome of review of *Science* paper).
2. Quigley, B., George, J., Smith, C., Meng, L.-J., and **La Rivière, P.J.**, "Simultaneous X-ray Fluorescence and X-ray Luminescence Imaging with a Pencil Beam Geometry." (Complete draft being reviewed by co-authors).
3. Chandler, T., Guo, M., Oldenbourg, R., Shroff, H., **La Riviere, P**: A series of four papers describing my student Talon Chandler's new theoretical results regarding (a) Spatio-angular transfer functions for fluorescence microscopes: Basic theory (b) Spatio-angular transfer functions for fluorescence microscopes: Effect of polarizers. (c) Singular value decomposition (SVD) of single-view polarized fluorescence microscopes; d) SVD of multi-view polarized fluorescence microscopes. (Extensive polished notes and results exist for all four of these. They need to be finalized and circulated to co-authors.)
4. Chandler, T., Guo, M., Oldenbourg, R., Shroff, H., **La Riviere, P**: A major paper describing the use of the dual-view light sheet microscope for 3D polarized fluorescence imaging. (We are still analyzing fixed-cell data acquired this summer at MBL and are about to acquire live-cell data).

#### **Original Peer-Reviewed Proceedings Articles**

1. **La Rivière, P. J.** and Pan, X., "Longitudinal sampling and aliasing properties in multi-slice helical computed tomography," *Proceedings of the Sixth International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine*, pp. 203–207, 2001.
2. **La Rivière, P. J.**, "Accurate analytic reconstruction in x-ray fluorescence computed tomography" *Proc. 2002 IEEE Intl. Symp. Biomedical Imaging*, pp. 637–640, 2002.
3. **La Rivière, P. J.**, "Three-dimensional reconstruction in x-ray fluorescence computed tomography," *Proceedings of the Seventh International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine*, pp. FR-AM1-3, 2003.
4. **La Rivière, P. J.** and Vargas, P., "Optimal sampling and interpolation schemes for 3D X-ray fluorescence computed tomography," *Proceedings of the Ninth International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine*, 2007.
5. **La Rivière, P. J.**, Vargas, P., Fu, G, and Men, Ling-Jian, "Accelerating X-ray Fluorescence Computed Tomography," *Proceedings of the IEEE Engineering in Biology and Medicine Conference*, 2009.
6. Little, K. A. and **La Rivière, P. J.**, "Effect of modeling anode size and angulation in fully iterative CT reconstruction," *Proceedings of the First International Conference on Image Formation in X-Ray Computed Tomography* (URL: <http://www.ucair.med.utah.edu/CTmeeting/>), 2010.
7. Vargas, P. A., and **La Rivière, P. J.**, "Comparison of image-domain and sinogram-domain penalized likelihood image reconstruction estimators," *Proceedings of the First International Conference on Image Formation in X-Ray Computed Tomography*, 2010 (<http://www.ucair.med.utah.edu/CTmeeting/>).
8. Rigie, D. and **La Rivière, P. J.**, "Calculation and Comparison of Figures of Merit for Spectral CT," *Proceedings of the Second International Conference on Image Formation in X-Ray Computed Tomography* (URL: <http://www.ucair.med.utah.edu/CTmeeting/>), 2012.
9. Modgil, D., Alessio, A. M., Bindschadler, M.D., Little, K.J., Vargas, P. A., and **La Rivière, P. J.**, "Multi-dimensional sinogram restoration for myocardial blood flow estimation from dose-reduced dynamic CT," *Proceedings of the Twelfth International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine*, 2013.
10. Rigie D. and **La Riviere, P.J.**, "A generalized vectorial total-variation for spectral CT reconstruction," *Proceedings of the Third International Conference on Image Formation in X-*

- Ray Computed Tomography (URL: <http://www.ucair.med.utah.edu/CTmeeting/>), 2014.
11. Vargas, P. and **La Riviere, P.J.**, “Sinogram restoration for security screening CT applications,” Proceedings of the Third International Conference on Image Formation in X-Ray Computed Tomography (URL: <http://www.ucair.med.utah.edu/CTmeeting/>), 2014.
  12. **La Riviere, P.J.**, Smith, C., Colon-Ramos, D., Kumar, A., Wu, Y., and Shroff, H., “Modeling and reconstruction for dual-view selective plane illumination microscopy,” *Proceedings of the Twelfth International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine*, 2015.
  13. Modgil, D., Rigie, D. S., Bindschadler, M.D., Alessio, A. M., and **La Rivière, P. J.**, “Image-Domain Denoising for Myocardial Blood Flow Estimation in Dynamic CT,” Proceedings of the Fourth International Conference on Image Formation in X-Ray Computed Tomography (URL: <http://ctmeeting.shpci.org>), 2016.

### Book Chapters

1. Pagonis, C., Redhead, M. L. G., and **La Rivière, P. J.**, “EPR, Relativity, and the GHZ Experiment” in Clifton, R. (ed), *Perspectives on Quantum Reality*. Kluwer, Dordrecht, pp. 43–55, 1996.
2. Redhead, M. L. G. and **La Rivière, P. J.**, “The Relativistic EPR Argument,” in Cohen, R. S. et al. (eds), *Potentiality, Entanglement and Passion-at-a-Distance*. Kluwer, Dordrecht, pp. 207–215, 1997.
3. Chen, C.-T. , Cooper, M. , Kao, C.-M. , **La Rivière, P. J.**, Pan, X., Wen., H.-H., Hsu, C.-H., Hsiau, Z., Lin, K. M.-C. and Lu, C.-C., “Functional and Molecular Imaging Using Positron Emission Tomography,” in Hwang, N. H. C. and Woo S. L.-Y. (eds), *Frontiers in Biomedical Engineering*, Kluwer Academic/Plenum Publishers, New York, pp. 295–314, 2003.
4. Kao, C.-M., **La Rivière, P. J.**, and Pan, X., “Basics of Imaging Theory and Statistics,” in Wernick, M. and Aarsvold, J. (eds.), *Emission Tomography: The Fundamentals of PET and SPECT*, Elsevier Academic Press, San Diego, pp. 103–126, 2004.
5. **La Rivière, P. J.**, “Multislice helical computed tomography: techniques and applications,” in C. Leondes (ed.), *Medical Imaging Systems*, World Scientific Publishing Company, Singapore, pp. 1-36, 2005.
6. **La Rivière, P. J.**, “Sinogram preprocessing for artifact reduction in computed tomography,” in S. Armato and M. Brown (eds.), *RSNA Categorical Course in Diagnostic Radiology Physics: Multidimensional Image Processing, Analysis, and Display*, Radiological Society of North America, pp. 51–62, 2005.
7. **La Rivière, P. J.**, Zhang, J., and Anastasio, M., “Image reconstruction in optoacoustic tomography accounting for frequency-dependent attenuation,” to appear in Wang, L. (ed.), *Photoacoustic imaging and spectroscopy*, CRC Press, 2008.
8. Kao, C.-M., Sidky, E. Y., **La Rivière, P. J.**, and Pan, X., “Some recent developments in Reconstruction Algorithms for Tomographic Imaging,” in Dhawan, A. P., Huang, H. K., and Kim, D-S, (eds.), *Principles and Advanced Methods in Medical Imaging and Image Analysis*, World Scientific Publishing Company, New Jersey, pp. 361-393, 2008

### Invited Lectures and Talks

1. **La Rivière, P. J.**, “X-ray fluorescence computed tomography: biomedical applications and reconstruction challenges,” Biomedical Engineering Seminar, Marquette University, 2003.
2. **La Rivière, P. J.**, “Development of molecular probes and acoustic attenuation correction schemes for optoacoustic tomography,” University of Wisconsin, Milwaukee, 2006.
3. **La Rivière, P. J.**, “Sinogram preprocessing for artifact reduction in computed tomography,” as part of the short course on *Multidimensional Image Processing, Analysis, and Display*, given

at the Radiological Society of North America, in 2005, 2006, and 2007.

4. **La Rivière, P. J.**, "Novel scanning approaches for synchrotron-based X-ray fluorescence computed tomography" National Health Research Institute, Taiwan, 2007.
5. **La Rivière, P. J.**, "Sinogram preprocessing for low-dose computed tomography," Chang Gung Memorial Hospital, Taiwan, 2007.
6. **La Rivière, P. J.**, "Development of protease-sensitive molecular probes and acoustic attenuation correction schemes for optoacoustic tomography," National Taiwan University, Taipei, Taiwan, 2007.
7. **La Rivière, P. J.**, "Penalized-likelihood sinogram preprocessing for low-dose and non-contrast computed tomography," Department of Biomedical Engineering, Purdue University, 2008.
8. **La Rivière, P. J.**, "X-ray fluorescence computed tomography: Applications and challenges," Department of Nuclear and Radiological Engineering, University of Illinois Urbana-Champaign, 2008.
9. **La Rivière, P. J.**, "X-ray fluorescence computed tomography: New approaches to imaging," Department of Nuclear and Radiological Engineering, University of Wisconsin, Milwaukee, 2008.
10. **La Rivière, P. J.**, Vargas, P., Fu, G, and Men, Ling-Jian, "Accelerating X-ray Fluorescence Computed Tomography," IEEE Engineering in Biology and Medicine Conference, 2009.
11. **La Rivière, P. J.** and Modgil, D., "Optoacoustic Molecular Imaging of protease expression in breast cancer," Linz, Austria, 2009.
12. **La Rivière, P. J.**, "Applications of acoustography to breast imaging," University of Wisconsin, Milwaukee, 2010.
13. **La Rivière, P. J et al.**, "Optimizing synchrotron microCT for high-throughput phenotyping of zebrafish," SPIE Developments in X-Ray Tomography Conference, 2010.
14. **La Rivière, P. J.**, "Potential of sinogram restoration for security screening CT," Algorithm Development for Security Applications," Boston, MA, 2011.
15. **La Rivière, P. J.**, "Task-based metrics for optimization and characterization of photon counting computed tomography," Second Workshop on Medical Applications of Spectroscopic X-ray Detectors, CERN, Geneva, Switzerland, 2013.
16. **La Rivière, P. J.**, "Potential clinical considerations and applications for spectral CT," IEEE Nuclear Science Symposium and Medical Imaging Conference, Seoul, Korea, 2013.
17. **La Rivière, P. J.**, "Potential for Material Identification in Dynamic Pink-Beam Studies Using Dual-Layer Scintillators," Integrated Imaging Initiative Seminar, Argonne National Lab, 2015.
18. **La Rivière, P. J.**, "Elemental imaging using novel approaches to x-ray fluorescence and x-ray absorption tomography," University of Houston Dept. of Physics Seminar, Houston, TX, November 2015.
19. **La Rivière, P. J.**, "Modeling and reconstruction for multi-view selective plane illumination microscopy," Workshop on 3D microscopy, Marine Biological Laboratory, Woods Hole, MA, August 2015.
20. **La Rivière, P. J.**, "Development of x-ray histology for phenotyping model organisms," Biological Sciences Division Imaging Workshop, Chicago, IL, April 2015.
21. **La Rivière, P. J.**, "Development of "color" x-ray histology using multiple metal stains and multi-energy synchrotron CT," **Plenary talk**, APS Users meeting, Argonne, IL, May 2016.
22. **La Rivière, P. J.**, "Development of "color" x-ray histology using multiple metal stains and multi-energy synchrotron CT," Biology and Synchrotron Radiation, SLAC, Palo Alto, CA, August 2016.
23. **La Rivière, P. J.**, "X-ray Fluorescence Computed Tomography: Novel Reconstruction Algorithms and Acquisition Strategies," NSLSII Users meeting, Brookhaven, NY, May 2017.

24. **La Rivière, P. J.**, "Towards Color Computed Tomography: Algorithmic Challenges and Opportunities in Spectral CT," **Plenary talk**, SIAM Imaging Sciences Symposium, Houston, TX, October 2017.
25. **La Rivière, P. J.**, "Towards Color Computed Tomography: opportunities and challenges in Spectral CT," ECE Department Seminar, IIT, Chicago, November, 2017.

### **Non-Peer-Reviewed Conference Proceedings Articles**

1. **La Rivière, P. J.** and Pan, X., "Direct spline-based inversion of the three-dimensional Radon transform with application to cardiac phantom data," *IEEE Nucl. Sci. Symp. Conf. Record*, **2**, pp. 1674-1678, 1997.
2. **La Rivière, P. J.**, Pan, X., Penney, B. C., and Chen, C.-T., "Improved detectability of malignant lesions in SPECT scintimammography using effective multi-dimensional smoothing," *IEEE Nucl. Sci. Symp. Conf. Record*, **2**, pp. 1581-1585, 1997.
3. Pan, X., **La Rivière, P. J.**, Ye, J., Mukherjee, J. and Chen, C.-T., "Efficient sinogram smoothing for dynamic neuroreceptor PET imaging," *Proc. SPIE*, **3033**, pp. 140-146, 1997.
4. Kao, C.-M., Pan, X., Anastasio, M., and **La Rivière, P. J.**, "An interpolation method using signal recovery and discrete Fourier transform," *IEEE Nucl. Sci. Symp. Conf. Record*, **2**, pp. 1387-1391, 1998.
5. **La Rivière, P. J.** and Pan, X., "Few-view tomography using interpolating and smoothing splines with implications for cardiac SPECT," *IEEE Nucl. Sci. Symp. Conf. Record*, **3**, pp. 1615-1619, 1998.
6. **La Rivière, P. J.** and Pan, X., "Noise properties of periodic interpolation methods with implications for few-view tomography," *IEEE Nucl. Sci. Symp. Conf. Record*, **3**, pp. 1610-1614, 1998.
7. **La Rivière, P. J.** and Pan, X., "Mathematical equivalence of zero-padding interpolation and circular sampling theorem interpolation with implications for direct Fourier image reconstruction," *Proc. SPIE*, **3338**, pp. 1117-1126, 1998.
8. **La Rivière, P. J.**, Pan, X., and Kao, C.-M., "Medical imaging applications of effectively multi-dimensional interpolation," *IEEE Nucl. Sci. Symp. Conf. Record*, **2**, pp. 1023-1027, 1999.
9. Pan, X. and **La Rivière, P. J.**, "FFT-based approach to longitudinal interpolation in single- and multi-slice helical CT," *IEEE Nucl. Sci. Symp. Conf. Record*, **3**, pp. 1588-1592, 1999.
10. **La Rivière, P. J.** and Pan, X., "Resolution properties of non-parametric regression sinogram smoothing using an explicit Poisson model," *IEEE Nucl. Sci. Symp. Conf. Record*, **3**, pp. 1657-1661, 1999.
11. **La Rivière, P. J.** and Pan, X., "Comparison of angular interpolation approaches in few-view tomography using statistical hypothesis testing," *Proc. SPIE*, **3661**, pp. 398-407, 1999.
12. **La Rivière, P. J.**, Pan, X., Gilland, D., Kao, C.-M., Chang, W., and Jaszczak, R., "Transmission image reconstruction and redundant information in SPECT with asymmetric fan-beam collimation," *IEEE Nucl. Sci. Symp. Conf. Record*, **2**, pp. 15\_194–15\_198, 2000.
13. **La Rivière, P. J.** and Pan, X., "Longitudinal sampling and aliasing in multi-slice helical computed tomography," *IEEE Nucl. Sci. Symp. Conf. Record*, **2**, pp. 15\_79–15\_83, 2000.
14. **La Rivière, P. J.** and Pan, X., "Favorable noise uniformity properties of Fourier-based approaches to interpolation in helical CT with implications for 3D visualization," *Proceedings of the 22nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, **2**, pp. 1043-1046, 2000.
15. **La Rivière, P. J.** and Pan, X., "Fourier-based approach to interpolation in helical CT exploiting redundant fanbeam information," *Proc. SPIE*, **3977**, pp. 280-291, 2000.
16. Pan, X., **La Rivière, P. J.**, Kao, C.-M., and Pan, T.-S., "Evaluation of noise properties of reconstruction algorithms in fan-beam computed tomography," *Proc. SPIE*, **3979**, pp. 1636-1641, 2000.



17. Feng, J., Kao, C.-M., **La Rivière, P. J.**, and Pan, X., "An angular frequency dependent filter for PET reconstruction," *IEEE Nucl. Sci. Symp. Conf. Record*, **3**, pp. 1742 -1745, 2001.
18. **La Rivière, P. J.** and Pan, X., "B-spline based weighting functions for helical CT," *IEEE Nucl. Sci. Symp. Conf. Record*, **3**, pp. 1494–1498, 2001.
19. **La Rivière, P. J.** and Pan, X., "Anti-aliasing weighting functions for helical CT," *Proc. SPIE*, **4320**, pp. 732–743, 2001.
20. **La Rivière, P. J.** and Pan, X., "Anti-aliasing weighting functions for multi-slice helical CT," *Proc. SPIE*, **4682**, pp. 380–391, 2002.
21. **La Rivière, P. J.** and Pan, X., "Sampling and aliasing consequences of quarter-detector offset use in helical CT," *IEEE Nucl. Sci. Symp. Conf. Record*, **3**, pp. 1711–1715, 2002.
22. Sidky, E. Y., Kao, C.-M., **La Rivière, P. J.** and Pan, X., "Noise properties of the inverse pi-scheme exponential Radon transform," *Proc. SPIE*, **4684**, pp. 790-796, 2002.
23. Yu, L., Pan, X., Pelizzari, C., **La Rivière, P. J.**, and Pan, T., "A New Approach for CT Image Reconstruction with Asymmetric Configuration," *Proc. SPIE*, **5032**, pp.1911–1917, 2003.
24. **La Rivière, P. J.**, "Reduction of noise-induced streak artifacts in x-ray computed tomography through penalized-likelihood sinogram smoothing," *IEEE Nucl. Sci. Symp. Conf. Record*, **5**, pp. 3239 – 3243, 2003.
25. **La Rivière, P. J.**, "Fourier crosstalk analysis of multi-slice and conebeam helical CT," *Proc. SPIE*, **5368**, pp. 19–28, 2004.
26. **La Rivière, P. J.** and Billmire, D. M., "Penalized-likelihood image reconstruction for x-ray fluorescence computed tomography with unknown fluorescence attenuation maps," *Proc. SPIE*, **5535**, pp. 243–252, 2004.
27. **La Rivière, P. J.**, "Penalized-likelihood sinogram restoration for CT artifact correction," to be published in *IEEE Nucl. Sci. Symp. Conf. Record*, 2004.
28. **La Rivière, P. J.** and Vargas, P., "Penalized-likelihood sinogram smoothing for dose reduction in computed tomography," *Proc. SPIE*, **5745**, pp. 992–1001, 2005.
29. **La Rivière, P. J.** and Vargas, P., "Monotonic penalized-likelihood image reconstruction for X-ray fluorescence computed tomography," *IEEE Nucl. Sci. Symp. Conf. Record*, **4**, 1596723 (5 pages), 2005.
30. **La Rivière, P. J.**, Zhang, J., and Anastasio, M., "Image reconstruction in optoacoustic tomography accounting for frequency-dependent attenuation," *IEEE Nucl. Sci. Symp. Conf. Record*, **4**, 1596689 (5 pages), 2005.
31. **La Rivière, P. J.**, Zhang, J., and Anastasio, M., "Ultrasonic attenuation correction in optoacoustic tomography," *Proc. SPIE*, **6086**, pp. 60861ff (8 pages), 2006.
32. **La Rivière, P. J.** and Vargas, P., "Evaluation of noise and resolution properties of penalized-likelihood CT sinogram smoothing and restoration algorithms," *Proc. SPIE*, **6142**, pp. 61420Xff (8 pages), 2006.
33. Forthmann, P., Kohler, T., Defrise, M., and La Riviere, P., "Comparison of three sinogram restoration methods," *Proc. SPIE*, **6142**, pp. 61420Yff (12 pages), 2006.
34. **La Rivière, P. J.** and Vargas, P., "Alternating update penalized-likelihood image reconstruction for x-ray fluorescence computed tomography," *Proc. SPIE*, **6318**, pp. 63180Zff (10 pages), 2006.
35. **La Rivière, P. J.** and Vargas, P., "Correction for resolution non-uniformities caused by anode angulation in computed tomography," *IEEE Nucl. Sci. Symp. Conf. Record*, **5**, pp. 2919-2923, 2006.
36. **La Rivière, P. J.** and Vargas, P., "Monotonic iterative reconstruction algorithms for targeted reconstruction in emission and transmission computed tomography," *IEEE Nucl. Sci. Symp. Conf. Record*, **5**, pp. 2924-2928, 2006.
37. **La Rivière, P. J.**, and Green, A., and Norris, J., "Development of a protease-sensitive molecular imaging agent for optoacoustic tomography," *Proc. SPIE*, **6437**, pp. 64370Kff (10 pages) 2007.

38. Zhang, J., Anastasio, M., and **La Rivière, P. J.**, "Comparison of iterative reconstruction approaches for photoacoustic tomography," *Proc. SPIE*, **6437**, pp. 64370Yff (10 pages) 2007.
47. **La Rivière, P. J.** and Vargas, P., "Potential equivalence of sinogram and image-domain penalized likelihood methods," **4**, pp. 4169-4173, *IEEE Nucl. Sci. Symp. Conf. Record*, 2007.
48. **La Rivière, P. J.**, Vargas, P. A., Newville, M., and Sutton, S., "Reduced-scan schemes for X-ray fluorescence computed tomography," **4**, pp. 2991-2995, *IEEE Nucl. Sci. Symp. Conf. Record*, 2007.
49. Modgil, D. and **La Rivière, P. J.**, "Implementation and comparison of reconstruction algorithms for 2D optoacoustic tomography using a linear array." *Proc. SPIE*, **6856**, 68571Dff (12 pages), 2008.
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