Jennifer L. Mueller

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Appointments

2020–2023: Professor Laureate, College of Natural Sciences, Colorado State University
2016– Professor of Electrical and Computer Engineering, Colorado State University (joint/courtesy appointment)
2011– Professor of Mathematics, Colorado State University
2011– Professor of Biomedical Engineering, Colorado State University
2013– : Associate Chair, Dept. of Mathematics, Colorado State University
2010– : Graduate Director, Colorado State University
2007–2011: Associate Professor of Biomedical Engineering, Colorado State University
2005–2011: Associate Professor of Mathematics, Colorado State University
2000–2005: Assistant Professor of Mathematics, Colorado State University
1997–2000: NSF Mathematical Sciences Postdoctoral Fellow, Rensselaer Polytechnic Institute
1998–2000: Research Fellow, Rensselaer Polytechnic Institute

Laboratories

2011– Director and founder of Electrical Impedance Tomography Laboratory

Education

1997 Ph.D. in Mathematics, University of Nebraska
1993 M.S. in Mathematics, University of Nebraska
1991 B.S. in Mathematics and Statistics, University of Nebraska, magna cum laude, Phi Beta Kappa

Editorships

Editorial Board member: Inverse Problems, Jan. 2018 - present
Editorial Board member: SIAM Book Series on Control and Design, Nov. 2017 - present
Associate editor: Journal of Electromagnetics, RF and Microwave in Medicine and Biology (JERM), Feb. 2017 - present
Associate editor: Inverse Problems in Science and Engineering, Oct., 2016- Dec. 2017
Associate editor: IEEE Transactions on Medical Imaging, Nov. 2015 - present
Associate editor: SIAM Journal of Applied Mathematics, Jan. 2014 - present

Advisory Boards

2012–2020: School of Biomedical Engineering, Milwaukee School of Engineering (MSOE)
2005 Invited participant, Respironics Medical Advisory Board Meeting, Cleveland, OH

Visiting Positions

Spring 2017: University of São Paulo, Brazil
Spring 2010: University of São Paulo, Brazil
Spring 2007: University of São Paulo, Brazil

Honors and Awards

08/2019: Invited Plenary Speaker at Conference on Modern Challenges in Imaging, in the Footsteps of Allan MacLeod Cormack on the Fortieth Anniversary of his Nobel Prize, Tufts University
2018: Recipient of the SBME Graduate Teaching Award
2017: Recipient of the SBME Graduate Teaching Award
2016: Co-chair of SIAM Annual Meeting 2017
04/2016: Invited Plenary Speaker: NIH Human Placenta Project Workshop
05/2014: Invited Plenary Speaker At "Progres recents dans l'analyse mathematique et numerique des problemes inverses", CIRM, Marseilles, France
2010–2012: Program Director of SIAM Activity Group on Imaging (elected)
2008–2010: Vice Chair of SIAM Activity Group on Imaging (elected)
1997–2000: NSF Mathematical Sciences Postdoctoral Fellowship
1995–1997: EPA Graduate Fellowship

Grants Received

2020–2022: *COVID Emergency Supplement to: Real-Time Assessment of Lung Structure and Function in CF Patients using Electrical Impedance Tomography*, NIH/NIBIB, PI. Note: This is a competitive award for COVID research, and the mechanism is as a supplement to an existing grant
2019–2023: *Real-Time Assessment of Lung Structure and Function in CF Patients using Electrical Impedance Tomography*, NIH/NIBIB, PI.
2019–2020: *Development of a Shape-Sensing Electrode Belt for Electrical Impedance Tomography*, OVPR Quarterly Strategic Funding, Colorado State University
2018–2019: *Thoracic Imaging of Small Animals with Electrical Impedance Tomography*, Co-PI with M. Mellenthin and B. Smith of CU-Denver, CCTSI Novel Methods Development (NMD) Pilot Program
2017–2020: *An integrated electrical impedance/ultrasound tomographic system for real-time monitoring of ICU patients with acute respiratory distress syndrome/acute lung injury*, NIH NIBIB, 1R21EB024683-01, PI.
2013–2016: *EIT: a non-radiating functional imaging method for cystic fibrosis*, NIH NIBIB, R21EB016869, PI.
2015–2015: *Equipment Proposal: Verasonics Ultrasound System,* OVPR Quarterly Strategic Funding, Colorado State University
2015–2018: *Scalable Compiler Technology for Exascale*, DOE, Co-PI with S. Rajopadhye.
2015–2016: *Graduate Student Workshop on Inverse Problems and Applications*, Institute for Mathematics and its Applications, PI.
2015–2016: *Coalition for Development and Implementation of Sensor Systems (CDISS)*, CSU Catalyst for Innovative Partnerships Program, Co-PI with D. Dandy, C. Henry, M. Reynolds, J. Cross, P. Aloise-Young, J. Volckens, K. Lear, T. Chen,

K. Reardon, S. Pallickara, and J. Anura..

2015: Purchase of a Verasonics Ultrasound System, OVPR Quarterly Investment, CSU, PI

2012–2015: *Monitoring techniques for intensive care unit environment based on integration of electrical impedance tomography (EIT) and ultrasound tomography*, University of São Paulo, Foreign Co-PI.

2010–2014: *The Inverse Problem for Estimation of Structure of Biological Macromolecules from Small-Angle X-ray Scattering Data*, HHS-NIH NIGMS, R01GM096192, Co-PI..

2010–2013: *Exploratory Research in Electrical Impedance Tomography*, NIH NIBIB, R21EB009508, PI..

2008–2013: *Towards a Flexible and Extendable Scientific Undergraduate Experience (FEScUE): Blending Mathematics and the Life Sciences*, NSF-DUE, Co-Investigator..

2007–2008: *Graduate Student Workshop in Inverse Problems and Applications*, NSF MPS, DMS-0711489, PI.

2005–2008: *The Dbar Method in Electrical Impedance Tomography*, NSF MPS, DMS-0513509, PI.

2004: Supplement to NSF Grant "A Direct Reconstruction Algorithm for the 2-D Inverse Conductivity Problem", summer funding for Jutta Bikowski.

2002–2003: *The First Mummy Range Workshop in Electrical Impedance Tomography*, NSF, PI..

2001–2004: *A Direct Reconstruction Algorithm for the 2-D Inverse Conductivity Problem*, NSF MPS, DMS-0104861, PI.

Books and Book Chapters

J. L. Mueller and S. Siltanen, *Linear and Nonlinear Inverse Problems with Practical Applications*, SIAM, Computational Science & Engineering, **10**, 2012

Book Chapter: D-bar Methods for EIT, co-authored with David Isaacson and Samuli Siltanen for the text *Electrical Impedance Tomography: Methods, History, and Applications, 2nd edition*, edited by Andy Adler and David S. Holder, CRC Press, in press.

Book Chapter: Evaluation of pulmonary structure and function in patients with cystic fibrosis from electrical impedance tomography data, J.L. Mueller for the text *Biosensors and Biodetection*, edited by Avraham Rasooly, Humana/Springer, in press.

Journal Publications

1. K. Shin and J. L. Mueller 2021 Calderon's method with a spatial prior for 2-D EIT imaging of ventilation and perfusion, in review.

2. Andre Viera Pigatto, Tzu-Jen Kao, Jennifer L. Mueller, Christopher D. Baker, Emily M. DeBoer, and Oren Kupfer 2020 Imaging ventilation before and after airway clearance therapy in spinal muscular atrophy using electrical impedance tomography, in review

3. M. Alsaker, D. Cárdenas, S. Furuie, and J. L. Mueller 2020 Complementary use of priors for pulmonary imaging with electrical impedance and ultrasound computed tomography, Journal of Computational and Applied Mathematics, to appear.

4. Rashmi Murthy, Yi-Hsuan Lin, Kwancheol Shin, and Jennifer L. Mueller 2020 A direct reconstruction algorithm for the anisotropic inverse conductivity problem based on Calderón's method in the plane, Inverse Problems, **36**, no. 12, 125008, doi: 10.1088/1361-6420/abbe5f.

5. K. Shin, S. Ahmad, and J. L. Mueller 2021 Three dimensional Calderón's method for EIT on the cylindrical geometry, IEEE Transactions on Biomedical Engineering, **68**, no. 5, pp. 1487-1495, doi: 10.1109/TBME.2020.3039197.

6. T. Santos, R. M. Nakanishi, J. P. Kaipio, J. L. Mueller, and R. G. Lima 2020 Introduction of sample based prior into the D-Bar method through a Schur complement property, IEEE Transactions on Medical Imaging, **39**, no. 12, doi: 10.1109/TMI.2020.3012428

7. J. L. Mueller and S. Siltanen 2020 The D-bar method for electrical impedance tomography – demystified, Inverse Problems, **36**, no. 9, 093001, https://doi.org/10.1088/1361-6420/aba2f5.

8. K. Shin and J. L. Mueller 2020 A second order Calderon's method with a correction term and a priori information, Inverse Problems, **36**, no. 12, 124005, http://iopscience.iop.org/10.1088 6420/abb014.

9. M. Capps and J. L. Mueller 2021 Reconstruction of Organ Boundaries with Deep Learning in the D-bar Method for Electrical Impedance Tomography, IEEE Transactions on Biomedical Engineering, **68**, no. 3, pp. 826-833, doi: 10.1109/TBME.2020.3006175.

10. Thiago de Castro Martins, André Kubagawa Sato, Fernando Silva de Moura, Erick Dario León Bueno de Camargo, Olavo Luppi Silva, Talles Batista Rattis Santos, Zhanqi Zhao, Knut M oeller, Marcelo Brito Passos Amato, Jennifer L. Mueller, Raul Gonzalez Lima, Marcos de Sales Guerra Tsuzuki 2019 A review of electrical impedance tomography in lung applications: Theory and algorithms for absolute images, Annual Reviews in Control, **48**, pp. 442–471.

11. M. Alsaker and J. L. Mueller 2019 EIT Images of Human Inspiration and Expiration using a D-bar Method with Spatial Priors, Journal of the Applied Computational Electromagnetics Society (ACES), **34**, No. 2, pp. 325–330.

12. M. M. Mellenthin, J. L. Mueller, E. de Camargo, F. de Moura, T. Santos, R. Lima, S. J. Hamilton, P. A. Muller, and M. Alsaker 2018 The ACE1 Electrical Impedance Tomography System for Thoracic Imaging, IEEE Transactions on Instrumentation & Measurement, doi 10.1109/TIM.2018.2874127, **68**, No. 9, pp. 3137-3150.

13. M. Alsaker, J. L. Mueller, and R. Murthy 2019 Dynamic optimized priors for D-bar reconstructions of human ventilation using electrical impedance tomography, Journal of Computational and Applied Mathematics, **362**, 276–294.

14. S. J. Hamilton, J. L. Mueller, and T. Santos 2018 Robust computation in 2D absolute EIT (a-EIT) using D-bar methods with the 'exp' approximation, Physiological Measurement, **39**, No. 6, 064005.

15. Jennifer L. Mueller, Peter Muller, Michelle Mellenthin, Rashmi Murthy, Michael Capps, Melody Alsaker, Robin Deterding, Scott D. Sagel, Emily DeBoer, 2018 Estimating regions of air trapping from electrical impedance tomography data, Physiological Measurement, **39**, No. 5, 05NT01.

16. Peter Muller, Jennifer L. Mueller, Michelle Mellenthin, Rashmi Murthy, Michael Capps, Brandie D. Wagner, Melody Alsaker, Robin Deterding, Scott D. Sagel,, Jordana Hoppe, 2018 Evaluation of surrogate measures of pulmonary function derived from electrical impedance tomography data in children with cystic fibrosis, Physiological Measurement, **39**, No. 4, 045008.

17. M. Alsaker and J. L. Mueller, 2018 Use of an optimized spatial prior in D-bar reconstructions of EIT tank data, Inverse Problems and Imaging, Aug;12(4):883–901.

18. P. A. Muller, J. L. Mueller, and M. Mellenthin, 2017 Real-time implementation of Calderón's method on subject-specific domains, *IEEE Transactions on Medical Imaging*, Sep;36(9):1868-1875. doi: 10.1109/TMI.2017.2695893. Epub 2017 Apr 19. PubMed PMID: 28436855

19. S. J. Hamilton, J. L. Mueller and M. Alsaker, 2017 Incorporating a Spatial Prior into Nonlinear D-Bar EIT imaging for Complex Admittivities, *IEEE Transactions on Medical Imaging*, Feb;36(2):457-466. doi: 10.1109/TMI.2016.2613511. Epub 2016 Sep 26. PubMed PMID: 28114061; PubMed Central PMCID: PMC5384275.

20. M. Alsaker and J. L. Mueller, 2016 A D-bar algorithm with a priori information for 2-D electrical impedance tomography, *SIAM Journal on Imaging Science*, Vol.9 No. 4, 1619–1654.

21. R. Croke, J. L. Mueller, M. Music, P. Perry, S. Siltanen and A. Stahel, 2015 The Novikov-Veselov equation: Theory and Computation, *Contemporary Mathematics*, Vol. 635, 25–70.

22. R. Croke, J. L. Mueller and A. Stahel, 2015 Transverse instability of plane wave soliton solutions of the Novikov-Veselov equation, *Contemporary Mathematics*, Vol. 635, 71–89. Arxiv link: http://arxiv.org/abs/1304.1489

23. C.N.L. Herrera, M.F.M. Vallejo, J.L.Mueller, R. Lima 2015 Direct 2-D reconstructions of conductivity and permittivity from EIT data on a human chest, *IEEE Transactions on Medical Imaging*, Vol. 34, No. 1, pp. 267-274.

24. M. Dodd and J. L. Mueller 2014 A Real-time D-bar Algorithm for 2-D Electrical Impedance Tomography Data, *Inverse Problems and Imaging*, Vol. 8, No. 4, pp.1013-1031.

25. S. J. Hamilton and J. L. Mueller, 2013 Direct EIT reconstructions of complex conductivities on a chest-shaped domain in 2-D, *IEEE Transactions on Medical Imaging*, Vol. 32, No. 4, pp. 757—769. PMID: 25203984

26. S. J. Hamilton, C. N. L. Herrera, J. L. Mueller, and A. Von Herrmann, 2012 A direct D-bar reconstruction algorithm for recovering a complex conductivity in 2-D, *Inverse Problems*, Vol. 28, 095005. Arxiv link: http://arxiv.org/abs/1202.1785

27. M. Lassas, J. L. Mueller, S. Siltanen, and A. Stahel, 2012 The Novikov-Veselov Equation and the Inverse Scattering Method, Part I: Analysis, *Physica D*, Vol. 241, pp. 1322–1335. Arxiv link: http://arxiv.org/abs/1105.3903

28. M. Lassas, J. L. Mueller, S. Siltanen, and A. Stahel, 2012 The Novikov-Veselov Equation and the Inverse Scattering Method, Part II: Computation, *Nonlinearity*, Vol. 25, pp. 1799–1818.

29. K. Knudsen and J. L. Mueller, 2011 The Born approximation and Calderón's method for reconstruction of conductivities in 3-D, Discrete and Continuous Dynamical Systems, Special Issue, pp. 844–853.

30. J. Bikowski, K. Knudsen, J. L. Mueller, 2011 Direct numerical reconstruction of conductivities in three dimensions, *Inverse Problems*, Vol. 27

31. K. Astala, J. L. Mueller, A. Perämäki, L. Päivärinta, S. Siltanen, 2010 Direct electrical impedance tomography for nonsmooth conductivities, *Inverse Problems and Imaging*, Vol. 3, No. 3, pp. 531–549

32. K. Astala, J. L. Mueller, L. Päivärinta, S. Siltanen, 2010 Numerical computation of complex geometrical optics solutions to the conductivity equation, *Applied and Computational Harmonic Analysis*, Vol. 29, No. 1, pp. 2-17.

33. M. DeAngelo and J. L. Mueller 2010 D-bar reconstructions of human chest and tank data using an improved approximation to the scattering transform, *Physiological Measurement*, Vol. 31, No. 2, pp. 221-232. PMID: 20057005

34. K. Knudsen, M. Lassas, J. Mueller, S.Siltanen 2009 Regularized D-bar method for the inverse conductivity problem, *Inverse Problems and Imaging*, Vol. 3, No. 4, pp. 599–624.

35. E.K. Murphy and J. L. Mueller, 2009 Effect of domain-shape modeling and measurement errors on the 2-D D-bar method for electrical impedance tomography, *IEEE Trans. Med. Imaging*, Vol. 28, No. 10, pp. 1576–1584.

36. K. Knudsen, M. Lassas, J. Mueller, S.Siltanen 2008 Reconstructions of piecewise constant conductivities by the D-bar method for electrical impedance tomography, Proceedings of the 4th AIP International Conference and the 1st Congress of the IPIA, Vancouver, 2007, *Journal of Physics: Conference Series, Vol. 124*, 2008.

37. J. Bikowski and J. L. Mueller, 2008 2D EIT reconstructions using Calderón's method, *Inverse Problems and Imaging, Vol. 2, No. 1*, 43–61.

38. M. Lassas, J. Mueller, and S. Siltanen 2007 Mapping properties of the nonlinear Fourier transform in dimension two, *Comm. PDE's., Vol. 32, No. 4* 591–610.

39. E.K. Murphy, J. L. Mueller, J. C. Newell, 2007 Reconstructions of conductive and insulating targets using the D-bar method on an elliptical domain, *Physiological Measurement, Vol. 28, No. 7* S101–S144. PMID: 17664628

40. K. Knudsen, M. Lassas, J. Mueller, S.Siltanen 2006 D-bar method for electrical impedance tomography with discontinuous conductivities, *SIAM J. on Applied Math., Vol. 67, No. 3* 893–913.

41. D. Isaacson, J. Mueller, J. Newell, and S. Siltanen 2006 Imaging Cardiac Activity by the D-bar Method for Electrical impedance tomography, *Physiol Meas. Vol. 27*, S43-S50. PMID: 16636419

42. K. Knudsen, J. Mueller, and S. Siltanen 2004 Numerical solution method for the dbar-equation in the plane, *J. Comp. Phys, Vol. 198, No. 2*, 500–517.

43. D. Isaacson, J. Mueller, J. Newell, and S. Siltanen 2004 Reconstructions of Chest Phantoms by the D-Bar Method for Electrical Impedance Tomography, *IEEE Trans. on Med. Imaging, Vol. 23, No. 7*, 821–828. PMID: 15250634

44. J. Mueller and T.Shores, 2004 A New Sinc-Galerkin Method for the Solution of Convection- Diffusion Equations with Mixed Boundary Conditions, *Computers and Mathematics with Applications, Vol. 47* 803–822.

45. J. Mueller and S. Siltanen 2003 Direct Reconstructions of Conductivities from Boundary Measurements, *SIAM Journal on Scientific Computation, Vol. 24, No. 4*, 1232–1266.

46. J. Mueller, S. Siltanen, and D. Isaacson 2002 A Direct Reconstruction Algorithm for Electrical Impedance Tomography, *IEEE Transactions of Medical Imaging, Vol. 21, No. 6*, 555–559.

47. S. Siltanen, J. Mueller, and D. Isaacson 2001 Reconstruction of High Contrast 2-D Conductivities by the Algorithm of A. Nachman. In *AMS proceedings of the 2000 conference on Radon Transforms and Tomography*, E. Quinto, editor, pp.241-254.

48. J. Mueller, D. Isaacson, and J. Newell 2001 Reconstruction of Conductivity Changes Due to Ventilation and Perfusion from EIT Data Collected on a Rectangular Electrode Array, *Physiol. Meas., Vol. 22, No. 1*, 97–106. PMID: 11236896

49. A. Hasanov and J. Mueller 2001 A Numerical Method for Backward Parabolic Problems with Non-Selfadjoint Elliptic Operators. *Appl. Num. Math.*, Vol. 37, pp. 55-78.

50. S. Siltanen, J. Mueller, and D. Isaacson 2000 An Implementation of the Reconstruction Algorithm of A. Nachman for the 2-D Inverse Conductivity Problem. *Inverse Problems,* **16** , 681–699.

51. A. Hasanov, J. Mueller, S. Cohn, and J. Redepenning 2000 Numerical Solution of a Nonlocal Identification Problem for Nonlinear Ion Transport. *Computers Math. Applic., Vol. 39, No. 7/8*, 225–235.

52. J. Mueller, D. Isaacson, and J. Newell 1999 A Reconstruction Algorithm for Electrical Impedance Tomography Data Collected on Rectangular Electrode Arrays, *IEEE Trans. Biomed. Engr.*, Vol. 46, No. 11, 1379–1386. PMID: 10582423

53. J. Mueller and T. Shores 1997 Uniqueness and Numerical Recovery of a Potential on the Real Line. *Inverse Problems* **13**, 781–800.

Refereed Proceedings Publications

1. Tzu-Jen Kao, Bruce Amm, David Isaacson, Jonathan Newell, Gary Saulnier, and Jennifer L. Mueller 2020 A 3D Reconstruction Algorithm for Real-time Simultaneous Multi-Source EIT Imaging for Lung Function Monitoring, in press.

2. Mueller JL, Cárdenas D, and Furuie S, *A preclinical simulation study of ultrasound tomography for pulmonary bedside monitoring*, Proceedings of the Second International Workshop on Medical Ultrasound Tomography (MUSTII), in press.

3. E. M. Lopes Filho, A. V. Pigatto, J. L. Mueller, and R. G. Lima, *Design and performance of a Tonpilz transducer for low frequency medical ultrasound tomography*, Proceedings of the Second International Workshop on Medical Ultrasound Tomography (MUSTII), in press.

4. M. M. Mellenthin and J. L. Mueller, 2018, *Physiologically Inspired Model of the Skin for Use in Electrical Impedance Tomography*, Proceedings of the 2018 International Applied Computational Electromagnetics Society Symposium, Denver, CO.

5. P. A. Muller and J. L. Mueller, 2018, *Reconstruction of Complex Conductivities by Caldern's Method on Subject-Specific Domains*, Proceedings of the 2018 International Applied Computational Electromagnetics Society Symposium, Denver, CO.

6. M. Alsaker and J. L. Mueller, 2018, *Spatial Priors in the D-bar Method for Human Thoracic Electrical Impedance Tomography Data*, Proceedings of the 2018 International Applied Computational Electromagnetics Society Symposium, Denver, CO.

7. T. B. R. Santos, E. L. B. de Camargo, J. L. Mueller and R. G. Lima, 2018, *Introduction of statistical priors into the D-bar method for electrical impedance tomography*, Proceedings of the 2018 International Applied Computational Electromagnetics Society Symposium, Denver, CO..

8. J. L. Mueller, M. M. Mellenthin, P. Muller, R. R. Deterding, and S. D. Sagel, 2015, *Electrical Imaging of Patients with Cystic Fibrosis*. In: Proceedings of the NIH-IEEE 2015 Strategic Conference on Healthcare Innovation and Point-of-Care Technologies for Precision Medicine.

9. M. Mellenthin, J. Mueller, E. D. L. B. Camargo, F. S. de Moura, S. J. Hamilton, R. Gonzalez Lima, 2015, *The ACE1 Thoracic Electrical Impedance Tomography System for Ventilation and Perfusion.* In: Proceedings of the 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, pp. 4073-4076.

10. E. Murphy and J. Mueller, 2008, *Effect of errors in domain shape modeling in 2-D reconstructions by the D-bar method,* In: Proceedings of the Conference on Electrical Impedance Tomography, Dartmouth University.

11. J. Mueller, 2004, *EIT Reconstructions and Faddeev Solutions for a Numerically Simulated Phantom Chest,* In: Biomedical Sciences Instrumentation, Vol. 40, ISA Volume 449, (S. James and H. Valenta, editors) pp. 213-218

12. J. Mueller and D. Isaacson, 2004, *Regularization of the computed scattering transform for the D-bar method for electrical impedance tomography*, In: Proceedings of the 2004 SPIE Annual Meeting Vol. 5562, (Bones, Fiddy, and Millane, editors) pp. 121-128

13. J. Bikowski and J. Mueller, 2004, *Electrical impedance tomography and the fast multipole method*, In: Proceedings of the 2004 SPIE Annual Meeting Vol. 5562, (Bones, Fiddy, and Millane, editors) pp. 129-140.

Popular articles

Mueller JL, Toward tomographic ultrasound imaging in the ICU, SIAM News Online, 2019.
`https://sinews.siam.org/Details-Page/toward-tomographic-ultrasound-imaging-in-the-icu`

Postdocs Directed

- Talles Santos, Department of Mathematics, Colorado State University, 2020–present
- Sanwar Ahmad, Department of Mathematics, Colorado State University, 2019–present
- Peter Muller, Department of Mathematics, Colorado State University, 2014–2017
- Miguel Montoya Vallejo, Department of Mathematics, Colorado State University, 2013
- Natalia Lara Herrera, Department of Mathematics, Colorado State University, 2013

Doctoral Students

- Ethan Murphy, Department of Mathematics, Colorado State University, 2007, Thesis: *2-D D-bar conductivity reconstructions on non-circular domains*
- Jutta Bikowski, Department of Mathematics, Colorado State University, 2009, Thesis: *Electrical impedance tomography reconstructions in two and three dimensions: from Calderon to direct methods*

• Alan Von Hermann, Department of Mathematics, Colorado State University, 2009, Thesis: *Properties of the reconstruction algorithm and associated scattering transform for admittivities in the plane*
• Ryan Croke, Department of Mathematics, Colorado State University, 2012, Thesis: *The Novikov-Veselov equation, stability of solitary-wave solutions and a numerical solution*
• Sarah Hamilton, Department of Mathematics, Colorado State University, 2012, Thesis: *A direct D-bar reconstruction algorithm for complex admittivities in $W^{2,\infty}(\Omega)$ for the 2-D EIT problem*
• Miguel Montoya Vallejo, University of São Paulo, Brazil, (co-advisor), 2012, Thesis: *Full Nonlinear 2D Reconstructions of Images for Electrical Impedance Tomography Using the D-bar Method*
• Natalia Lara Herrera, University of São Paulo, Brazil, (co-advisor), 2012, Thesis: *A D-bar Method for Computing the Admittivity in 2-D EIT*
• Michelle Mellenthin, School of Biomedical Engineering, CSU, 2016, Thesis: *The Active Complex Electrode (ACE1) Electrical Impedance Tomography System*
• Melody Alsaker (Dodd), Department of Mathematics, Colorado State University, 2016, Thesis: *Computational Advancements in the D-bar Reconstruction Method for 2-D Electrical Impedance Tomography*
• Rashmi Murthy, Department of Mathematics, Colorado State University, 2018, Thesis: *Bayesian approach to the anisotropic EIT problem and effect of structural changes on reconstruction algorithm using 2-D D-bar algorithm*
• Michael Capps, Department of Mathematics, Colorado State University, 2019, Thesis: *Recovery of Organ Boundaries in Electrical Impedance Tomography Images Using a priori Data, Optimization, and Deep Learning*
• Kwancheol Shin, Department of Mathematics, Colorado State University, 2020, Thesis: *Electrical Impedance Tomography with Calderón's Method in Two and Three Dimensions*
• Andre Viera Pigatto, School of Biomedical Engineering, CSU, in progress
• Scott Ziegler, Department of Mathematics, Colorado State University, in progress
• Emily Heavner, Department of Mathematics, Colorado State University, in progress
• Nilton Rosa, School of Biomedical Engineering, CSU, in progress

Master's Students
Jutta Bikowski, 2004, Elena Jakubikova, 2005, Jennifer Maple, 2006, Ashley Swannack, 2008, Sarah Hamilton, 2009, Shelby Stanhope, 2010, Ryan Price, 2012, Scott Ziegler, 2018, Emily Heavner, 2019.

Undergraduate Research
Chase Ashby, 2015-2017, Lucas Martins Rocha, 2015, Jessyca Fonesca Araujo, 2015, Chris Dean, 2013-2014, Connor Watkins, 2013-2014, Katherine O'Dell, funded by HP, 2013-2014, Michael DeAngelo, funded through the Undergraduate Research Institute, CSU, Summer 2007 - Spring 2008. Publication in Physiological Measurement, Marian Allen, 2003, Emily Turner, Honors thesis, 2004

Recent Invited Conference Presentations

• Regularized reconstructions by the Distorted Born Iterative Method for LF USCT, AMS Fall Southeastern Virtual Sectional Meeting, Chattanooga, TN, invited talk in the

minisymposium Special Session on Advances in Image Reconstruction Algorithms for Inverse Tomography Problems, Oct. 10, 2020.
• A Preclinical Simulation Study of Ultrasound Tomography for Pulmonary Bedside Monitoring, Second International Workshop on Medical Ultrasound Tomography (MUSTII), Sept. 2019, Detroit, MI.
• Electrical Impedance Tomography: Modern Advances and Challenges, Conference on Modern Challenges in Imaging, In the Footsteps of Allan MacLeod Cormack on the Fortieth Anniversary of his Nobel Prize, Tufts University, Medford, MA, plenary talk, August 7, 2019.
• Reconstructing organ boundaries with deep learning in the D-bar method for electrical impedance tomography, ICEBI, Joinville, Brazil, June 13, 2019.
• Forward and Inverse Computation in Ultrasound Tomography, SIAM Conference on Computational Science and Engineering (CSE19), Spokane, WA, invited talk in the minisymposium Inverse Problems in Medical Imaging, Feb. 28, 2019.
• Modeling and Direct Reconstruction in Ultrasound Tomography, 2018 SIAM Conference on Imaging Science, Bologna, Italy, invited talk in the minisymposium Advances in Ultrasound Tomography, June 8, 2018.
• D-bar Methods Applied to Functional Pulmonary Imaging: Methods and Clinical Results, 2018 SIAM Conference on Imaging Science, Bologna, Italy invited talk in the minisymposium Advances in Reconstruction Methods for Electrical Impedance Tomography, June 6, 2018.
• Spatial Priors in the D-bar Method for Human Thoracic Electrical Impedance Tomography Data, 2018 International Applied Computational Electromagnetics Society Symposium, Denver, CO, March 24 - 29, 2018
• Computation and Modeling in Ultrasound Tomography Reconstructions, 2017 SIAM Annual Meeting, Pittsburgh, July 12, 2017: invited talk in the minisymposium Matrix Computations for Image Processing and Inverse Problems
• Sensor Location in Ultrasound Tomography, IMA, Sept. 7, 2017: Invited talk at the workshop on Sensor Location in Distributed Parameter Systems
• Electrical impedance tomography: A novel method for imaging, NIH Human Placenta Project Workshop, April 14-15, 2016, NIH, Bethesda, MD, Invited
• Direct Reconstruction Algorithms for Real-Time Patient Imaging with Electrical Impedance Tomography, Computational and Analytical Aspects of Image Reconstruction, ICERM, Brown University, July 15, 2015, Invited
• Electrical Imaging of Patients with Cystic Fibrosis, Poster Presentation, NIH-IEEE POC Conference, Bethesda Maryland, Nov. 9-10, 2015
• D-bar Methods for Electrical Impedance Tomography, May 22, 2014, At "Progres recents dans l'analyse mathematique et numerique des problemes inverses", CIRM, Marseilles, France , Plenary Lecture

Recent Invited Colloquia and Seminars

• Electrical Impedance Tomography: Direct Reconstruction Methods for Pulmonary Imaging, Brown Bag Seminar, Department of Computational Math, Science and Engineering, Michigan State University, Apr. 2, 2021

• Electrical Impedance Tomography: The D-bar Method and Pulmonary Imaging, Colloquium, University of New Mexico, Sept. 22, 2020
• Electrical Impedance Tomography: A non-ionizing imaging technology for the assessment of pulmonary function and structure, Cystic Fibrosis Research Meeting, Children's Hospital Colorado, July 8, 2019.
• Direct reconstruction methods in EIT applied to pulmonary functional imaging: Methods and clinical results, Colloquium, University of Arizona, Oct. 6, 2017
• The D-bar method for the inverse problem of EIT and its application to functional pulmonary imaging, Applied Math Seminar, Universidade Federal do Santa Catarina (UFSC), Florianopolis, Brazil, May 25, 2017
• Electrical Impedance Tomography – An Introduction, Seminar for Graduate Students, Universidade Federal do Santa Catarina (UFSC), Florianopolis, Brazil, May 24, 2017
• Direct reconstruction methods in EIT applied to functional pulmonary imaging: Methods and clinical results, online seminar on Applied Partial Differential Equations, University of Washington, Applied Mathematics Department, Dec. 1, 2016
• Electrical impedance tomography for functional pulmonary imaging: Methods and clinical results, Colloquium, Rensselaer Polytechnic Institute, Oct. 17, 2016
• Electrical Impedance Tomography for Functional Pulmonary Imaging, Institute for Engineering in Medicine Seminar Series, University of Minnesota, Oct. 26, 2015

Invited Minicourses

Electrical impedance tomography and the D-bar method (five lectures), RMMC Summer School: Inverse Problems in Imaging, University of Wyoming, Laramie, June 3–8, 2019

NIH Review Service

Reviewer: NIH ITD Study Section, appointed as standing member for a six year term, served 10/2020, 2/2021, 6/2021
Reviewer: NIH 10/2019 ITD Study Section
Reviewer: NIH 09/2018 MEDI - Medical Imaging Study Section
Reviewer: NIH 02/2018 Special Emphasis Panel/Scientific Review Group 2018/05 BMIT-A
Reviewer: NIH 12/2016 Special Emphasis Panel/Scientific Review Group 2017/01 ZEB1 OSR-C (J3) S meeting
Reviewer: NIH 06/2015 NOIT Neuroscience and Ophthalmic Imaging Technologies Study Section
Reviewer: NIH 02/2015 ZRG1 MOSS-K (11) Oral, Dental, and Craniofacial Sciences SBIR/STTR
Reviewer: NIH 10/2014 ZRG1 SBIB-L (90) Electromagnetics Studies
Reviewer: NIH 10/2014 NOIT Neuroscience and Ophthalmic Imaging Technologies Study Section
Reviewer: NIH 10/2014 BMIT-B Biomedical Imaging Technology B Study Section
Reviewer: NIH 06/2013 ZRG1 BBBP-E (53) RFA-RM-12-018: NIH Director's Early Independence Awards Review
Reviewer: NIH 02/2011 BMIT Biomedical Imaging Technology Study Section

Reviewer: NIH 10/2010 ZRG1 SBIB-U (56) Electromagnetics Devices
Reviewer: NIH 06/2010 ZRG1 SBIB-U (56) Electromagnetics Devices
Reviewer: NIH 11/2009 ZEB1 OSR-E (J1) R13 conference Grant Meeting
Reviewer: NIH 10/2009 ZRG1 SBIB-U (92) Electromagnetics Devices
Reviewer: NIH 02/2009 ZRG1 SBIB-U (92) Electromagnetics Devices
Reviewer: NIH 04/2006 ZEB1 OSR-A (M1) ZEB1 OSR-A M1 S 2006 Imaging Neural Activity

Recent Teaching Experience

- Math 430, Fourier and Wavelet Analysis with Applications, CSU, Spring 2015
- Math 645, Advanced Partial Differential Equations I, CSU, Fall 2014, 2016
- Math 535, Foundations of Applied Mathematics, CSU, Fall 2012, 2013, 2015, 2017, 2018, 2020
- Math 676, Mathematics of Medical Imaging, CSU, Fall 2012
- BME 570, Lecturer for imaging module, CSU, Fall 2011, 2012, 2013, 2014, 2016
- Math 545, Partial Differential Equations I, CSU, Fall 2008, 2009, 2010,2011
- Math 546, Partial Differential Equations II, CSU, Spring 2008, 2009, 2018
- Math 455, Mathematics in Biology and Medicine, CSU, Spring 2006, 2008, Fall 2009
- Math 676, Inverse Problems, CSU, Fall 2007, Spring 2011, Spring 2015

Course Development (Developed for CSU)

- Foundations of Applied Mathematics
- Mathematics of Medical Imaging
- Redesign of Partial Differential Equations
- Inverse Problems
- Mathematics in Biology and Medicine

Recent Departmental, College, and University Service

- Acting Chair, Dept. of Mathematics, Fall 2021
- VPR Advisory Committee (VPAC), Fall 2019 - present
- Sabbatical Committee, College of Natural Sciences, Fall 2018 - Fall 2020 (chaired in Fall 2020)
- Chair of Graduate Committee, Mathematics Dept. 2010 - present
- Chair of Curriculum Committee, School of Biomedical Engineering, 2010 - present
- Chair of Promotion and Tenure Committee, Department of Mathematics, 2014, 2015
- External Review Committee member, 2014-15