

CONTACT INFORMATION	<p>Department of Mathematics, Applied Mathematics and Statistics Case Western Reserve University 2049 Martin Luther King Jr Dr., Cleveland, OH 44106</p> <p>Cell Phone: (781) 813-9382 Office: (216) 368-2880 email: Anuj.Abhishek@case.edu</p>
EDUCATION	<p>Tufts University, Medford, Massachusetts, USA Ph.D., Department of Mathematics, August 2018 <i>Advisor: Professor Eric Todd Quinto (Tufts University)</i> <i>Co-Advisor: Professor Venky Krishnan (TIFR, Bangalore)</i> TIFR - Centre for Applicable Mathematics, Bangalore, India M.S., July 2013 Manipal Institute of Technology, Manipal, Karnataka, India Bachelor of Engineering, June 2010 <i>Undergraduate major: Electronics and Communication Engineering</i></p>
RESEARCH INTERESTS	<p>Statistical and Numerical methods for Inverse Problems</p> <p>Integral Geometry</p> <p>Microlocal Analysis</p>
ON-GOING RESEARCH	<p>I am interested in the area of inverse problems in general which arise in various imaging paradigms such as medical imaging, geophysical imaging, and non-destructive testing of materials. My research encompasses tools from functional analysis, numerical analysis as well as statistics. During my Ph.D., I pursued such problems from a ‘microlocal’ perspective and proved various interesting results such as support theorems and injectivity properties of ray transforms like transverse ray transform that arises in polarization tomography and momentum ray transform that arises in problems related to seismic imaging. Since my Ph.D, in addition to working on inverse problems related to ray transforms, I have also investigated inverse problems arising from PDEs such as coefficient inverse problems and inverse source problems. These types of problems arise in medical imaging paradigms such as electrical impedance tomography (EIT) and Diffuse Optical Tomography (DOT). I have investigated such problems from a numerical analytic viewpoint as well as from the viewpoint of statistical inversion.</p>
JOURNAL PUBLICATIONS AND WORKS IN PROGRESS	<p><i>Support theorems and an injectivity result for integral moments of a symmetric m-tensor field</i>, with Dr. Rohit Kumar Mishra (J. Fourier Anal. Appl. 25 (2019), no. 4, 1487-1512.).</p> <p><i>Support theorems for transverse ray transform of a tensor field of rank m</i> (J. Math. Anal. Appl., 485(2):123828, 2020)</p> <p><i>A modified inverse Born series for Calderon problem</i>, with Prof. Shari Moskow</p>

and Prof. Marc Bonnet (Inverse Problems, Aug 2020)

An optimal Bayesian estimator for absorption coefficient in diffuse optical tomography with Prof. Taufiqar Khan and Dr. Thilo Strauss (SIAM J. on Imaging Sciences, Vol. 15, Iss. 2 (2022), doi:10.1137/21M1462842)

Minimax optimal estimator in a stochastic inverse problem for exponential Radon transform (Sankhya A, May 2022, doi: 10.1007/s13171-022-00285-4)

Adaptive estimation of a function from its exponential Radon transform in presence of noise with Dr. Sakshi Arya (Sankhya A, November 2022)
<https://link.springer.com/article/10.1007/s13171-022-00300-8>

The Carleman-Newton method to globally reconstruct a source term for nonlinear parabolic equation with Thuy Le, Prof. Loc Nguyen and Prof. Taufiqar Khan (submitted, <https://arxiv.org/abs/2209.08011>)

A Bayesian inversion method for simultaneous reconstruction of diffusion and absorption parameters in Diffuse Optical Tomography with Dr. Thilo Strauss and Prof. Taufiqar Khan (submitted.)

ACCEPTED
PUBLICATIONS IN
CONFERENCES

Improved Training of Physics-informed Neural Networks using Energy-Based priors: A Study on Electrical Impedance Tomography with Akarsh Pokkunuru, Dr. Pedram Rooshenas, Dr. Thilo Strauss and Prof. Taufiqar Khan (Accepted in Machine Learning and the Physical Sciences workshop at NeurIPS 2022.)

CURRENT AND
PAST POSITIONS

Assistant Professor, Case Western Reserve University (Jul. 2023 - current)
Post-Doctoral Research Fellow, UNC Charlotte (Feb. 2021 - Jun. 2023)
Visiting Assistant Professor, Drexel University (Sep.2018 - Jan. 2021)

PROFESSIONAL
REFERENCE

Prof. Weihong Guo, CWRU (USA),
email: weihong.guo@case.edu , Ph: +1 216.368.5107

Prof. Todd Quinto, Tufts University (USA),
email: todd.quinto@tufts.edu, Ph: +1 617.627.3402

Prof. Taufiqar Khan, UNC Charlotte (USA),
email: taufiqar.khan@uncc.edu, Ph: +1 704.687.0635

Prof. Venky Krishnan, Tata Institute of Fundamental Research (India),
email: vkrishnan@math.tifrbng.res.in, Ph: +91-806.695.3729

Prof. Shari Moskow, Drexel University (USA),
email: moskow@math.drexel.edu, Ph: +1 215.895.2668

PROFESSIONAL
SERVICE

Co-organizer of AMS Special Session on Reliable and Efficient Machine Learning for Scientific Forward and Inverse Problems, Fall Southeastern Sectional Meeting, University of Tennessee at Chattanooga, October 2022.

Co-organizer of a minisymposium on [Tomographic Inverse Problems at IPMS-2022, Malta.](#)

Co-organizer of a minisymposium on Theory Meets Practice for Inverse Problems in Imaging Applications at SIAM Southeastern Atlantic Section Conference -2021, Auburn University.

Co-organizer of Computational and Applied Mathematics Seminar, UNC Charlotte.

Officer : Society for Industrial and Applied Mathematics, Tufts University Chapter, 2016- 2017.

CONFERENCES, WORKSHOPS AND TALKS

Talks:

- *A Bayesian level-set inversion method for simultaneous reconstruction of absorption and diffusion coefficients in diffuse optical tomography:* Workshop on Tomographic Inverse Problems: Mathematical Challenges and Novel Applications, MFO, Oberwolfach (Germany) May 2023
- *Bayesian estimation of parameters in a stochastic problem of Diffuse Optical Tomography:* Workshop on Medical Imaging, RICAM, Linz(Austria) October 2022
- *Adaptive nonparametric estimator in an inverse problem for Exponential Radon Transform :* 10th International Convergence on Inverse Problems: Modeling and Simulation, Malta, May 2022
- *An optimal Bayesian estimator for a stochastic problem in Diffuse Optical Tomography:* AMS - UT Arlington Student Chapter Meeting, April 2022.
- *An optimal Bayesian estimator for a stochastic problem in Diffuse Optical Tomography :* SIAM Conference on Imaging Sciences, March 2022
- *An optimal Bayesian estimator for a stochastic problem in Diffuse Optical Tomography:* Numerical Analysis and Scientific Computing Seminar, Emory University, November 2021.
- *An optimal Bayesian estimator for a stochastic problem of diffuse optical tomography :* SIAM-SEAS, September 2021.
- *Adaptive Estimation of Function from Exponential Radon Transform Data:* Virtual Inverse Days, December 2020.
- *Support theorems for transverse ray transform of tensor fields:* Minisymposium on Applied Mathematics in Tomography , Conference on Modern Challenges in Imaging, Tufts University, Medford, MA, August 5- August 9, 2019.
- *A Support Theorem for Integral Moments of a Symmetric m -Tensor Field:* Mini-Symposium on Numerical Microlocal Analysis, 100 Years of Radon Transform, Linz (Austria), March 27- March 31, 2017.
- *The Singular Applications of Microlocal Analysis,* Tufts SIAM meeting, Medford, MA, March 9, 2016.

Contributed Posters:

- *A Modified Inverse Born Series for the Calderon Problem.* Workshop on Mathematics in Optical Imaging, IMA, University of Minnesota, April 29-May 3, 2019.
- *A Support Theorem for Integral Moments of a Symmetric m -Tensor Field.* Workshop on Optical Imaging and Inverse Problems, IMA, University of

Minnesota, February 13- 17, 2017.

- *Characterization of Artifacts in Common Offset Synthetic Aperture Radar Imaging*. Workshop on Computational and Analytical Aspects of Image Reconstruction, ICERM, Brown University, Providence, RI, July 13-17, 2015.

Workshops and Conferences Attended

- 10th International Conference on Inverse Problems: Modeling and Simulation, May 22-28, 2022.
- SIAM conference on Imaging Sciences, March 21-25, 2022.
- SIAM Southeastern Atlantic Section Conference, September 18- September 19, 2021
- Introductory Workshop : Microlocal Analysis, MSRI, Berkeley, September 3- September 6, 2019
- Conference on Modern Challenges in Imaging, Tufts University, Medford, MA, August 5- August 9, 2019.
- Microlocal Analysis and Applications, Shanghai Center for Mathematical Sciences Fudan University (China), June 17- June 21, 2019
- Workshop on Mathematics in Optical Imaging, IMA, University of Minnesota, April 29- May 3, 2019
- 100 Years of the Radon Transform RICAM, Linz (Austria), March 27-31, 2017.
- Workshop on Optical Imaging and Inverse Problems, IMA, University of Minnesota, February 13- 17, 2017.
- Computational and Analytical Aspects of Image Reconstruction, Brown University, Providence, RI, July 13-17, 2015.
- Advanced Instructional School on Theoretical and Numerical Aspects of Inverse Problems, TIFR-CAM, Bangalore, India, June 16-28, 2014.
- Advanced Instructional School on Analysis and Geometry, TIFR-CAM, Bangalore, India, July, 2013.
- Advanced Instructional School on Partial Differential Equations, TIFR-CAM, Bangalore, India, December 17, 2012- January 4, 2013.

TEACHING EXPERIENCE

Drexel University

Instructor:

- Math 121 Calculus 1 (Fall 2020).
- Math 210 Differential Equations (Spring 2019 and 2018, Winter 2019).
- Math 301 Numerical Analysis II (Winter 2019, Winter 2018).
- Math 300 Numerical Analysis I (Fall 2019).
- Math 101 Introduction to Mathematical Analysis (Winter 2018).

Tufts University

Instructor:

- MATH 19 Math of Social Choice (Summer 2018 and 2017, Fall 2016).
- MATH 32 Calculus I (Fall 2015).

HONORS AND AWARDS

Graduate Student Teaching Award, Tufts University (2017-18).

Received Graduate Student Travel Fund from Tufts University to attend “100 Years of Radon Transform” organized by RICAM, Linz (Austria).

Received Airbus Travel grant to conduct research at TIFR-CAM (2015, 2016).

Tata Institute of Fundamental Research Masters Fellowship, 2011 - 2013.

MEMBERSHIPS

Society for Industrial and Applied Mathematics (SIAM).

COMPUTER SKILLS

L^AT_EX, MATLAB, Python, FEniCS