

# ARMENAK PETROSYAN, PH.D.

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## SUMMARY

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My research is primarily in Applied Harmonic Analysis and Machine Learning. I study problems related to recovery of systems of signals under sparse or structural assumptions, and approximation and representation capabilities of artificial neural networks.

## PROFESSIONAL EXPERIENCE

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- **Hale Visiting Assistant Professor** Aug 2020 - Present  
School of Mathematics  
Georgia Institute of Technology, Atlanta, GA, USA  
Mentor: Prof. Christopher Heil
- **Postdoctoral Research Associate** Aug 2017 - Jul 2020  
Computer Science and Mathematics Division  
Oak Ridge National Laboratory, TN, USA  
Mentor: Prof. Clayton Webster

## FORMAL EDUCATION

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- **PhD in Mathematics** Aug 2012 - Aug 2017  
Vanderbilt University, Nashville, TN, USA  
PhD advisor: Prof. Akram Aldroubi
- **Master's degree in Mathematics** Sep 2010 - May 2012  
Yerevan State University, Armenia  
Master's advisor: Prof. Artur Sahakian
- **Bachelor's degree in Mathematics** Sep 2006 - May 2010  
Yerevan State University, Armenia

## PUBLICATIONS

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- A. Petrosyan, K. Pieper, and H. Tran  
**A proximal Lagrange-function Gradient method for rank-aware joint sparse regularization.**  
In preperation
- A. Aldroubi, V. Baily, I. Krishtal, and A. Petrosyan  
**Dynamical sampling on networks.**  
In preperation
- K. Pieper and A. Petrosyan  
**Non-convex penalization for shallow neural networks.**  
arXiv:2004.11515, 2021
- A. Aldroubi, C. Cabrelli, U. Molter, and A. Petrosyan  
**Local-to-global frames and applications to dynamical sampling problem.**  
Excursions in Harmonic Analysis, Volume 6, pp. 211-220. Birkhäuser, Cham, 2021

- K. Hamm, B. Hayes, and A. Petrosyan  
**An operator theoretic approach to the convergence of rearranged Fourier series.**  
 Journal d'Analyse Mathématique, 143(2), pp.503-534, 2021
- A. Dereventsov, A. Petrosyan, and C. Webster  
**Neural network integral representations with the ReLU activation function.**  
 Mathematical and Scientific Machine Learning, pp. 128-143. PMLR, 2020.
- K. Hamm, B. Hayes, and A. Petrosyan  
**Rearranged Fourier Series and Generalizations to Non-Commutative Groups.**  
 13th International Conference on Sampling Theory and Applications (SampTA), pp. 1-4. IEEE, 2019.
- A. Aldroubi, L. Huang, A. Petrosyan  
**Frames induced by the action of continuous powers of an operator.**  
 Journal of Mathematical Analysis and Applications, 478(2), 1059-1084, 2019
- A. Petrosyan, H. Tran, and C. Webster  
**Reconstruction of jointly sparse vectors via manifold optimization.**  
 Applied Numerical Mathematics, 144, p. 140-150, 2019
- A. Aldroubi, C. Cabrelli, A. F. Cakmak, U. Molter, and A. Petrosyan  
**Iterative actions of normal operators.**  
 Journal of Functional Analysis, 272(3), p. 1121-1146, 2017
- A. Aldroubi and A. Petrosyan  
**Dynamical sampling and systems from iterative actions of operators**  
 Frames and Other Bases in Abstract and Function Spaces, pp. 15-26. Birkhäuser, Cham, 2017.
- R. Aceska, A. Aldroubi, J. Davis, and A. Petrosyan  
**Dynamical sampling in shift-invariant spaces**  
 AMS Contemporary Mathematics (CONM) book series, p. 139-148, 2013

## GRANTS AND AWARDS

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- Georgia Tech-ORNL seed grant (\$4000).
- Member of the Grand Prize winner team for ORNL SNS Neutral Scattering Ugly Data challenge competition.  
 Details can be found at <https://datadays.pages.ornl.gov/SNS/>.

## CONFERENCE AND SESSION ORGANIZATION

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- **Focus program on Data Science, Approximation Theory, and Harmonic Analysis**  
 co-organized with Akram Aldroubi, Keaton Hamm and Javad Mashregi, Fields Institute, 2022
- **Fast Algorithms, Sparsity and Approximation, Part I-III**  
 16th International Conferences on Approximation Theory  
 co-organized with with Bosu Choi and Mark Iwen, University of Tennessee at Knoxville, September 21-22, 2019
- **Reduced and Parametric Methods for Function Approximations**  
 16th International Conferences on Approximation Theoryco-organized with with Anton Dereventsov, Vanderbilt University, TN, May 19, 2019

## RECENT PRESENTATIONS

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- CodEx Seminar  
Online, September 7, 2021  
Title: “Integral neural networks with weight penalization.”
- Mathematical and Scientific Machine Learning (MSML 2020),  
Princeton University (held online), July 21, 2020.  
Title: “Integral neural networks with the ReLU activation function.”
- Applied Mathematics Seminar,  
University of California, Los Angeles, March 4, 2020.  
Title: “Neural network integral representations and sparse networks.”
- Conference on Computational Mathematics and Applications,  
University of Nevada, Las Vegas, October 25 - 27, 2019.  
Title: “Neural network integral representations.”
- SIAM SEAS 2019 Annual Meeting,  
University of Tennessee, Knoxville, September 20-22, 2019.  
Title: “Neural network integral representations on the sphere for the ReLU activation function.”
- 13th SampTA (Sampling Theory and Applications),  
University of Bordeaux, France, July 8-12, 2019.  
Title: “Rearranged Fourier Series and Generalizations to Non-commutative Groups.”
- Signal Processing with Adaptive Sparse Structured Representations (SPARS) workshop,  
ENSEEIH, Toulouse, France, July 1-4, 2019.  
Title: “Joint sparse recovery through manifold optimization.”
- 16th International Conferences on Approximation Theory,  
Vanderbilt University, Nashville, TN, May 19-22, 2019.  
Title: “Rearranged Fourier Series and Generalizations to Non-commutative Groups.”
- AMS Fall Western Sectional Meeting,  
San Francisco State University, San Francisco, CA, October 27-28, 2018.  
Title: “Joint sparse recovery through manifold optimization.”
- 7th International Conference on Computational Harmonic Analysis and 60th Birthday Workshop for Akram Aldroubi,  
Nashville TN, May 14-19, 2018.  
Title: “Joint sparse recovery through manifold optimization.”
- BIRS Numerical Analysis and Approximation Theory meets Data Science,  
Banff, Canada, April 22-28, 2018.  
Title: “Joint sparse recovery through manifold optimization.”

## TEACHING

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- **Statistical Theory**  
Georgia Institute of technology  
Spring 2022.

- **Discrete Mathematics and Graph Theory**

Georgia Institute of technology

Fall 2021.

- **Probability and Statistics**

Georgia Institute of technology

Fall 2020, Spring 2021, Summer 2021.