Profile

Name : Dr. Arati Shashi

Current position : Assistant Professor,
Department of Mathematics,
Christ Nagar College,
Maranalloor, Koovalassery PO,
Thiruvananthapuram-695512,

Previous position : NBHM Post Doctoral Fellow (PDF),
School of Mathematics,
IISER Thiruvananthapuram,
Maruthamala PO, Vithura,
Thiruvananthapuram - 695551,

Research areas :

Harmonic Analysis

- Time-frequency analysis on Heisenberg group
- Sampling and reconstruction problems in mathematical aspects of signal processing
- R-duality related problems in Gabor analysis
- Problem of erasures in finite frame theory

Research Experience (post PhD):

- 01 May 2021 - 30 April 2024 : NBHM Post Doctoral Fellow (PDF) at IISER Thiruvananthapuram.

Education:

Degree	**Specialization**	**Marks/ CGPA**	**University/Institute**	**Year of passing**
Ph.D	Mathematics	CGPA:9.71/10	IIT Madras	2019
M.Phil	Mathematics	CGPA:5.86/6	RIASM, University of Madras	2009
M.Sc	Mathematics	CGPA:10/10	Anna University, Chennai	2008
B.Sc	Mathematics	98%	Stella Maris College[Autonomous], University of Madras	2006

- Pursued PhD from IIT Madras, Chennai (July 2014 - July 2019) under the mentorship of Prof. R. Radha. The title of the Ph.D thesis is 'The system of translates and the wavelet system on the Heisenberg group'.
- The post doctoral research was under the guidance of Dr. P. Devaraj, School of Mathematics, IISER Thiruvananthapuram.
- The M.Phil dissertation was on a study on wavelets, their construction and MSF wavelets.
- The M.Sc project was on Lenstra's method of factoring integers using elliptic curves and the algorithm was implemented using Maple software.

List of publications:

1. S. Arati, Himanshi Bansal and P. Devaraj, Characterizations of weak R-duality and its application to Gabor frames. *Results in Mathematics*, Vol 80, pp 1-34, https://doi.org/10.1007/s00025-025-02388-4 (2025). (SCIE indexed, Q2 journal with impact factor 1.1)

2. S. Arati, P. Devaraj and Shankhadeep Mondal, Optimal dual pairs of frames for erasures. *Linear and Multilinear Algebra*, pp 1-18, https://doi.org/10.1080/03081087.2025.2464649 (2025). (SCIE indexed, Q2 journal with impact factor 0.9)

3. S. Arati and P. Devaraj, On Riesz duals for Gabor systems on LCA groups. *Rendiconti del Circolo Matematico di Palermo Series 2*, Vol 73, pp 1801-1815, https://doi.org/10.1007/s12215-024-01015-5 (2024). (Scopus indexed, Q2 journal with impact factor 0.9)

4. S. Arati, P. Devaraj and Shankhadeep Mondal, Optimal dual frames and dual pairs for probability modelled erasures. *Advances in Operator Theory*, Vol 9, No 15, pp 1-30, DOI: 10.1007/s43036-023-00314-5 (2024). (Scopus indexed, Q3 journal with impact factor 0.8)

5. S. Arati and R. Radha, Sampling theorem and reconstruction formula for the space of translates on the Heisenberg group. *Communications on Pure and Applied Analysis*, Vol 22, No 2, pp 508-529, DOI: 10.3934/cpaa.2022161 (2023). (SCIE indexed, Q2 journal with impact factor 1)

6. S. Arati, P. Devaraj and Ankush Kumar Garg, Random average sampling and reconstruction in shift-invariant subspaces of mixed Lebesgue spaces. *Results in Mathematics*, Vol 77:223, pp 1-38, https://doi.org/10.1007/s00025-022-01738-w (2022). (SCIE indexed, Q2 journal with impact factor 1.1)

7. S. Arati and R. Radha, Orthonormality of wavelet system on the Heisenberg group. *Journal de Mathématiques Pures et Appliquées* (Elsevier), Vol 131, pp 171-192, DOI:10.1016/j.matpur.2019.02.004 (2019). (SCIE indexed, Q1 journal with impact factor 2.46 and ranked 11 in the world)

8. S. Arati and R. Radha, Wavelet system and Muckenhoupt $\mathcal{A}_2$ condition on the Heisenberg group. *Colloquium Mathematicum*, Vol 158, No 1, pp 59-76, DOI: 10.4064/cm7467-9-2018 (2019). (SCIE indexed, Q3 journal with impact factor 0.4)

9. S. Arati and R. Radha, Frames and Riesz bases for shift invariant spaces on the abstract Heisenberg group. *Indagationes Mathematicae* (Elsevier), Vol 30, pp 106-127, https://doi.org/10.1016/j.indag.2018.09.001 (2019). (SCIE indexed, Q2 journal with impact factor 0.71)

10. S. Arati and R. Radha, Frames, biorthogonal dual and other properties associated with wavelet system on $\mathbb{R}$. *International Journal of Wavelets, Multiresolution and Information Processing* (World Scientific), Vol 17, No 3, 1950008 (22 pages), DOI:10.1142/S0219691319500085 (2019). (SCIE indexed, Q3 journal with impact factor 0.9)

Teaching experience:

- Served as tutorial assistant for the courses Fourier analysis, Functions of several variables, Series and matrices, Differential equations and Probability, stochastic process and statistics at IIT Madras during the Ph.D programme.
- Served as part-time Assistant Professor in Stella Maris College, Chennai for 6 months.
- Coached students for the National Eligibility Test (NET).
- Coached IX and X standard CBSE students.

Academic achievements:

- Awarded NBHM Post-Doctoral Fellowship in December 2020.
- Cleared GATE 2014 (Mathematics) with all India rank 10.
- Cleared the Joint CSIR-UGC Test for JRF and NET (Mathematical Sciences) in December 2013 with rank 41.
- Secured first rank, gold medal and best outgoing student award in M.Sc.
- Secured first rank, gold medal and yearly proficiency in B.Sc.
- Secured the best outgoing student in school (Standard X).

Conferences/Workshops/Talks:

- Participated and delivered a talk on "Wavelet system and Muckenhoupt $\mathcal{A}_2$ condition on the Heisenberg group" at the international conference "17th Discussion Meeting in Harmonic Analysis" held at the School of Mathematical Sciences, NISER Bhubaneswar in January, 2022.
- Gave a talk on "The orthonormality of wavelet system on the Heisenberg group" at the Math Club of the Department of Mathematics, IISER Thiruvananthapuram in August, 2021.
- Participated in the GIAN course - Mathematical Foundations of Signal Analysis (A Fresh Look at Harmonic Analysis) organised by Prof. R. Radha and Prof. S.H. Kulkarni with the foreign expert Prof. H.G. Feichtinger at Indian Institute of Technology Madras during January 8-20, 2018.
- Participated in the National Conference in Analysis held at Chennai Mathematical Institute on Dec 23, 2017.
- Participated in the 15th Discussion Meeting in Harmonic Analysis - International Conference held at the Department of Mathematics, Indian Institute of Science, Bangalore from Dec 18 to 21, 2017.
- Gave a poster presentation titled "Frames, biorthogonal dual and other properties associated with wavelet system on $\mathbb{R}$" in the symposium on 'Function Spaces and Inequalities' in the 83rd Annual Conference of Indian Mathematical Society - An International Meet held at S V University, Tirupati from Dec 12 to 15, 2017.

- Participated in the International Conference on Fourier Analysis and Wavelets held during March 21-25, 2017 at Ramanujan Institute for Advanced Study in Mathematics, University of Madras, Chennai.
- Participated in the 11th Discussion Meeting on Harmonic Analysis - International Conference and Workshop held at National Institute of Science Education and Research (NISER), Bhubaneswar from Dec 28, 2009 to Jan 9, 2010.
- Participated in the Workshop on Elliptic Curves and Cryptology held at the Institute of Mathematical Sciences, Chennai from July 21 to Aug 2, 2008.