Po Lam Yung

Curriculum Vitae

Address: Mathematical Sciences Institute, Australian National University, Australia

Email: polam.yung@anu.edu.au

Education

Ph.D.   Princeton University, Department of Mathematics, 2010
Adviser: Elias M. Stein

M.Phil.   The Chinese University of Hong Kong, 2005
Adviser: Ka-Sing Lau

B.Sc.   The Chinese University of Hong Kong, 2003

Appointments

Associate Professor, Australian National University, 2022 – present

Adjunct Professor, The Chinese University of Hong Kong, 2022 – 2025

Associate Professor, The Chinese University of Hong Kong, 2020 – 2021

Senior Lecturer, Australian National University, 2019 – 2021

Assistant Professor, The Chinese University of Hong Kong, 2014 – 2020

Titchmarsh Fellow, University of Oxford, 2013 – 2014

Hill Assistant Professor, Rutgers, the State University of New Jersey, 2010 – 2013

Research Interests

Harmonic Analysis, Partial Differential Equations

Awards/Honors

2021	Antonio Ambrosetti Medal, SISSA, Italy
2020	Future Fellowship, Australian Research Council, Australia
2018	Distinguished Paper Award, The International Congress of Chinese Mathematicians
2016	Faculty Exemplary Teaching Award, Faculty of Science, The Chinese University of Hong Kong
2015	Early Career Award, Research Grant Council, Hong Kong
2013	Junior Research Fellow, St. Hilda's College, University of Oxford
2007	New World Mathematics Silver Award for Master Thesis, presented at the International Congress of Chinese Mathematicians
2004, 2005	Sir Edward Youde Memorial Fellowship
2003	Dr. Chao Yong Chi-Hsing Scholarships in Mathematics
2002	Bankee Kwan Award for Mathematics Project

Research Grants

2020 – 2024	Australian Research Council Future Fellowship FT200100399 Problems in harmonic analysis: decoupling & Bourgain-Brezis inequalities
2017 – 2019	HKRGC General Research Fund 14303817 Problems in harmonic analysis related to Carleson's operators
2016 – 2019	HKRGC General Research Fund 14313716 Restrictions of pseudodifferential operators of mixed homogeneities
2015 – 2018	HKRGC Early Career Fund 24300915 Compensation for the failures of some critical Sobolev embeddings
2012 – 2014	NSF Grant DMS 1201474 Three problems in Harmonic Analysis
2011 – 2013	AMS Simons Travel Grant

Publications

42. (Joint with Jianhui Li and Zane Kun Li) Strichartz inequalities: some recent developments, arXiv:2310.15306.

41. (Joint with Jeffrey S. Case, Eric Chen, Yi Wang and Paul Yang) The Neumann problem on the Clifford torus in $\mathbb{S}^3$, Adv. Nonlinear Stud. 23 (2023), no. 1, Paper No. 20220072, 42 pp.

40. (Joint with Andrew Hassell, Pierre Portal and Jan Rozendaal) Function spaces for decoupling, arXiv:2302.12701.

39. (Joint with Philip T. Gressman, Lillian B. Pierce and Joris Roos) A new type of superorthogonality, Proc. Amer. Math. Soc. 152 (2024), 665–675.

38. (Joint with Brian Cook, Kevin Hughes, Zane Kun Li, Akshat Mudgal and Olivier Robert) A decoupling interpretation of an old argument for Vinogradov's Mean Value Theorem, Mathematika 70 (2024), no. 1, e12231.

37. (Joint with Haïm Brezis, Andreas Seeger and Jean Van Schaftingen) Sobolev spaces revisited, Rendiconti Lincei - Matematica e Applicazioni, Vol. 33, no.2, p. 413–437 (2022).

36. (Joint with Óscar Domínguez, Andreas Seeger, Brian Street and Jean Van Schaftingen) Spaces of Besov-Sobolev type and a problem on nonlinear approximation, J. Funct. Anal. 284 (2023), no. 4, Paper No. 109775, 50 pp.

35. (Joint with Haïm Brezis, Andreas Seeger and Jean Van Schaftingen) Families of functionals representing Sobolev norms, Analysis & PDE 17 (2024), no. 3, 943–979.

34. (Joint with Denis Brazke and Armin Schikorra) Bourgain-Brezis-Mironescu Convergence via Triebel-Lizorkin Spaces, Calc. Var. Partial Differential Equations 62 (2023), no. 2, Paper No. 41, 33 pp.

33. (Joint with Philip T. Gressman, Shaoming Guo, Lillian B. Pierce and Joris Roos) On the strict majorant property in arbitrary dimensions, Q. J. Math. 74 (2023), no. 1, 139–161.

32. (Joint with Haïm Brezis and Jean Van Schaftingen) Going to Lorentz when fractional Sobolev, Gagliardo and Nirenberg estimates fail, Calc. Var. Partial Differential Equations 60 (2021), no. 4, Paper No. 129, 12pp.

31. (Joint with Shaoming Guo and Zane Kun Li) Improved discrete restriction for the parabola, Math. Res. Letts. 30 (2023), no. 5, 1375–1409.

30. (Joint with Qingsong Gu) A new formula for the L^p norm, J. Funct. Anal. 281 (2021), no. 4, 109075.

29. (Joint with Jean Van Schaftingen) *Limiting Sobolev and Hardy inequalities on stratified homogeneous groups*, Ann. Fenn. Math. 47 (2022) no. 2, 1065–1098.

28. (Joint with Haïm Brezis and Jean Van Schaftingen) *A surprising formula for Sobolev norms*, Proc. Natl. Acad. Sci. 118 (2021) no. 8, e2025254118.

27. (Joint with Shaoming Guo, Zane Kun Li and Pavel Zorin-Kranich) *A short proof of ℓ^2 decoupling for the moment curve*, Amer. J. Math. 143 (2021), no. 6, 1983–1998.

26. (Joint with Shaoming Guo, Changkeun Oh, Joris Roos and Pavel Zorin-Kranich) *Decoupling for two quadratic forms in three variables: a complete characterization*, Rev. Mat. Iberoam. 39 (2023), no. 1, 283–306.

25. (Joint with Shaoming Guo and Zane Kun Li) *A bilinear proof of decoupling for the cubic moment curve*, Trans. AMS. 374 (2021), no. 8, 5405–5432.

24. (Joint with Philip T. Gressman, Shaoming Guo, Lillian B. Pierce and Joris Roos) *Reversing a philosophy: from counting to square functions and decoupling*, J. Geom. Anal. 31 (2021), no. 7, 7075–7095 in "Elias M. Stein: In Memoriam".

23. (Joint with Shaoming Guo, Joris Roos and Andreas Seeger) *Maximal functions associated with families of homogeneous curves: L^p bounds for $p \leq 2$*, Proc. Edinb. Math. Soc. 63 (2020), no. 2, 398–412.

22. (Joint with Shaoming Guo, Joris Roos and Andreas Seeger) *A maximal function for families of Hilbert transforms along homogeneous curves*, Mathematische Annalen 377 (2020), no. 1–2, 69–114.

21. (Joint with Shaoming Guo and Joris Roos) *Sharp variation-norm estimates for oscillatory integrals related to Carleson's theorem*, Analysis & PDE 13 (2020), no. 5, 1457–1500.

20. (Joint with Chin-Yu Hsiao) *Solution of the tangential Kohn Laplacian on a class of non-compact CR manifolds*, Calc. Var. Partial Differential Equations 58 (2019), no. 2, Art. 71, 62 pp.

19. (Joint with Pierre Bousquet, Emmanuel Russ and Yi Wang) *Approximation in higher-order Sobolev spaces and Hodge systems*, J. Funct. Anal. 276 (2019), no. 5, 1430–1478.

18. (Joint with Lillian B. Pierce) *A polynomial Carleson operator along the paraboloid*, Rev. Mat. Iberoam. 35 (2019), no. 2, 339–422.

17. (Joint with Shaoming Guo, Lillian B. Pierce and Joris Roos) *Polynomial Carleson operators along monomial curves in the plane*, J. Geom. Anal. 27 (2017), no. 4, 2977–3012.

16. (Joint with Sagun Chanillo and Jean Van Schaftingen) *Bourgain-Brezis Estimates on Symmetric Spaces of Non-compact Type*, J. Funct. Anal. 273 (2017), no. 4, 1504–1547.

15. (Joint with Sagun Chanillo and Jean Van Schaftingen) *The incompressible Navier Stokes flow in two dimensions with prescribed vorticity*, in Sagun Chanillo, Bruno Franchi, Guozhen Lu, Carlos Perez and Eric T. Sawyer (eds.), Harmonic Analysis, Partial Differential Equations and Applications, Birkhäuser, Applied and Numerical Harmonic Analysis, 2017, 19–25.

14. (Joint with Sagun Chanillo and Jean Van Schaftingen) *Variations on a proof of a borderline Bourgain-Brezis Sobolev embedding theorem*, Chin. Ann. Math. Ser. B 38 (2017), no. 1, 235–252.

13. (Joint with Philip T. Gressman, Danqing He, Vjekoslav Kovač, Brian Street and Christoph Thiele) *On a trilinear singular integral form with determinantal kernel*, Proc. Amer. Math. Soc. 144 (2016), no. 8, 3465–3477.

12. (Joint with Sagun Chanillo and Jean Van Schaftingen) *Applications of Bourgain-Brezis inequalities to Fluid Mechanics and Magnetism*, C. R. Math. Acad. Sci. Paris 354 (2016), no. 1, 51–55.

11. (Joint with Chin-Yu Hsiao) *Solving the Kohn Laplacian on asymptotically flat CR manifolds of dimension 3*, Adv. Math. 281 (2015), 734–822.

10. *A sharp subelliptic Sobolev embedding theorem with weights*, Bull. London Math. Soc. 47 (2015), no. 3, 396–406.

9. (Joint with Sagun Chanillo) *Absence of self-similar blow-up and local well-posedness for the constant mean-curvature wave equation*, J. Funct. Anal. 269 (2015), no. 4, 1180–1202.

8. (Joint with Yi Wang) *A subelliptic Bourgain-Brezis inequality*, J. Eur. Math. Soc. 16 (2014), 649–693.

7. (Joint with Elias Stein) *Pseudodifferential operators of mixed type adapted to distributions of k-planes*, Math. Res. Lett. 20 (2013), no. 6, 1183–1208.

6. (Joint with Chin-Yu Hsiao) *The tangential Cauchy-Riemann complex on the Heisenberg group via Conformal Invariance*, Bulletin of the Institute of Mathematics, Academia Sinica (New Series), Vol. 8 (2013), no. 3, 359–375.

5. (Joint with Sagun Chanillo) *Wave Equations Associated to Liouville Systems and Constant Mean Curvature equations*, Adv. Math, Vol 235 (2013), 187–207.

4. (Joint with Sagun Chanillo) *An improved Strichartz estimates for systems with divergence free data*, Comm. PDE., Vol 37 (2012), no. 2, 225–233.

3. *Sobolev inequalities for $(0,q)$ forms on CR manifolds of finite type*, Math. Res. Lett. 17 (2010), no. 1, 177–196.

2. *Doubling properties of self-similar measures*, Indiana Univ. Math. J. 56 no. 2 (2007), 965–990.

1. (Joint with Jonathan Needleman, Robert Strichartz and Alexander Teplyaev) *Calculus on the Sierpinski gasket I: polynomials, exponentials and power series*, J. Funct. Anal., 215 (2004), 290–340.

Organization of Workshops, Summer schools and Research Activities

17. (Joint with Vigleik Angeltveit) Director of AMSI summmer school 2024.

16. (Joint with Andrew Hassell, Pierre Portal and Laura Cladek) Organizer of special year in harmonic analysis at ANU.

15. (Joint with Philip T. Gressman, Shaoming Guo, Lillian B. Pierce and Joris Roos) Organizer of SQuaRE workshop on Geometric perspectives in harmonic analysis, at American Institute of Mathematics (AIM), Nov 13-17, 2023.

14. (Joint with Dominique Maldague, Yumeng Ou and Ruixiang Zhang) Organizer of a Research Community on Fourier restriction and related problems, supported by American Institute of Mathematics (AIM), 2022-present.

13. (Joint with Kwok-Kun Kwong) Organizer of a special session on "Geometric and Harmonic analysis" at the 65th annual meeting of the Australian Mathematical Society, 2021.

12. (Joint with Dorothee Frey, Zihua Guo, Andrew Hassell, Pierre Portal, and Jan Rozendaal) Organizer of MATRIX-MFO Tandem Workshop: Rough Wave Equations, at Melbourne and Oberwolfach, Sept 13-18, 2021.

11. (Joint with Philip T. Gressman, Shaoming Guo, Lillian B. Pierce and Joris Roos) Organizer of SQuaRE workshop on Geometric perspectives in harmonic analysis, supported by American Institute of Mathematics (AIM), March 29-April 2, 2021.

10. (Joint with Kwok-Wai Chan, Conan Nai-Chung Leung and Jun Zou) Organizer of CUHK Mathematics Alumni International Conference, at the Chinese University of Hong Kong, June 5-7, 2019.

9. (Joint with Philip T. Gressman, Shaoming Guo, Lillian B. Pierce and Joris Roos) Organizer of SQuaRE workshop on Geometric perspectives in harmonic analysis, at American Institute of Mathematics (AIM), April 22-26, 2019.

8. (Joint with De-Jun Feng, Chi-Wai Leung and Zhouping Xin) Organizer of workshop on Fractal Geometry and Related Topics, On the Occasion of Professor Ka-Sing Lau's Retirement, at the Chinese University of Hong Kong, May 4-5, 2018.

7. (Joint with Philip T. Gressman, Shaoming Guo, Lillian B. Pierce and Joris Roos) Organizer of SQuaRE workshop on Geometric perspectives in harmonic analysis, at American Institute of Mathematics (AIM), March 19-24, 2018.

6. Organizer of workshop on harmonic analysis, at the Chinese University of Hong Kong, June 26-30, 2017.

5. Organizer of workshop on harmonic analysis, at the Chinese University of Hong Kong, August 10, 2016.

4. (Joint with Zhouping Xin) Organizer of workshop on wave equations, at the Chinese University of Hong Kong, July 22, 2016.

3. (Joint with Philip T. Gressman, Victor Lie and Lillian B. Pierce) Organizer of workshop on Carleson theorems and multilinear operators, at American Institute of Mathematics (AIM), May 18-22, 2015.

2. (Joint with Zhouping Xin) Organizer of workshop on Probability and PDEs, at the Chinese University of Hong Kong, April 1, 2015.

1. (Joint with Lillian B. Pierce and Christoph Thiele) Organizer of summer school on Carleson theorems and Radon type behaviour, at Hausdorff Institute of Mathematics (HIM), May 25-30, 2014.

PARTICIPATION AT CONFERENCES, WORKSHOPS, MEETINGS AND WEBINARS

48. Invited speaker, Symposium on Applied Mathematics and Data Science, The Education University of Hong Kong, 2023.

47. Invited speaker, RIMS Symposium on Harmonic Analysis and Nonlinear Partial Differential Equations, Kyoto, Japan, 2023.

46. Invited speaker, Modern Trends in Harmonic analysis, International Centre for Theoretical Sciences, India, 2023.

45. Invited speaker, a series of 3 lectures at a workshop on Real analysis and geometry, CIRM, France, 2023.

44. Invited speaker, Workshop on Hypoelliptic Operators in Geometry, Oberwolfach, Germany, 2023.

43. Invited speaker, MATRIX-RIMS Tandem Workshop: Geometric Analysis in Harmonic Analysis and PDE, Creswick, Australia, 2023.

42. Invited speaker, Trilateral Meeting on Nonlinear Partial Differential Equations and Applications, University of Western Australia, 2023.

41. Invited speaker, Annual meeting of the Australian Mathematical Society (2 talks), 2022.

40. Invited speaker, 2nd Harmonic analysis workshop in Seoul, Seoul National University, 2022.

39. Invited speaker, Analysis webinar, University of Wisconsin, Madison, 2022.

38. Invited speaker, Nonlinear analysis and PDE webinar, Rutgers, the State University of New Jersey, 2021.

37. Invited speaker, OIST Nonlinear Analysis Seminar, 2021.

36. Invited speaker, Asia-Pacific Analysis and PDE Seminar, 2021.

35. Invited speaker, Harmonic Analysis from the Edge, Hausdorff Institute of Mathematics, Bonn, 2021.

34. Invited speaker, Arithmetic (and) Harmonic Analysis, Institute Mittag-Leffler, Sweden, 2021.

33. Invited speaker, Canberra Number Theory day, at Canberra, Australia, 2021.

32. Invited speaker, Analysis and PDE Joint Seminar Day, at University of Sydney, Australia, 2020.

31. Invited speaker, The 7th East Asian Conference in Harmonic Analysis and applications, at Chung-Ang University, Korea, 2019.

30. Invited speaker, International Conference on Partial Differential Equations and Applications, at Beijing Normal University, 2019.

29. Invited speaker for 45 minutes lecture, the 8th International Congress of Chinese Mathematicians, at Beijing, 2019.

28. Invited speaker, International Workshop on Applied Analysis and Optimization, at Research Center for Interneural Computing, China Medical University, Taichung, 2019.

27. Invited speaker, International Workshop on Geometric and Harmonic Analysis, at National Center for Theoretical Sciences, Taiwan, 2019.

26. Invited speaker, Madison Lectures in Fourier Analysis, at the University of Madison, Wisconsin, 2019.

25. Invited speaker, Follow-up Workshop to Trimester program "Harmonic Analysis and Partial Differential Equations", at Universität Bonn, 2019.

24. Invited speaker, Conference on Differential Geometry, Geometric Analysis and PDEs, at Academia Sinica, Taiwan, 2018.

23. Plenary speaker, ICM Satellite Conference in Harmonic Analysis, at Federal University of Rio Grande do Sul, Brazil, 2018.

22. Participant in the IAS/PCMI Research Program on Harmonic Analysis, at the Park City Mathematics Institute, Utah, 2018.

21. Invited speaker, Special Session in Harmonic Analysis and Partial Differential Equations, at the 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications, at National Center for Theoretical Sciences, Taiwan, 2018.

20. Invited speaker, a series of 3 talks, at the Workshop on Critical Phenomena, at National Chiao Tung University, Taiwan, 2018.

19. Mentor in the Mathematics Research Community program on "Harmonic Analysis: New Developments on Oscillatory Integrals", organized by the American Mathematical Society, at Rhode Island, 2018.

18. Invited speaker, 2018 Taipei Conference on Geometric Invariance and Partial Differential Equations, at Academia Sinica, Taiwan, 2018.

17. Invited speaker, The 5th East Asian Conference in Harmonic Analysis and applications, at Zhejiang University of Science and Technology, 2017.

16. Invited speaker, Recent Developments in Harmonic Analysis, at MSRI, 2017.

15. Invited speaker, Harmonic Analysis, Geometric Analysis and PDE workshop, at Saitama University, 2016.

14. Invited speaker, Harmonic Analysis, $\overline{\partial}$, and CR geometry, at Casa Matemática Oaxaca, 2015.

13. Invited speaker, AMS-EMS-SPM International Meeting at Porto, 2015.

12. Invited speaker, Analytical aspects of the $\overline{\partial}$-equation, at Nagoya University, 2015.

11. Invited speaker, 2014 Taipei Workshop on Analysis and Geometry in Several Complex Variables, at Academia Sinica, Taiwan, 2014.

10. Invited speaker, Workshop on Contact and CR Geometry, at the University of Hong Kong, 2014.

9. Invited speaker, Workshop in Real Analysis, Harmonic Analysis and Applications, at Oberwolfach, 2014.

8. Invited speaker, Workshop on Real Analysis, in the Hausdorff Trimester program on Harmonic Analysis and Partial Differential Equations, at Universität Bonn, 2014.

7. Participant of workshop on the Cauchy-Riemann equations in several variables, at American Institute of Mathematics (AIM), 2014.

6. Invited speaker, 39th Spring Lecture Series, at University of Arkansas, 2014.

5. Invited lecturer, 4-hour mini-course at Rencontres d'Analyse, Institut Camille Jordan, Université Claude Bernard Lyon 1, France, 2014.

4. Invited speaker, International Conference on Several Complex Variables and Complex Geometry, at Academia Sinica, Taiwan, 2012.

3. Invited speaker, Workshop in Real Analysis, Harmonic Analysis and Applications at Oberwolfach, 2011.

2. Invited speaker, Special Day in Fourier Analysis, at National Center for Theoretical Sciences, Hsinchu, Taiwan, 2011.

1. Plenary speaker, Taiwan-Norway workshop in Analysis and Applications, at National Center for Theoretical Sciences, Hsinchu, Taiwan, 2011.

Public Lectures

2. *Wave Propagation: A mathematical perspective*, STEM Lecture series, Australian National University, 16 June 2021

1. *The Kakeya Conjecture*, New Wave Mathematics Lecture Series, The Chinese University of Hong Kong, 21 March 2015

Outreach

4. Colloquium speaker, Australian National University, 2024.

3. Co-director of Australian Mathematical Sciences Institute (AMSI) summer school, 2024.

2. *What is mathematics research like? A case study and some stories*, Guest Lecture for ANU Maths Society, 25 August 2022

1. *Lines in 2 and 3 dimensions*, Guest Lecture at ANU Maths Extension program, Australian National University, 9 June 2022

Academic Visits

University of Madison, Wisconsin, Nov 2023

Indiana University, Bloomington, Nov 2023

Princeton University, June 2023

University of New South Wales, April 2023

Monash University, July 2022

University of Queensland, January 2019

Australian National University, January 2019

Princeton University, June 2018

Cornell University, March 2018

Universität Bonn, October 2017

University of Wrocław, September 2017

Princeton University, August 2017

Oberwolfach, July 2017

University of Edinburgh, July 2017

MSRI, January, April and May 2017

Rutgers, the State University of New Jersey, February 2016

Princeton University, February 2016

Academia Sinica, Taipei, January 2016

Universite Catholique de Louvain, June 2015

Princeton University, May and July 2015

University of California, Davis, May 2015

Princeton University, August 2014

Hausdorff Research Institute for Mathematics, Universität Bonn, July 2014

Rutgers, the State University of New Jersey, June 2014

Princeton University, June 2014

University of Cambridge, June 2014

University of Edinburgh, January 2014

Hausdorff Center for Mathematics, Universität Bonn, December 2013

University of Sussex, November 2013

University of Warwick, October 2013

Princeton University, June 2013

University of Connecticut, April 2013

University of Arkansas, April 2013

Washington University in St. Louis, March 2013

Hong Kong University of Science and Technology, February 2013

University of Hong Kong, February 2013

University of Oklahoma, January 2013

University of Colorado-Boulder, January 2013

University of Georgia, January 2013

Chinese University of Hong Kong, January 2013

National Central University, Taiwan, December 2012

University of Cambridge, December 2012

University of Edinburgh, December 2012

City University of New York, November 2012

University of Oxford, May 2012

Mathematical Sciences Research Institute (MSRI), December 2011

Georgetown University, November 2011

University of Oxford, April 2011

EDITORIAL WORK

Editorial Board member of *Pseudo-Differential Operators: Theory and Applications* by Birkhäuser

SYNERGISTIC ACTIVITIES

Referee for Acta Mathematica Scientia

Referee for Advances in Mathematics

Referee for the American Journal of Mathematics

Referee for the Annals of Mathematics

Referee for Analysis & PDE

Referee for Bulletin of the Australian Mathematical Society

Referee for Canadian Journal of Mathematics

Referee for Calculus of Variations and Partial Differential Equations

Referee for Communications in Contemporary Mathematics

Referee for Duke Mathematical Journal

Referee for Forum of Math: Pi

Referee for Geometric and Functional Analysis

Referee for the Indiana University Mathematics Journal

Referee for Journal d'Analyse Mathematique

Referee for Journal of the European Mathematical Society

Referee for Journal of Fourier Analysis and Applications

Referee for Journal of Fractal Geometry

Referee for Journal of Functional Analysis

Referee for Journal of Geometric Analysis

Referee for Mathematische Annalen

Referee for Mathematical Research Letters

Referee for the Proceedings of the AMS

Referee for the Pacific Journal of Mathematics

Referee for Quarterly Journal of Mathematics

Referee for Revista Matemática Iberoamericana

Referee for Transactions of the AMS

Referee for Vietnam Journal of Mathematics

Reviewer for the Mathematical Reviews

STUDENT SUPERVISION

Shu Shing Lai (M. Phil CUHK 2017)

Tongou Yang (M. Phil CUHK 2017)

Chun Ho Lau (M. Phil CUHK 2018)

Jianhui Li (M. Phil CUHK 2019)

Hoi Dong Ng (M. Phil CUHK 2019)

Siliang Weng (M. MSci ANU 2021)

Griffin Pinney (Honours ANU 2021)

Wenqi Zhang (PhD ANU ongoing)

11 May 2024