Joe J. Perez
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Education

Northeastern University
Ph.D. in Mathematics (2005) in Partial Differential Equations and Geometry. Dissertation title: The G-Fredholm Property of the $\bar{\partial}$-Neumann Problem. Advisor: M.A. Shubin. Qualifying exams in Analysis, Geometry, and Algebra.

Tulane University
M.S. (ABD) in Mathematics (1994). Oral exam in Functional Analysis, qualifying exams in Analysis, Topology, and Applied Mathematics. Studied primarily Functional Analysis and Applied Mathematics

Texas A&M University
B.A. in Physics (1988), minor in Mathematics. Also completed some graduate coursework in Math and Physics, concentrating on Quantum Field Theory, General Relativity, and Differential Geometry.

Research Positions

Faculty of Mathematics, University of Vienna, Austria
FWF Postdoc, Fall 2009–present.
Complex Analysis Group
Work in Several Complex Variables, Harmonic Analysis, and Geometry

Fields Institute for Mathematical Research, Toronto, Canada.
Graduate Student Fellow, 1994–1995.
Studied Functional Analysis and Operator Algebras. Worked on Schrödinger operator spectra.

Department of Physics, Texas A&M University
Graduate Research Assistant, 1985–1988.
Instrument designer and machinist (manual and CNC) for antimatter trapping and cooling project designed to weigh the antiproton. Designed and built machinable glass (macor) and high-purity copper (OFHC) Penning ion traps, helium cryostats, and ultrahigh-vacuum systems and their instrumentation. P.I.: R.A. Kenefick.

Undergraduate Research Assistant, 1984–1985. Built electronic apparatus for detector arrays for Superconducting Supercollider.

Shorter Stays

Department of Pure Maths, Durham University, United Kingdom
Grey Fellowship, January–March 2012.

Fakultät für Mathematik, Technische Universität, Chemnitz, Germany.
Visitor, October–November 2011.
Collaborating with spectral theory and mathematical physics group

Erwin Schrödinger Institute Vienna, Austria
Visitor, Fall 2009 and Dec. 2010.
Programme in the $\bar{\partial}$-Neumann problem, and Follow-up

Faculty of Mathematics, University of Copenhagen, Denmark.
Visitor, 1995–1996.
Studied Non-Commutative Geometry and Quantum Gravity.

Teaching Experience

Texas A&M University at Kingsville, Department of Mathematics
Visiting Assistant Professor, Spring 2008–Spring 2009

Taught the following courses: College Algebra, Business Math I, II, Calculus I, II, III, Applications of Linear Algebra (graduate), STEP mentor, Spring '08 and '09 (Topics: PDE of math physics, Numerical Methods of PDE and programming).

Stonehill College, Department of Mathematics
Assistant Professor, Fall 2006 - Spring 2007
Instructor, Fall 2001 - Spring 2006

Taught the following courses: Precalculus, Calculus I, II, and III, Ordinary Differential Equations, Applied Calculus for Business, Calculus for Biology, Linear Algebra, Real Analysis I and II, Complex Analysis, Mathematical Probability and Statistics, Numerical Analysis, Quantum Mechanics, Seminar in Applied Math, and Partial Differential Equations.

Mentored independent study projects, and coached students in preparing oral presentations and written reports.

Initiated collaborations with administrators and colleagues to develop new programs and courses, including an elementary course in logic and proof, and interdisciplinary courses in Classical Wave Theory and in Quantum Mechanics.

Northeastern University
Teaching Assistant, Department of Mathematics, 1995-2001.
Taught courses in Precalculus, Calculus, Calculus for Biology, Combinatorics, Applied Algebra, and Differential Equations.

Tulane University
Teaching Assistant, Department of Mathematics, 1988-1994.
Led recitation sections for courses in Calculus and Analysis. Helped deepen students' understanding of the material by reviewing lectures and working examples in an individualized setting. Graded for graduate courses in Real and Complex Analysis.

Tutor, Center for Educational Resources and Counseling, 1992-1993.
Tutored Math, Physics, and Engineering.

Texas A&M University
Teaching Assistant, 1985-1988.
Led laboratory sections for courses in Classical Mechanics, Electrodynamics, and Quantum Mechanics. Guided students in collecting and interpreting data, and relating experimental results to theory.

Publications

- The G-Fredholm property of the $\bar{\partial}$-Neumann problem. *J. Geom. Anal.*, (2009) **19**, 87–106, available at `http://arxiv.org/abs/0711.3870`

- The Levi problem on strongly pseudoconvex G-bundles. *Ann. Global Anal. Geom.*, (2010) **37**, 1–20, available at `http://arxiv.org/abs/0802.3981`,

- A transversal Fredholm property for the $\bar{\partial}$-Neumann problem on G-bundles. *Contemp. Math.*, (2011) **535**, 187–193, available at `http://arxiv.org/abs/0912.4287`

- Heat kernel estimates for the $\bar{\partial}$-Neumann problem on G-manifolds (joint with P. Stollmann). *Manuscripta Math.*: **138** 3 (2012), 371-394 `http://www.springerlink.com/content/441m5h377116n163/`

- Essential self-adjointness, generalized eigenforms, and spectra for the $\bar{\partial}$-Neumann problem on G-manifolds (joint with P. Stollmann). *J. Funct. Anal.*, **261**, (2011) 2717–2740, available at `http://www.mat.univie.ac.at/~esiprpr/esi2301.pdf`

- Unitary representations of unimodular Lie groups in Bergman spaces (joint with G. Della Sala) *Math. Z.* (2012) 272:483-496 and available at `http://www.mat.univie.ac.at/~esiprpr/esi2267.pdf`, DOI 10.1007/s00209-011-0945-0

- Generalized Fredholm properties for invariant pseudodifferential operators. *Acta Appl. Math.* (2012). DOI 10.1007/s10440-012-9770-7. Available at `http://arxiv.org/pdf/1101.4614`

- Bergman spaces of natural G-manifolds (joint with G. Della Sala). *Submitted.* Available at `http://arxiv.org/abs/1205.5154`

Meetings and Talks

- ÖMG-Tagung - CSASC 2011, Sep. 25–28, 2011, Donau-Universität Krems, Austria, Talk: *Unitary representations of unimodular Lie groups in Bergman spaces*

- Analysis and Topology in Interaction 2011, Jun. 6–11, 2011, Cortona, Italy

- Advanced Course on Krein-de Branges Spaces of Entire Functions and Old and New Spectral Problems May 2–6, 2011, Centre de Recerca Matemàtica, Barcelona, Spain

- *Analysis Oberseminar,* Dec. 14, 2010, Leibniz Universität Hannover, Germany, Talk: *Linear, Invariant PDE on G-manifolds – Generalized Fredholm Properties and Paley-Wiener theorems*

- Pure Maths Colloquium, Dec. 6, 2010, Durham University, UK, Talk: *Linear, invariant operators on manifolds with symmetry*

- Stulken Seminar in Geometry and Analysis, Nov. 3, 2010, Rice University, Houston, Texas, Talk: *Linear, Invariant PDE on G-manifolds – Generalized Fredholm Properties and Paley-Wiener theorems*

- Several complex variables seminar, Oct. 29, 2010, Texas A&M University, College Station, Texas, Talk: *The Bergman spaces of Grauert tubes of unimodular Lie groups*

- Seminar, Several Complex Variables group, Universität Wien, Oct. 12, 2010, Talk: *The Bergman spaces of Grauert tubes of unimodular Lie groups*

- Summer School on Analysis, "Spectral Theory and PDE," Sep. 13–17, 2010 Leibniz Universität, Hannover, Germany

- Seminar, Several Complex Variables group, Universität Wien, Jun. 1, 2010 Talk: *The Transversal Fredholm property and Amenability*

- Paseky Spring School on Harmonic Analysis 2010, May 23–29, 2010

- *Analysis Oberseminar*, TU–Chemnitz, Apr. 14, 2010 Talk: *Linear PDE on G-manifolds*

- CIRM Meeting, *Le problème du $\bar{\partial}$-Neumann et l'Analyse spectrale des operateurs de Hankel*, Talk: *Fredholm Properties of the $\bar{\partial}$-Neumann problem on G-bundles* Apr. 6–10, 2010

- *Mathematisches Kolloquium*, Universität Bern, Mar. 22, 2010, Talk: *Linear partial differential equations on noncompact manifolds with symmetry*

- Seminar, Several Complex Variables group, Universität Wien, Oct. 6, 2009, Talk: *L^2-holomorphic functions on Grauert tubes of unimodular Lie groups*

- Spectral Theory and Geometric Analysis (meeting in honor of M A Shubin's 65th birthday) Jul. 29–Aug. 2, 2009

- Several Complex Variables Seminar, Texas A&M University (College Station), Apr. 9, 2009. Talk: *L^2-holomorphic functions on strongly pseudoconvex G-manifolds*

- South Texas Mathematics Consortium, UTPA, Edinburg, Texas, Feb. 21, 2009. Talk: *L^2-holomorphic functions on G-complexifications of manifolds*

- Departmental Seminar, Texas A&M University - Kingsville, Apr. 18, 2008, Talk: *On Rellich's lemma in noncompact settings*

- Analysis Seminar, NEU, Dec. 13, 2007, Talk: *On Feynman's derivation of the Navier-Stokes equation*

- UMass Boston Analysis Seminar, Oct. 29, 2007, Talk: *The G-Fredholm property of the $\bar{\partial}$-Neumann problem and Paley-Wiener theorems for unimodular groups*

- Analysis Seminar, Montana State University, Apr. 14, 2006, Talk: *The G-Fredholm property and regularity*

Skills

- Extensive experience teaching and mentoring students in Math and Physics

- Solid laboratory experience including instrumentation, machining, instrument design

- Computer Programming (C, Mathematica, Maple) for classroom demonstrations and problem solving in various fields, including image processing, combinatorics, applied statistics, visualization, and animation

- Document preparation in LaTeX, Microsoft Office

- Fluent in Spanish and Italian; good reading and fair spoken French; learning German