CURRICULUM VITAE FOR LIA BRONSARD

Dept. of Mathematics & Statistics
McMaster University
Hamilton, Ont. L8S 4K1, Canada
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EDUCATIONAL BACKGROUND:

Ph.D. New York University, Courant Inst. of Math. Sci., 1988.

M.S. New York University, Courant Inst. of Math. Sci., 1986.

Bacc. Univ. de Montréal, Mathématiques, 1983.

PERSONAL DATA

Citizenship: Canadian. I am totally fluent (reading-writing-speaking) in both french and english.

RESEARCH INTERESTS:

Nonlinear Partial Differential Equations, Calculus of Variation, Singular perturbations, Liquid Crystals, Superconductivity, Phase boundary dynamics.

POSITIONS:

McMaster University, Department of Mathematics and Statistics
Full Professor, 7/01-present.
Associate Professor, 7/95-6/2001.
Assistant Professor, 7/92-6/95.
Member: Brockhouse Institute for Materials Research, 1997-present.

Carnegie-Mellon University, Center for Nonlinear Analysis, Dept. of Math.
Postdoctoral Fellow, 8/91-6/92.

Institute for Advanced Study, School of Mathematics.
NSERC Postdoc, 9/89-6/91.

Brown University, Dept. of Applied Mathematics.
Visiting Assistant Professor, 9/88-8/89

RESEARCH GRANTS

NSERC (Canada) research grants:

- 2024-2029, $185,000 (37K per annum);
- 2018-2024, $210,000 (35K per annum);
- 2013-2017, $95,000 (19K per annum);
- 2004-2012, $225,000 (25K per annum);
- 2000-2004, $92,000;
- 1995-2000, $85,500;
- 1992-95, $71,300;

• MITACS Globalink Research Abroad. $ 6,000. For postdoc Chong Wang to visit the Department of Applied Physics and Applied Mathematics at Columbia University, Sept-Dec 2019. Co-PI with S. Alama.

• LABEX MILYON (ANR-10-LABX-0070) of Université de Lyon, within the program Investissements dAvenir (ANR-11-IDEX- 0007) operated by the French National Research Agency (ANR). 3,000 Euros, November 2019.

• Field's funding, for the "Workshop on New Trends in Variational Models: From Superconductors to Liquid Crystals", co-organized with S. Alama, R. Jerrard and I. Topaloglu $20,000 + $11,250 (NSF), June 17-20, 2019.

• CNRS-McMaster funding, to collaborate with X. Lamy and R. Ignat at Univ. de Toulouse, $5,000, 2018-2020

• AARMS funding, for the CMS special session on "Singularities and Phase transitions in Nonlinear PDEs", co-organized with T. Giorgi and I. Topaloglu: $2,000, June 1-4, 2018

• Field's funding, for the "Multiscale problems in materials and biology", co-organized with D. Golovaty, PE Jabin, H Owadi and Y. Gorb: $15,000 + $ 15,000 (NSF), June 4-7, 2018

• CRM funding, for the "Partial Order in Materials: Analysis, Simulations and Beyond, Workshop at CRM, Montréal QC, co-organized with S. Alama, A. Majumdar, A. Rey: $40,000, June 21-30, 2016.

• SERB (McMaster University) grant: 1993-1994, $10,000. 1992-1993, $15,000.

HONORS and SCOLARSHIPS:

• **Invited Plenary** SIAM Material Science, Pittsburgh, May 19-24, 2024.

• **Invited Plenary** lecture at the 15th International Conference on Free Boundary Problems, August 31 - September 4, 2020, Humboldt-Universitt zu Berlin, Germany, postponed to Sept 13-17, 2021. Given virtually.

• Invited to co-organize several **Oberwolfach** Conference "Calculus of Variations", 2022-2024.

• **CMS Fellow** 2018-

• **Organizing Committee Chair** SIAM **Annual Meeting** 2020, July 6-10, Toronto, Canada.

• **Canadien Math Society President** July 2014-July 2016; President-Elect 2013-14 and Past President 2016-2017.

• **Program Director** for the SIAM-SIAG PDE, voted by SIAM members, December 2014-December 2016.

• Invited **Plenary Speaker** at the SIAM **Annual meeting** in Boston, July 11-15, 2016.

• Invited **Semi-Plenary Speaker** at the Mathematical Congress of the America, Montréal, July 24-28, 2017.

• Invited **Plenary Speaker** at the CMS Summer meeting 2018, Fredericton, June 1–4, 2018.

• Awarded the **2010 Krieger-Nelson Prize** from the Canadian Math Soc-SocMathCanadienne

• **Women's Faculty Award**, NSERC, 1992-97.
• NSERC Postdoctoral Fellowship, 1989-91.
• NSERC Graduate Fellowship, 1983-87.
• Courant Institute Assistantship, 1987-88.
• FCAR (Québec), 1988 (summer).
• Assistant Research Scientist (Courant Inst.), summers of 1987 and 1988
• NSERC, 1982 and 1983 (summers).

EDITORSHIP

Since 2022, I am a Subject Editor of FACETS, Canadian Science Publishing.
Since 2021, I am an associate editor for CJM and CBM.
Since 2020, I am an editor for Nonlinear Analysis.
Since 2019, I am an editor for Mathematics in Science and Industry.
Since 2005, I am an editor for the Canadian Applied Math Quarterly.

PUBLICATIONS:

Submitted preprints

[**1**] *An Infinite Double Bubble Theorem*, Lia Bronsard and Mike Novack, 2024, arXiv:2401.08063

[**2**] *Spherical Particle in Nematic Liquid Crystal with a Magnetic Field and Planar Anchoring*, Lia Bronsard, Dean Louizos* and Dominik Stantejky*, 2024, arXiv:2403.20274

[**3**] *A priori L^∞ bound for Ginzburg-Landau energy minimizers with divergence penalization*, Lia Bronsard, Andrew Colinet* and Dominik Stantejsky*, 2024, arXiv:2403.09949

[**4**] Γ-*Convergence of the Ginzburg-Landau Functional with tangential boundary conditions*, Stan Alama and Lia Bronsard and Andrew Colinet*, 2023, arXiv:2305.05815

Accepted preprints in peer-reviewed journal

[**5**] *Core shells and double bubbles in a weighted nonlocal isoperimetric problem,* Stan Alama, Lia Bronsard, XinYang Lu and Chong Wang*, **preprint: arXiv:2212.06381** Accepted in SIAM Math Anal

[**6**] *The standard lens cluster in $\mathbf{R}^2$ uniquely minimizes relative perimeter*, Stanley Alama, Lia Bronsard and Silas Vriend*, 2023, http://arxiv.org/abs/2307.12200 Accepted in **Transaction of the AMS.**

Accepted preprints in peer-reviewed conference proceeding

[**7**] "On a Free-Endpoint Isoperimetric Problem in $\mathbf{R}^2$", S. Alama, L. Bronsard and S. Vriend*. In *AIPRT2022 Anisotropic Isoperimetric Problems & Related Topics,* G. Saracco, A. Pluda and V. Franceschi (eds.), **Springer Nature**, 5-9 Sept 2022, arXiv:2304.10531

Published articles in peer-reviewed journals

[**8**] *On a Quaternary Non-Local Isoperimetric Problem,* Stan Alama, Lia Bronsard, XinYang Lu and Chong Wang*, **Quaterly of Applied Mathematics** vol LXXXII, Nb 1 March 2024, pages 97113 https://doi.org/10.1090/qam/1675

[**9**] *On minimizers of the 2D Ginzburg-Landau energy with tangential anchoring,* Stan Alama, Lia Bronsard and Lee van Brussel*, **Nonlinear Analysis**, 232, 2023, Paper No. 113276, 24

[**10**] *Far-Field Expansions for Harmonic Maps and the Electrostatics Analogy in Nematic Suspensions,* Stan Alama, Lia Bronsard, Xavier Lamy, Raghavendra Venkatraman, **Jour of Nonlinear Science.** 33, 2023, 3, arXiv:2202.12794

[**11**] *Saturn ring defect around a spherical particle immersed in nematic liquid crystal.* S. Alama,L. Bronsard, D. Golovaty, X. Lamy, arXiv:2004.04973, **Calc. Var. Partial Differential Equations** 60 (2021), no. 6, Paper No. 225, 50 pp.

[**12**] *Convergence of the TFDW Energy to the Liquid Drop Model.* L. Aguirre Salazar*, S. Alama, L. Bronsard, **SIAM J. Math. Anal.** 53 (2021), no. 3, 34933519.

[**13**] *A nonlocal isoperimetric problem with density perimeter* , S. Alama, L. Bronsard, I. Topaloglu, A. Zuniga*, arXiv:2006.16278, **Calc. Var. Partial Differential Equations 60** (2021), no. 1, Paper No. 1, 27 pp.

[**14**] Periodic minimizers of a ternary non-local isoperimetric problem, Alama, Stanley and Bronsard, Lia and Lu, Xinyang and Wang, Chong*, **Indiana Univ. Math. J.**, 70 (2021), no. 6, 2557-2601.

[**15**] *Inside the light boojums: a journey to the land of boundary defects.* S. Alama, L. Bronsard, P. Mironescu, hal-02508458, **Anal. Theory Appl.** 36 (2020), no. 2, 128160.

[**16**] *Thin Film Liquid Crystals with Oblique Anchoring and Boojums,* S. Alama,L. Bronsard, D. Golovaty, arXiv:1907.04757. **Ann. Inst. H. Poincaré Anal. Non Linéaire** 37 (2020), no. 4, 817853.

[**17**] *Mass splitting in the Thomas-Fermi-Dirac-von Weizsäcker model with background potential,* Lorena Aguirre Salazar*, Stan Alama and Lia Bronsard, arXiv:1910.02104, **J. Math. Phys.** 61, 021502 (2020); https://doi.org/10.1063/1.5130565

[**18**] *Droplet phase in a nonlocal isoperimetric problem under confinement,* S. Alama, L. Bronsard, R. Choksi, I. Topaloglu*, arXiv:1609.03589, **Comm Pure Applied Analysis** 19, no. 1, pp. 175–202.

[**19**] *Droplet breakup in the liquid drop model with background potential,* Stan Alama, Lia Bronsard, Rustum Choksi, Ihsan Topaloglu*, arXiv:1708.04292, **Comm. Contemp. Math.**(2018) https://doi.org/10.1142/S0219199718500220

[**20**] *Spherical particle in a nematic liquid crystal under an external field: the Saturn ring regime*, Stan Alama, Lia Bronsard, Xavier Lamy. arXiv:1710.04756, **J Nonlinear Sci** (2018) 28: 1443. https://doi.org/10.1007/s00332-018-9456-z

[**21**] *"Ground-states for the liquid drop and TFDW models with long-range attraction"*, Stan Alama, Lia Bronsard, Rustum Choksi, Ihsan Topaloglu*, arXiv:1707.06674, **Journal of Math Physics.** Volume 58, Issue 10, (2017): 103503.

[**22**] *"A Degenerate Isoperimetric Problem and Traveling Waves to a Bi-stable Hamiltonian System"*, S. Alama, L. Bronsard, A. Contreras*, J. Dadok, P. Sternberg, arxiv.org: 1504.00423, **Comm. Pure Appl. Math.**. Volume 70, Issue 2, (2017), pp 340-377, DOI: 10.1002/cpa.21615

[**23**] *"Sharp Interface Limit of an Energy Modelling Nanoparticle-Polymer Blends"*, S. Alama, L. Bronsard, I. Topaloglu*, arXiv:1508.01206, **Interfaces and Free Boundaries**. Volume 18, Issue 2, (2016), pp. 263–290, DOI: 10.4171/IFB/364

[**24**] *"Minimizers of the Landau–de Gennes energy around a spherical colloid particle"*, S. Alama, L. Bronsard,X. Lamy*, arXiv:1504.00421, **Arch Rat Mech Anal.** 222 (2016), no. 1, 427–450.

[**25**] *"An analytic description of the Saturn-ring defect in nematic colloids"*, S. Alama, L. Bronsard, X. Lamy*, **Phys. Rev. E 93**, (2016), 012705.

[**26**] *"Vortex structure in p-wave superconductors"*, S. Alama, L. Bronsard, X. Lamy*, arxiv.org: 1411.3665v1. **J. Math. Phys.** 56 (2015), no. 11, 111503, 20 pp.

[**27**] "Weak Anchoring for a Two-Dimensional Liquid Crystal", S. Alama, L. Bronsard, B. Galvão-Sousa*, **Nonlinear Anal.**, 119 (2015), 74-97.

[**28**] "Domain walls in the coupled Gross-Pitaevskii equations", S. Alama, L. Bronsard, A. Contreras*, D. Pelinovsky, **Arch. Ration. Mech. Anal.**, 215 (2015), no. 2, 579-610.

[**29**] "Singular Limits for Thin Film Superconductors in Strong Magnetic Fields. " S. Alama, L. Bronsard, B. Galvo-Sousa*, **Asymptotic Analysis**, 83, no. 1-2, (2013), 127-156, .

[**30**] "On compound vortices in a two-component Ginzburg-Landau functional." S. Alama, L. Bronsard, P. Mironescu, **Indiana Univ. Math. J.** 61, No. 5 (2012), 18611909.

[**31**] "On the Lawrence-Doniach Model of Superconductivity: Magnetic Fields Parallel to the Axes." S. Alama, L. Bronsard and E. Sandier, **J. Eur. Math. Soc. (JEMS)** 14 (2012), no. 6, 18251857.

[**32**] "Minimizers of the Lawrence-Doniach Functional with Oblique Magnetic Fields." S. Alama, L. Bronsard and E. Sandier, **Comm. Math. Phys.** 310 (2012), no. 1, 237266.

[**33**] 'Gamma-convergence of 2D Ginzburg-Landau func- tionals with vortex concentration along curves." S. Alama, L. Bronsard and V. Millot, **J. Anal. Math.** 114 (2011), 341391.

[**34**] "Thin film limits for Ginzburg–Landau with strong applied magnetic fields." S. Alama, L. Bronsard, B. Galvo-Sousa*, **SIAM Jour. of Mathematical Analysis**, Vol. 42 (2010), No. 1, pp. 97124.

[**35**] "Periodic Minimizers of the Anisotropic Ginzburg-Landau Model", S. Alama, L. Bronsard and E. Sandier, **Calc. Var. Partial Differential Equations** 36 (2009), no. 3, 399–417.

[**36**] " On the structure of fractional degree vortices in a spinor Ginzburg-Landau model," S. Alama, L. Bronsard, P. Mironescu, **Journal of Functional Analysis** 256 (2009), pp. 1118-1136.

[**37**] "Vortices for a rotating toroidal Bose–Einstein Condensate," S. Alama, L. Bronsard, A.J. Montero*, **Arch. Rat. Mech. Anal.**, vol. 187 (2008), no. 3, pp. 481-522.

[**38**] " On the shape of interlayer vortices in the Lawrence-Doniach model," with S. Alama and E. Sandier. **Trans. Amer. Math. Soc.** 360 (2008), no. 1, 1–34 (electronic).

[**39**] "Fractional degree vortices for a spinor Ginzburg-Landau model," with S. Alama. **Commun. Contemp. Math.** 8 (2006), no. 3, 355–380.

[**40**] "On the Ginzburg-Landau model of a superconducting ball in a uniform field," with S. Alama and J. Alberto Montero*. **Ann. Inst. H. Poincaré Anal. Non Linéaire** 23 (2006), no. 2, 237–267.

[**41**] "Vortices and pinning effects for the Ginzburg-Landau model in multiply connected domains," with S. Alama. **Comm. Pure Appl. Math.** 59 (2006), no. 1, 36–70.

[**42**] " Giant vortex and the breakdown of strong pinning in a rotating Bose-Einstein condensate," with A. Aftalion and S. Alama. **Arch. Ration. Mech. Anal.** 178 (2005), no. 2, 247–286.

[**43**] " Pinning effects and their breakdown for a Ginzburg-Landau model with normal inclusions", with S. Alama. **J. Math. Phys.** 46 (2005), no. 9, 095102, 39 pp.

[**44**] " Long-time behavior for competition-diffusion systems via viscosity comparison," with Seong-A Shim*. **Discrete Contin. Dyn. Syst.** 13 (2005), no. 3, 561–581.

[**45**] " Vortices and the lower critical field for a Ginzburg-Landau model of superconductors with ferromagnetic interactions," with S. Alama. **Proc. Roy. Soc. Edinburgh Sect. A**, 135 (2005), no. 2, 223–252.

[**46**] "On the second critical field for a Ginzburg–Landau model with ferromagnetic interactions," with S. Alama. **Rev. Math. Phys.**, vol. 16, No. 2 (2004), 147-174.

[**47**] "Half Degree Vortices for a Spin–Coupled Ginzburg–Landau Model / Des vortex fractionnaires pour un modèle Ginzburg–Landau spineur", with S. Alama. **C. R. Acad. Sci. Paris**, série I, vol. 337 (2003), 243–247.

[**48**] "Minimizers of the Lawrence–Doniach energy in the small-coupling limit: finite width samples in a parallel field", with S. Alama and J. Berlinsky. **Annales IHP-Analyse nonlinéaire**, vol. 19 (2002), 281–312.

[**49**] "Periodic vortex lattices for the Lawrence–Doniach model of layered superconductors in a parallel field", with S. Alama and J. Berlinsky. **Commun. Contemp. Math.**, vol. 3 (2001), no. 3, 457–494.

[**50**] "Vortices with antiferromagnetic cores in the $SO(5)$ theory of superconductivity", with S. Alama, J. Berlinsky, and T. Giorgi*. **Phys. Rev. B.** vol. 60, no. 9, pp. 6901–6906, 1999.

[**51**] "Vortex Structures for an $SO(5)$ Model of High-T_C Superconductivity and Antiferromagnetism", with S. Alama and T. Giorgi*. **Proc. Roy. Soc. Edin., ser. A.** vol. 130 (2000), no. 6, 1183–1215.

[**52**] "Uniqueness of Symmetric Vortex Solutions in the Ginzburg–Landau Model of Superconductivity," with S. Alama and T. Giorgi*. **Journal of Functional Analysis**, vol. 167, pp. 399–424, 1999.

[**53**] "A multi-phase Mullins-Sekerka system: matched asymptotic expansions and an implicit time discretization for the geometric evolution problem", with H. Garcke and B. Stoth, **Proc. of the Royal Soc. of Edinborough**, Vol 128A, pp. 481–506, 1998.

[**54**] "The Singular Limit of a Vector-Valued Reaction-Diffusion Process", with B. Stoth, **Trans. AMS** , Vol 350, no. 12, pp. 4931–4953, 1998.

[**55**] "A Singular Limit of the Ginzburg-Landau Equations for Superconductivity and the one- phase Stefan problem", with B. Stoth, **Annales IHP-Analyse nonlinéaire**, Vol 15, no. 3, pp. 371–397, 1998.

[**56**] "Slow motion in the gradient theory of phase transitions via energy and spectrum,", with N. Alikakos and G. Fusco, **Calc. of Variation and PDE**, Vol 6, pp. 39–66, 1998.

[**57**] "Volume Preserving Mean Curvature Flow as a Limit of a Nonlocal Ginzburg-Landau Equation", with B. Stoth, **SIAM J. Math. Anal.**, Vol 28, no 4, pp.769-807, July 1997.

[**58**] "Stationary layered solutions in $\mathbf{R}^2$ for an Allen-Cahn system with multiple well potential" with S. Alama and C. Gui*, **Calc. of Variation and PDE**, vol. 5, pp 359-390, 1997.

[**59**] "A Three Layered Minimizer in $\mathbf{R}^2$ for a Variational Problem with a Symmetric Three Well Potential", with C. Gui* and M. Schatzman, **Comm. Pure Appld. Math.**, vol 49, pp 677- 715, 1996.

[**60**] "On the Existence of High Multiplicity Interfaces", with B. Stoth, **Math. Res. Lett.**, vol 3, pp 41-50, 1996.

[**61**] "A Numerical Method for Tracking Curve Networks Moving with Curvature Motion", with B. Wetton, **Jour. Comp. Phys.**, vol 120, pp 66-87, 1995.

[**62**] "On Three-Phase Boundary Motion and the Singular Limit of a Vector-Valued Ginzburg-Landau Equation," with F. Reitich, **Arch Rat. Mech. and Analysis**, vol 124, no 4, pp 355- 379, 1993

[**63**] "Front Propagation for Reaction-Diffusion Equations of Bistable Type", with G. Barles and P. E. Souganidis, **Ann. I. H. P.-non linéaire**, vol 9 no 5, pp 479-496, 1992

[**64**] "On the Slow Dynamics for the Cahn-Hilliard Equation in One Space Dimension", with D. Hilhorst, **Proc. Roy. Soc. Lon.-series A (math. phys. Sci.)**, vol 439 no 1907, pp 669- 682, 1992.

[**65**] "Motion by Mean Curvature as the Singular Limit of Ginzburg-Landau Dynamics", with R. V. Kohn, **Jour. of Diff. Eq.**, vol. 90, pp. 211-237, 1991.

[**66**] "On the Slowness of Phase Boundary Motion in One Space Dimension", with R. V. Kohn, **Comm. Pure Appl. Math.**, vol. XLIII, pp. 983-997, 1990.

Papers in Refereed Conference Proceedings

[**67**] "On a Free-Endpoint Isoperimetric Problem in $\mathbf{R}^2$", with S. Alama and S. Vriend. In *AIPRT2022 Anisotropic Isoperimetric Problems & Related Topics,* G. Saracco, A. Pluda and V. Franceschi (eds.), Springer Nature, 5-9 Sept 2022.

[**68**] "Symmetric Vortex solutions in the $U(1)$ and $SO(5)$ Ginzburg–Landau Models of Superconductivity," with S. Alama. In *Nonlinear PDE's in Condensed Matter and Reactive Flows,* H. Berestycki et Y. Pomeau (eds.), pp. 323–337, Kluwer Academic Publishers, 2002.

[**69**] "Analysis of some macroscopic models of high–T_c superconductivity," with S. Alama. *CRM Proceedings and Lecture Notes*, AMS, vol. 27, pp.1–16, 2001.

Invited article

[**70**] "On Vortices in Ginzburg-Landau Minimizers", Research Notes in the CMS notes, Vol. 43, no 4, September 2011, pp. 10–12.

Books edited

[**71**] Alama, Stan; Bronsard, Lia; Sternberg, Peter, (ed.). "Singularities in PDE and the Calculus of Variations." Proceedings of the CRM workshop, July 17-21, 2006. **CRM Proceedings and Lecture Notes,** AMS, 44, 2008, ISBN 978-0-8218-4350-5.

Book review:

[**72**] SIAM review, Vortices in the Magnetic Ginzburg-Landau Model. By Etienne Sandier and Sylvia Serfaty. Birkhauser, 2007. $119.00. xii+304 pp., hardcover. ISBN 978-0- 8176-4316-4., SIAM Rev. 50, issue 1, 149 (2008)

INVITED LECTURES at Conferences (2010-2024):

- Invited talk: "", Palermo, Italy, July, 2024
- Invited talk: "", Sevilla, Spain, July, 2024
- Invited talk: "", BIRS, Banff, Canada, June, 2024
- Invited Plenary talk: "CYDRA", Bilbao, Spain, June, 2024
- Invited Plenary talk: "SIAM MS 24", Pittsburgh, USA, May 19-24, 2024
- Invited talk in the minisymposium: "", SIAM MS 24, Pittsburgh, USA, May 19-24, 2024
- Invited talk: "", Napoli Center, Napoli, Italy, Feb, 2024
- Invited talk: "", Oberwolfach, Oberwolfach, Germany, Feb, 2024

- Invited talk: "", Grenanda Center, Grenada, Spain, Jan, 2024

- Invited talk: "Optimal Transport and the Calculus of Variations", ICMS The Bayes Centre, Edinburgh, Scotland, Dec 11-15, 2023

- Invited talk: CMS Winter meeting 2023, in the minisymposium: "Recent Progress in Statistical Mechanics", Montral, December 2nd, 2023

- Invited "Courant analysis seminar": "Patterns in tri-block copolymers: double-bubbles, core-shells, and a new partitioning problem", NYU, Nov. 16th, 2023, NY, USA

- Invited colloquium: Colloque des Science Mathématiques du Québec, "Patterns in tri-block copolymers: droplets, double-bubbles and core-shells, and a new partitioning problem", CRM, Montréal, Oct 13th, 2023.

- Invited talks: ICIAM 2023, talk in the two minisymposia: "Recent Advances on Nonlocal Interaction Models" as well as "Variational methods for singularities and concentration on low dimensional sets", Japan, August 20-25, 2023

- Invited talk: 11th French biennial of Applied and Industrial Math, talk in the minisymposium: "Calcul des Variations: local et nonlocal", Le Gosier, Guadeloupe, May 22-26, 2023

- Invited talk "Topological and geometrical aspects in complex materials", Bonn, March 27-31, 2023

- Invited plenary lecture: Applied Analysis: from the calculus of variations to materials science, finance and data science a celebration of the science of Bob Kohn, Flatiron Institute, November 5-7, 2022

- Invited plenary lecture: Anisotropic Isoperimetric Problems and Related Topics, Roma, Italy, Sept 5-9, 2022.

- Invited plenary lecture: Topological Methods in Nonlinear Analysis, Recent Advances, Professor Granas Memorial Conference, Centre de recherches mathmatiques, Montréal, July 4-8, 2022.

- CMS Winter meeting, talk in the minisymposium: "Applied and Pure Analysis", "Patterns in tri-block copolymers: droplets, double-bubbles and core-shells", Dec 2-7, 2021

- AMS Fall Western Sectional Meeting, talk in the minisymposium: "Elliptic and parabolic equations on topics arising from models in materials science", "Patterns in tri-block copolymers: droplets, double-bubbles and core-shells", Oct 23-24, 2021.

- Invited **Plenary** lecture at the 15th International Conference on Free Boundary Problems, Sept 13-17, 2021, Humboldt-Universitt zu Berlin, Germany (virtual).

- USNCCM minisymposium: "Nonlocal Models in Continuum Mechanics: Mathematical, Computational, Machine Learning Aspects", Patterns in tri-block copolymers: droplets, double-bubbles and core-shells, July 15-19, 2021, Chicago (Virtual)

- SIAM Conference of Mathematical Aspects of Materials Science, Minisymposium on "Mathematical Analysis of Soft Materials", Bilbao, Spain (virtual), May 17-28, 2021. Invited talk on "Ring defect in liquid crystal".

• Invited participant at Oberwolfach, Germany, August 2-6, 2020. Hybrid conference in the Calculus of Variations.

• Invited lecture at a conference in honor of N. Alikakos, Athens, Greece, June 13-14,2020, postponed to June 11-12, 2021. (Cancelled.)

• "Nonlinear Days in Alghero", Alghero, Sardinia, Italy, September 16– 19, 2019, *Thin Film Liquid Crystals with Oblique Anchoring and Boojums.*

• McMaster University-CNRS Joint workshop 2019, "Topological defects in Liquid Crystals," joint talk with X. Lamy, Grenoble, July 15-18, 2019
https://cnrs-mcmaster.sciencesconf.org

• "New Perspectives in Nonlinear PDE, a research workshop in honor of Prof. Haim Brezis", Technion, Haifa, Israel, June 1-7, 2019, *Thin Film Liquid Crystals with Oblique Anchoring and Boojums*
https://cms-math.net.technion.ac.il/brezis-registration/

• Workshop "Variational Problems in Physics," Toulouse, 20-24 May 2019, Thin Film Liquid Crystals with Oblique Anchoring and Boojums,
http://www.cimi.univ-toulouse.fr/cov/en/workshop-variational-problems-physics

• " PDEs and Geometric Measure Theory", 29 Oct.–2 Nov., 2018 at ETH Zurich, Droplet breakup in the liquid drop model with background potential,
https://www.math.ethz.ch/fim/conferences/pdes-and-geometric-measure.html

• "Variational problems from Material Science", SIAM conference on Mathematical Aspect of Material Sciences, Portland, OR, July 9–13, 2018. I gave a talk on "Droplet phase in a nonlocal isoperimetric problem under confinement"

• "Analysis of singular patterns in variational models," Toulouse, June 18–22, 2018. I gave a talk on "Spherical particle in a nematic liquid crystal under an external field: the Saturn ring regime".

• Invited **Plenary Speaker** at the CMS Summer meeting 2018, Fredericton, June 1–4, 2018.

• "Transitions de phase et équations non locales", I gave a talk on "Spherical particle in a nematic liquid crystal under an external field: the Saturn ring regime" Bucharest, April 25–27, 2018.

• Joint Workshop 2018, Le Centre National de la Recherche Scientifique (CNRS) and McMaster University, I gave a talk on "Droplet phase in a nonlocal isoperimetric problem under confinement", McMaster Univ, February 4–7, 2018.

• Modern trends in Structure Forming Systems, Heidelberg, August 7–11, 2017. I gave a talk on "Droplet phase in a nonlocal isoperimetric problem under confinement"

• Mathematical Congress of the Americas, Montréal QC, July 23-28, 2017. **Invited Semi-Plenary Speaker**: "Droplet phase in a nonlocal isoperimetric problem under confinement".

• AMS Sectional Meeting, New York NY, May 6-7, 2017. Invited talk in the Special Session on "Analysis and Numerics on Liquid Crystals and Soft Matter". Talked on "Minimizer of the Landau de Gennes Energy Around a Spherical Colloid Particle."

• Workshop on "Phase Transitions Models", BIRS, Banff Alta, April 30-May 5, 2017. Invited talk on "Minimizer of the Landau de Gennes Energy Around a Spherical Colloid Particle."

• AMS Sectional Meeting, Bloomington IN, April 1-2, 2017. Invited talk in the Special Session on "Analysis of Variational Problems and Nonlinear Partial Differential Equations". Talked on "Droplet phase in a nonlocal isoperimetric problem under confinement".

• "Workshop on Topology", invited speaker, University of Pennsylvania, Philadelphia, US, Oct 29th, 2016.

• "Asymptotic Patterns in Variational Problems: PDE and Geometric Aspects ", invited speaker, BIRS-CMS, Oaxaca, Mexico, Sept 26-30, 2016

• Minimsymposium on "Nonlinear Partial Differential Equations in Material Science and Mathematical Biology", invited talk, AMS sectional meeting, Bowdoin College, Sept 24-25, 2016

• Invited speaker for the conference: "Topics in Applied Nonlinear Analysis: Recent Advances and New Trends," in honors of David Kinderlherer, Carnegie-Mellon University, Pittsburgh, July 18-20, 2016.

• Invited **Plenary Speaker** at the **SIAM Annual meeting**, Boston, July 11-15, 2016.

• Invited speaker in the Minisymposium on "Mathematical analysis of liquid crystal models", Annual SIAM meeting, Boston, July 11-15, 2016

• International Conference on "Calculus of Variations, Optimal Transportation, and Geometric Measure Theory: from Theory to Applications", Invited plenary speaker, Université Claude Bernard, Lyon, France, July 4-8th, 2016.

• ECMI 2016, Invited speaker in the minisymposium on "The treatment of singularities and defects in industrial applications, Santiago de Compostela, Spain, June 13th-17th, 2016

• Invited speaker in the "One-day workshop on Nonlinear Partial Differential Equations", University of Girona, Spain, June 10, 2016

• Minisymposium: "Mathematical problems in nematic colloids and chromonic liquid crystals", SIAM Conference on Mathematical Aspects of Materials Science (MS16), Philadelphia, May 15-19, 2016

• "Computation Of Quantum Systems In Cold-matter Physics And Chemistry", Invited talk, Fields Institute in Toronto, February 22-26, 2016

• SIAM SIAG-PDE meeting, Scottsdale AZ, Dec 7–10, 2015. Invited talk in the Special session on "Mathematical Analysis of Liquid Crystals".

• AMS Sectional Meeting, Chicago IL, Oct 2-5, 2015. Invited talk in the Special Session on Mathematical Analysis and Computation of Nematic Liquid Crystals.

• CMS Summer Meeting, session on "Nonlinear PDE", June 5–7, 2015.

• Conference on Nonlinearity, Transport, Physics, and Patterns, Fields Institute, October 6-10 2014, "Weak anchoring for Liquid Crystals"

• Invited **Minicourse lecturer** of three lectures at the summer school "Around Vortices", held at IMPA, Rio, Brazil on March 16-21, 2014.

• CMS-summer meeting, Minisymposium on "Nonlinear PDE and their applications", Halifax, June 4-7, 2013.

• SIAM Conference on Mathematical Aspects of Materials Science, Minisymposium on The GinzburgLandau Model and Related Topics, Philadelphia, PA, June 9-12, 2013.

• SIAM-SIAG PDE, "Vortices for a Two-component Ginzburg-Landau Model", San Diego, Nov 14-17, 2011

• ICIAM 2011, invited talk in the minisymposium: "Modern methods and applications of the Calculus of Variations", July 18–22, 2011, Vancouver

• ICIAM 2011, invited talk in the minisymposium: "Analysis of PDEs for Condensed Matter Systems", July 18–22, 2011, Vancouver

• "Superconductivity, Bose-Einstein Condensation and Liquid Crystals." Invited talk at the conference at Aarhus University, Denmark, June 29-July, 2011.

• Kreiger-Nelson Prize lecture, CMS-SCM Winter Meeting, Vancouver, Dec 4–6, 2010

• Invited talk in the minisymposium: "Analysis and Geometry of nonlinear Partial Differential Equations", CMS-SCM Winter Meeting, Vancouver, Dec 4–6, 2010.

• 2nd Meeting of Women of the Laplacian, Organizer and speaker in the minisymposium "Singularities in PDE", Bari, Italy, June 3-6, 2010

INVITED LECTURES at Conferences until 2010:

• "Singularities in the Calculus of Variations and PDE", invited talk in this minisymposium in the SIAM Conference on Partial Differential Equations, Miami, December 7-10, 2009.

• **Plenary speaker** at the "Midwest PDE Seminar", Purdue University, USA, Nov. 8-9, 2009

• **Plenary speaker** at the "Eighth Americas Conference on Differential Equations", Veracruz, Oct 19–23, 2009

• "6th European Conference on Elliptic and Parabolic Problems", invited talk in the minisymposium: "Singular perturbation problems and Ginzburg-Landau equations", Gaeta, Italy, May 25–29, 2009

• "The Gross-Pitaevskii equation and related topics", IGESA center, Porquerolles, France, Oct 12–18, 2008.

• Invited plenary speaker to the conference "Non-linear Phenomena in Mathematical Physics: A dedication to Cathleen Synge Morawetz on her 85th birthday", Fields Institute, Toronto, September 18 -20, 2008.

• " Partial Differential Equations", minisymposium at the *Second congrès Canada–France des sciences mathèmatiques,* Montreal, June 1–6, 2008.

• "Workshop on Variational Methods for Nonlinear PDE and their Applications", Technion, Haifa, Israel, March 5-10, 2008.

• "Variational Problems in Condensed Matter", AMS-Albuquerque meeting (October 13-14, 2007).

• "Workshop on Analysis and its Applications," University of Athens, Greece, June 18, 2007.

• "International Conference on Mathematical Theory of Superconductivity and Liquid Crystals", East China Normal University, Shanghai, China, May 14–18, 2007.

• "Modern Applications of Gross-Pitaevskii Equations: Bose-Einstein Condensation," workshop at the Wolfgang Pauli Institut in Vienna (Austria), November 6-10, 2006.

• "Variational Methods in PDE," special session in the Joint CMS-SMM Meeting, September 21-23, 2006 in Guanajuato, Mexico.

• "Superconductivity, Ginzburg-Landau Theory, and Related Topics," minisymposium at the SIAM Conference on Analysis of Partial Differential Equations, July 10-12, 2006, in Boston MA.

• "Journée Ginzburg–Landau," one-day workshop at Univ. Paris-Sud (Orsay), France, February 14, 2006.

• Advances in PDEs from Materials Science, invited talk in the minisymposium at the First SIAM Conference on Partial Differential Equations, Houston (TX), December 58, 2004.

• "Singularities in Materials", workshop at the IMA, Minneapolis (MN), October 25-29, 2004.

• "Seventh New Mexico Analysis Seminar," October 14-15, 2004, Albuquerque (NM). Invited Speaker.

• AMS Sectional Meeting, Albuquerque (NM), October 16-17, 2004. In the special session, "Nonlinear Partial Differential Equations Applied to Materials Science".

• "Premier congrès Canada–France des sciences mathématiques," Toulouse (France), July 12-16, 2004. In the Special session on Partial Differential Equations.

• AIMS conference on Dynamical Systems, June 16-19, 2004, Los Angeles (CA). In the special session, "Analysis and Simulations of Magnetic and Superconducting Materials".

• AIMS conference on Dynamical Systems, June 16-19, 2004, Los Angeles (CA). In the special session, "Free Boundary problems and applications".

• PIMS–Banff workshop on "Defects and their dynamics", Banff, Canada, August 9–16, 2003.

• ISM Pan-Québecois Conference, Université Laval, Québec, May 23–25, 2003. Plenary lecture.

• SIAM 50th Anniversary and 2002 Annual Meeting, minisymposium on "Superconductivity, Ginzburg-Landau theory and related topics", Philadelphia, July 8–12, 2002.

• First SIAM-EMS conference "Applied Mathematics in our Changing World", minisymposium on "recent progress in superconductivity", Berlin, Sept. 2-6, 2001.

• "Singular Variational Problems", Isaac Newton Institute for Mathematical Sciences, Cambridge University, GB, June 25–30, 2001.

• "Partial Differential Equations in Mathematical Physics", workshop at the Fields Institute, Univ. of Toronto, April 16–21, 2001.

- "Fields Institute Applied Math Colloquium", invited, October 12, 2000.
- "Singularities in Ginzburg–Landau systems", Workshop at the Leiden Center, University of Leiden, the Netherlands. March 27–April 6, 2000.
- "Equations aux Dérivées Partielles Non Linéaires Frontières libres, Interfaces et Singularités", workshop at ORSAY, Université de Paris-Sud, France. March 22-23, 2000.
- Workshop on "Nonlinear Dynamics and the Renormalization Group" Centre de Recherche Mathématique, Montréal, August 22–27, 1999. "Vortex lattices for the Lawrence-Doniach model of layered superconductors in parallel magnetic fields".
- "PDE's in models of superfluidity, superconductivity and reactive flows," NATO Advanced Study Institute, Institut d'Etudes Scientifiques de Cargèse, Corsica, June 21–July 2, 1999.
- Workshop on Singularities Arising in Nonlinear Problems, Kyoto, Japan, November 30–December 2, 1998. "Vortex structure for an SO(5) model of high-Tc superconductivity and antiferromagnetism", invited main speaker.
- SIAM Annual Meeting, Toronto, July 13–17, 1998. "On a Multi-phase Mullins–Sekerka System", invited talk in the special session MS75 on Nonlinear Partial Differential Equations.
- Dynamical systems and differential equations, Univ of Waterloo, Aug. 1-4, 1997, Special session on Capillarity problems: "On multi-phase dynamics".
- BIMR workshop: "Mathematics and Materials", McMaster Univ., April 23, 1997. "On a multi-phase Mullins-Sekerka System"
- 1997 Spring Clifford Conference on PDE, Tulane Univ., Feb 15–17, 1997. "On vector-valued Ginzburg-Landau dynamics".
- AMS regional meeting in Chattanooga, Oct. 11-12, 1996. "A multi-phase Mullins-Sekerka system as the singular limit of a Cahn-Hilliard system".
- ESF/FBP-Workshop at the IAM-SFB256 (Univ of Bonn) on "Lower Dimensional Interfaces: Ginzburg-Landau Equations and the Evolution of Point and Line Singularities", May 26-30, 1996. "A multi-phase Mullins-Sekerka system as the singular limit of a Cahn- Hilliard system".
- AMS regional meeting at New York University, April 13-14, 1996. "The Singular Limit of a Vector- Valued Reaction-Diffusion Process".
- AMS regional meeting at Kent State Univ., Nov. 3-4, 1995. "A Singular Limit of the Ginzburg- Landau Equations for Superconductivity and the one-phase Stefan problem".
- TMS Minerals, Metals, Materials: "Materials week '95", Oct. 30-Nov 2, 1995, Cleveland, OH. "A multi- phase Mullins-Sekerka system as the singular limit of a Cahn-Hilliard system".
- Oberwolfach: "Mathematical models in phase transitions", May 14-20, 1995. "On the existence of high multiplicity interfaces".
- École d'été du CRM (Banff): "Frontière, Interfaces et transitions", August 6-18, 1995. Two lectures on "Interfaces motion for Ginzburg-Landau Dynamics".
- ICIAM, International congress in industrial and applied mathematics, Hamburg, Germany, July 3-7, 1995. "The Singular Limit of a Vector-Valued Reaction-Diffusion Process".
- Telluride Summer Research Center: Interface Motion in Multicomponent Media, August 7- 15, 1994. "On three-phase boundary motion and the singular limit of a vector-valued Ginzburg-Landau equation".

• Oberwolfach: "Freie Randwertporbleme", July 10-16, 1994. "A Three layered minimizer in R^2 for a variatonal problem with a symmetric three well potential".

• The Mathematical Theory of Phase Transitions: A Summer Workshop, Univ. of Sussex, July 5-10, 1994. "A Three layered minimizer in R^2 for a variatonal problem with a symmetric three well potential".

• AMS regional meeting, special session on PDE, Brooklyn, April 8-10, 1994. "On the asymptotic limit of a nonlocal Ginzburg-Landau equation".

• Workshop on "Nonlinear Partial Differential Equations, Pattern Formation, Singularities and Related Topics" (March 29-April 1) and Conference on Nonlinear Elliptic and Parabolic PDE and Applications, American-Japanese meeting, Johns-Hopkins Univ., April 1-4, 1994. "On the asymptotic limit of a nonlocal Ginzburg-Landau equation".

Conferences, Workshops and sessions organized:

• *CMS 2023 Winter meeting*: co-organized a session with my post-doc Dr. Stantejsky called "Geometry in Calculus of Variations and PDEs", 8 speakers, Dec 2-3rd, 2023.

• *Applied Analysis: from the calculus of variations to materials science, finance and data science a celebration of the science of Bob Kohn*, co-organized with R. Choksi, R. Venkataraman, K. Bhattacharya, S. Serfaty, and L. Greengard, Flatiron Institute, November 5-7, 2022

• *Calculus of Variations*, co-organized with L. Szekelyhidi, Y. Tonegawa and T. Toro, Oberwolfach, 14 August - 20 August 2022

• *Theoretical and Applied Aspects for nonlocal Models*, co-organized with I. Topaloglu, P. Radu and K. Dayal, Banff, July 17-July 22, 2022

• CMS Winter meeting, minisymposium: "Recent advancement in Nonlinear Partial Differential Equations", co-organized with L. Aguirre-Salazar, Dec 2-7, 2021.

• SIAM Conference on Mathematical Aspects of Materials Science (MS20), minisymposium "Nonlocal Variational Models of Materials", co-organized with S. Alama and I. Topaloglu, postponed to May 24 to 29, 2021

• SIAM/CAIMS An 2020: minisymposium co-organized with Tiziana Giorgi, titled: "Nonlinear Elliptic and Parabolic PDEs in Materials Science: A Minisymposium in Honor of Professor Patricia Bauman", Toronto, July 6-10 2020, postponed to May 24 to 29, 2021 (Cancelled.)

• ICIAM Conference: minisymposium co-organizer with Maria Westdickenberg, of "Rings, wrinkles, and vortices: Singularities, nonlinear PDE, and materials science (https://iciam2019.org/), July 15–19, 2019, Valencia, Spain

• New Trends in Variational Models: From Superconductors to Liquid Crystals, Fields Institute, Toronto, Canada, June 17-20, 2019, co-organized with S. Alama, R Jerrard and I. Topaloglu.

• "Multiscale problems in materials and biology", co-organized with D. Golovaty, PE Jabin, H Owadi and Y. Gorb, Fields Institute, Toronto, June 4-7, 2018

• CMS Summer meeting, Fredericton, June 1-4, 2018, co-organizer with Tiziana Giorgi and Ihsan Topaloglu of the special session on "Singularities and Phase transitions in Nonlinear PDEs".

• MCA 2017, co-organizer with Tiziana Giorgi of the Special Session on "Singularities and Phase Transitions in Condensed Matter", Montréal QC, July 23-28, 2017.

• CMS Winter Meeting, Niagara Falls ON, December 2-5, 2016. Co-organizer with Ihsan Topalogly of the Special Session on "Nonlinear PDE's and Variational Problems".

• Partial Order in Materials: Analysis, Simulations and Beyond, Workshop at CRM, Montréal QC, June 21-30, 2016. (co-organized with S. Alama, A. Majumdar, A. Rey.)

• SIAM Annual Meeting (AN16), Boston MA, July 10-15, 2016. Organization of a Minisymposium on Pattern Formation in Singularly Perturbed Variational Problems. (Co-organized with S. Alama.)

• **Program Director** of the 2015 SIAM Conference on Analysis of Partial Differential Equations, Dec 7-10, 2016, Arizona. I was in charge, with David Lannes (ENS Paris), and 8 members of the scientific committee (chosen by David and I,) to organize the whole conference (over 500 participants.) This means inviting plenary speakers, inviting organizers for sessions, for minitutorials, and approving everything.

• " PDE methods for problems in Material Sciences", Minisymposium at SIAM SIAG PDE, Arizona, Dec 7-10, 2015, co-organized with T. Giorgi.

• "MS17 Singularities in the Calculus of Variations and PDE", Minisymposium at Equadiff 2015, Lyon, France, July 6–10, 2015. Co-organized with S. Alama.

• Co-organized, with Stan Alama, a Special Session at the CMS Winter Meeting, Dec 5-8, 2014, in Hamilton ON, on "Nonlinear PDE of Mathematical Physics"

• Co-organized the Conference "IMA Hot Topics Workshop: Mathematics at the Interface of Partial Differential Equations, the Calculus of Variations, and Materials Science", May 21-23, 2014, http://www.ima.umn.edu/2013-2014/SW5.21-23.14/

• Co-organizer (with T. Giorgi (NMSU) a special session "PDE in Materials Science", held at the AMS Sectional Meeting, Albuquerque NM, April 4-6, 2014.

• Co-organizer (with V. Millot (Paris 7)) "Singularities in Physical systems and the Calculus of Variations", minisymposium in the SIAM-PDE conference on Partial Differential Equations, San Diego, November 14-17, 2011. 16 participants.

• Co-organizer (with T. Giorgi (NMSU)) "Singular solutions and phase transitions in PDE", minisymposium in the SIAM-PDE conference on Partial Differential Equations, San Diego, November 14-17, 2011. 8 participants.

• Co-organizer (with S. Alama) "Singularities in the Calculus of Variations and PDE", minisymposium in the SIAM Conference on Partial Differential Equations, Miami, December 7-10, 2009.

• Co-organizer (with S. Alama) of the CAIMS minisymposium "Singular Perturbations and the Ginzburg-Landau Model," at the *Second congrès Canada–France des sciences mathèmatiques,* Montreal, June 1–6, 2008.

• Co-organizer (with E. Cances and M. Esteban) of the minisymposium "Variational and Numerical Methods in Geometry, Physics and Chemistry," workshop at the *Second congrès Canada–France des sciences mathèmatiques,* Montreal, June 1–6, 2008.

• Co-organizer (with T. Giorgi, New Mexico State Univ.) of the minisymposium Variational Problems in Condensed Matter, for AMS-Albuquerque meeting (October 13-14, 2007).

• Co-organized (with S. Alama (McMaster) and P. Sternberg (Univ of Indiana)) a 1-week workshop at the CRM (Montral) on Workshop on Singularities in PDE and the Calculus of Variations, July 17-21, 2006.

• Co-organized (with P. Padilla (UNAM)) a special session Variational Methods for PDE at the joint CMS-SMM meeting in Guanajuato, Mexico, Sept. 21-23, 2006.

• Workshop on "Defects and their dynamics", Banff, August 9–16, 2003. (Joint with P. Bates and C. Gui.)

• Workshop on "Calculus of Variations: Geometric problems, Superconductivity and Material Microstructures", The Fields Institute for Mathematical Sciences, Toronto, August 25–29, 2003. (Joint with S. Alama, R. Choksi, R. McCann and R. Jerrard.)

• "Phase transitions in materials," minisymposium at the CAIMS/SCMAI–99 meeting, Québec, June 10–13, 1999.

• "Concentration phenomena in differential equations" Special session, AMS regional meeting, Milwaukee, Oct. 23-24, 1997. (Joint with Wei-Ming Ni.)

• "Mathematics of superconductivity", Brockhouse Institute for Materials Research (BIMR), McMaster University, Sept. 13, 1997. (Joint with S. Alama.)

• "Mathematics and materials", Brockhouse Institute for Materials Research (BIMR), McMaster University, April 23, 1997. (Joint with G. Purdy.)

• "Singular Perturbation Problems and Interface Dynamics", minisymposium at ICIAM, Hamburg, Germany, July 5, 1995.

Workshops invited:

• Anisotropic Isoperimetric Problems and Related Topics, Roma, Italy, Sept 5-9, 2022.

• Workshop on *New Trends in the Variational Modeling and Simulation of Liquid Crystals*, Edwin Schroedinger Center, Vienna, Austria. Dec 2-6, 2019. Invited, and my collaborator Stan Alama gave a talk on Thin Film Liquid Crystals with Oblique Anchoring and Boojums.

• McMaster University-CNRS Joint workshop 2019, "Topological defects in Liquid Crystals," invited and my collaborator X. Lamy gave a talk, Grenoble, July 15-18, 2019

• IMA, Minneapolis, Invited to participate in a workshop: "Working group on singularities in nematic liquid crystals and related problems," June 24–29, 2018.

Invited Colloquiums and Seminars:

PDE seminar: Université de Lille, Lille, France, May 2024
Calc Var groupe de travail, PDE seminar, Paris cité, Paris, France, Feb 2024
PDE seminar: Ecole Polytechnique, Paris, France, April 2024
PDE seminar: Université de Créteil, Paris, France, April 2024
Virtual Colloquium: Old Dominion University, Norfolk, Virginia, Oct 8, 2020
One World PDE Seminar, Virtual seminar, Oct 13th 2020.
Colloquium, Liquid Crystal Institute, Kent State, OH, April 11th, 2018
Colloquium, New Mexico State University, Las Cruces, NM, March 29th, 2018
PDE seminar, Indiana Univ, Bloomington, IN, Nov 27th, 2017
Applied Math Colloquium, Purdue Univ, West Lafayette, Nov 2nd, 2017
Colloquium, University of Toronto, Toronto, Nov 30, 2016
Applied Math Colloquium, McGill University, Montréal, Nov 30, 2015
Colloque des sciences mathématique du Québec, Montréal, Nov 20, 2015
Seminar at the new Analysis Seminar series at RWTH Aachen University, Aachen, Germany July 16, 2013.
McMaster University: "threads lectures", September 2011.
Laboratoire Jacques-Louis Lions, Paris, May 2010, (PDE seminar)
University of Indiana, Bloomington, April 2009, (PDE Colloquium),
Univ of Lincoln, Nebraska, May 2009, (Math dept Colloquium),
CRM applied math series at McGill, Nov 2009,
University of Georgia Tech, Atlanta, Jan 26, 2008,
George Washington University, Washington, Nov. 9, 2007,
Univ. Claude Bernard Lyon I, Lyon, France, May 8, 2006,
Univ. di Napoli Federico II, April 7, 2006 (part of INdAM invited Visiting Professorship), McGill Univ. (2004), Univ. of Toronto (2004), Laboratoire J.-L. Lions, Univ. Paris-VI (2003), Universität Bonn (2003), Univ. Laval (2002), Univ. de Paris XII (2001), Univ of Wisconsin-Madison (2001), SFU (2001), Univ. de Tours (2000), Brown Univ. (1999), Rutgers Univ. (1999), Courant Institute (1999), UBC (1999), Univ. of Tokyo (1998), Univ. of Chile (1997, Dept de Ing. Mat.), Orsay (1996), Univ. di Roma "La Sapienza" (1996),Univ. of Minnesota (1995), Brockhouse Institute for Materials Research (1995), Univ. of Bonn-IAM SFB256 (1995 & 1993), Univ. Autonoma Nacional de Mexico (series of two lectures, 1994), Univ. di Roma "La Sapienza" (1994), Univ. di Roma "Tor Vergata" (1995, 1994 & 1993), Univ. of British Columbia (1994), Univ. of Wisconsin (1993), Bonn (1993), Suny at Buffalo (1992), Univ. de Lyons (1992 and 1991), ENS Paris (1991), Orsay (Paris, 1991), Indiana Univ. (1990 & 1991), Brigham Young Univ. (1991), Univ. of Cal. at Davis (1991), Arizona State Univ. (1991), Rutgers Univ. (1990), CRM (1990), Univ. de Montréal (1990), U.Q.A.M. (1990), Univ. dOttawa (1990), McMaster Univ. (1990), Univ. of Pennsylvania (1990 and 1989), Univ. of Tennessee (1989), Georgia Tech. (1989), Duke Univ. (1988), Univ. of Pittsburgh (1988).

SUPERVISION OF POSTGRADUATES

Supervision and collaboration with post-doctorates:

I am/have co-sponsored with Stan Alama, and work/worked on research projects with:

• Lee van Brussel 2023-2024. We are currently working on the structure of defects in a model of Liquid Crystals with unequal elastic constants.

• Dominik Stantejsky 2022-2024. We are currently working on the structure of Saturn Ring defects in Liquid Crystals

• Andrew Collinet 2021-2023. We are currently working on a Gamma convergence result for Liquid Crystals.

• Andres Zuniga 2019-2020. We are currently working on a weighted perimeter problem with non-local terms.

• Chong Wang 2018-2021. We are currently working on tri-block copolymer and associated nonlocal Ohta-Kawasaki model.

• Ihsan Topaloglu 2014-2016. We are working on the nonlocal Ohta-Kawasaki model for block copolymer and on the Gamow liquid drop model and the Non Local Isoperimetric Problem. We have published 3 articles and have submitting another one. He is an assistant professor at Virginia Commonwealth.

• Andres Contreras 2012-2014. We have worked on Gross-Pitaevskii systems and on a Degenerate Isoperimetric Problem related to a Bi-stable Hamiltonian System. We have produced two papers (with D. Pelinovsky, and another one with P. Sternberg.) He is an assistant professor at New Mexico State University.

• Bernardo Galvo-Sousa 2008-2010. We have worked on thin-film models for Ginzburg-Landau models. We have produced three papers. He is now at the University of Toronto, teaching stream.

• José Alberto Montero 2003-05. We have worked on three-dimensional Ginzburg–Landau models. We have produced two papers. He is professor at Santiago, Catolica Universidad.

• Seong-A Shim 2001-03. We have a paper on viscosity solutions for a singularly perturbed Lotka-Volterra system.

• Ana-Maria Matei 2001-03 (Co-supported with S. Alama and W. Craig) We have worked on a project in reaction–diffusion systems involving the p-Laplacian.

• Xuefeng Wang 1998-2000. Discussed problems in phase transitions.

• Tiziana Giorgi 1997-1999. Produced three papers.

• C. Gui 1993-1995. Produced two well-cited papers.

Supervisor of MSc and Phd students:

Dean Louizos, MSc Student thesis option, Fall 2022-May 2024. We submitted one article and are working on another one.

Silas Vriend, MSc Student, 2022-23, co-supervised with Stan Alama. We have two articles accepted.

Lee Van Brussel, PhD Student, Fall 2017-Summer 2022, co-supervised with Stan Alama. We have one article accepted and are working on another one.

Lorena Aguirre Salazar, PhD Student, Fall 2016-2021, co-supervised with Stan Alama. We have two articles accepted.

Yurij Salmaniw, MSc Student, Fall 2016-Summer 2018, thesis option, co-supervised with Stan Alama.

Hilton Maurer, M.Sc student, January–August 2017, non-thesis option.

Lee Van Brussel, M.Sc Student, thesis option September 2015–July 2017, Thesis Title: On Landau-de Gennes Energy Minimizers surrounding generalized colloid particles.

Xavier Lamy, exchange PhD student from Lyon (student of Petru Mironescu) (March to July 2014 and Sept-Dec 2014). Co-supervised with Stan Alama. We have three published articles.

Cong Zhou, PhD student 2013–2014 (transferred to University of Indiana.)

Sara Alzaid, PhD student 2009–2015. *Thesis Title:* Γ-convergence results for superconducting thin films with holes and for Ginzburg-Landau models for superconductors with normal inclusions.

Diana-Marie Batista, M. Sc Student, thesis option (2008–2010) *Title of Thesis:* Gamma-covergence in multiply connected domains.

Adam Dailey-Mc Ilrath, M. Sc Student, thesis option (2004-06),
Title of Thesis: Some nice results about anisotropic mean curvature flow

D. Hender, M. Sc. student (1998-2000), co-supervised with Dr. N. Kevlahan,
Title of Thesis: Phase separation for the one dimensional Cahn-Hilliard equation: theory and computations

Undergraduate research project:

Summer 2023: USRA supervised students Spencer Locke, Hayley Monson " Calculus of Variations and applications to Liquid Crystals". Both projects are related to liquid crystal.

Summer 2022: USRA supervised students Dean Louizos, Jessie Meanwell "Calculus of Variations and applications". One project relates to liquid crystal and one to material science. Dean continued as a MSc with me. Jessie Meanwell is continuing in math at McGill and won a prestigious McCall MacBain scholarship, one of only two at McMaster this year and of 20 in all Canada.

Summer 2021: USRA supervised students Mark Bouman, Matthew How-Chun-Lun "Elasticity and Hair". Matthew won the CMS Summer meeting 2023 Best Poster.

summer 2019: James Stewart undergraduate research funds, supervised Seva Skvortsov, *title of the project*: "Dynamical Systems, Transition to Chaos and Forecasting in Meteorology "

Summer 2016: USRA supervised student Hilton Maurer, *title of the project*: "Nonlinear analysis: Fourier series, and applications. "

Summer 2015: USRA supervised student Evelyn Lai, *title of the project*: "The Calculus of Variations and applications to heteroclinic solutions for the forced pendulum problems and to the vocal fold problem "

For the academic year 2014-2015: undergraduate math thesis: Jesse Lee, *title of the project*: "On Heteroclinic solutions to forced pendulum problems via the Calculus of Variations"

For the academic year 2013-2014: undergraduate math thesis: Lee van Brussel, *title of the project*: "Eigenvalue problems in multiply-connected domains".

For the academic year 2012-2013: undergraduate math thesis: Chris Adkins, *title of the project*: "Existence for the Canham-Helfrich functional with protein dependance".

Summer 2013: supervised Lee van Brussel in the Calculus of Variation (Math 4W03).

Summer 2012: Supervised an NSERC-USRA research assistant: Adam Gerlings, *title of the project*: "Calculus of Variations in PDE", co-supervised with S. Alama

Summer 2012: Supervised a research assistant: Bilal Abbasi, *title of the project*:"Numerical methods and the Calculus of Variations", co-supervised with S. Alama.

Summer 2012: Supervised an NSERC-USRA research assistant: Ben Goodman, *title of the project*: "Numerical analysis of vortex for the Ginzburg-Landau energy", co-supervised with S. Alama.

Summer 2011: Supervised an NSERC-USRA research assistant: Irena Papst, *title of the project*: "Biological Application of the Calculus of Variations".

Summer 2009: Supervised an NSERC-USRA research assistant: Alex Chan to work on extensions of current papers on 1D superconducting wires, *title of the project*: "Modeling A Superconducting Wire With A Josephson Junction Subjected To A Constant Voltage Difference".

Summer 2008: Supervised a research assistant D.-M. Batista to work on travelling wave solutions to certain vector-valued non-linear PDE's. She was supported by an HRSDC grant from the 2008 Canada Summer Job Program from the Human resources and Social development Canada, as well as my NSERC discovery grant.

Summer 2007: Supervised an NSERC-USRA summer research project, S. Badbanchi, and hired another undergraduate research assistant, D.-M. Batista, to work on projects related to nonlinear PDE's whole title was: "Modelling Traffic flow"

Summer 1995: Supervised an NSERC summer research project for (an undergraduate student) J. Bernans. We proved the well-posedness of the nonlocal Allen-Cahn equation using a (discrete in time) variational method.

External supervision

- External referee for the Habilitation thesis of Rodiac, Orsay, Paris, June 16th 2023
- External referee for the PhD thesis of Stantejsky, Ecole Polytechnique, Paris, September 2022

• External referee for the PhD thesis of L'official, Univ of Paul Sabatier, Toulouse, July 2022 • Invited to be on the Jury and to be (virtually) present for the PhD (Viva) Defence of Aaron Pim from Bath, on March 28th, 2022.

• Invited to be on the jury and to be present at four Ph. D. Defenses: at the Univ. of Lyon, July 6th 2015, at the Univ. of Paris 6, July 9, 2007 and Dec. 14, 2004, and at the Univ. of Paris 12 on Dec. 17, 2004.

ADMINISTRATIVE DUTIES

External Services

2022-23 Member of Scientific committee of SMAI'2023 (Soc Math Appli and Industriel, France), Pointe à Pitre, Guadeloupe, 22 au 26 Mai 2023

2022 Scientific committee member for the CMS Winter meeting, Toronto, Dec 4-7, 2022

2021 Member of a team of three professors for the Evaluation of the undergraduate math program at Univ Laval, Qubec, November 9-11, 2021

2020- Reviewer for the Fund of Scientific Research FNRS, Belgium, about one to two a year.

2020-2023: Board of Directors for the **Fields Institute**

2019-20: Organizing Committee Chair for the **SIAM/CAIMS Annual meeting 2020**, July 6-10, 2020, Toronto, Canada.

Since 2016: Reviewer for ARC 2020-2025 research programme, reviewer for the Fund for Scientific Research - FNRS.

2013-2017: CMS President. (President-elect 2013-14, President 2014-16, Past-President 2016-17)

Dec 2014-Dec 2016: **Program Director** for the SIAM-SIAG PDE. Co-chair of the SIAM-SIAG PDE conference to be held in December 2015 at Scottsdale, AZ, involving 130 scientific sessions.

External committees

2022–26 Committee Member, CRM international scientific advisory committee (ISAC), Centre de Recherche Mathmatiques We evaluate all proposal for thematique semesters at the Centre de Recherche Mathmatiques and choose the Andr-Aisenstadt prize as well as the Simons CRM scholars.

2022-24 Nominating Committee member for the CMS

2022-24 Scientific Council for the SMAI (Soc Math Appl & Industriel), France

2020-21 Chair of the SIAG/APDE Early Career Prize committee

2020-23 NSERC Mathematics and Statistics Liaison Committee

2019-20 Chair of CMS selection committee for the 2020 CMS Fellows

2019–21 NSERC selection committee for the **Vanier Canada Graduate Scholarships (Vanier CGS) program.**

2019–23 Committee Member, **CRM international scientific advisory committee (ISAC)**, Centre de Recherche Mathmatiques We evaluate all proposal for thematique semesters at the Centre de Recherche Mathmatiques and choose the Andr-Aisenstadt prize as well as the Simons CRM scholars.

2020 Comité multidisciplinaire D, Grant selection committee for the Québec government FRQNT agency (fonds de recherche du Québec-Nature et technologies)

2018–12 Committee Member, CRM international scientific advisory committee (ISAC), Centre de Recherche Mathmatiques We evaluate all proposal for thematique semesters at the Centre de Recherche Mathmatiques and choose the Andr-Aisenstadt prize as well as the Simons CRM scholars.

Since 2018 Ambassador for the Committee for Women in Mathematics (CWM), which is part of the IMU.

Summer 2018 Member of the CMS committee (formed of the past and future CMS presidents) to recruit the new CMS Executive Director

2017–18 Comité multidisciplinaire D, Grant selection committee for the Québec government FRQNT agency (fonds de recherche du Québec-Nature et technologies) We choose among all first choices of 12 different committees, who will be actually funded.

2018, 2011–2015 Comité NC03, Grant selection committee for the Québec government FRQNT agency (fonds de recherche du Québec-Nature et technologies.) I was a member of the committee evaluating the grant proposal of young researchers. I was chair in 2014-15.

2014–17 Committee Member, CRM international scientific advisory committee (ISAC), Centre de Recherche Mathmatiques We evaluate all proposal for thematique semesters at the Centre de Recherche Mathmatiques and choose the Andr-Aisenstadt prize as well as the Simons CRM scholars.

2008–2012 NSERC Committee 1508

2010–2016 CMS-SMC Research committee

2011-2014 Chair of the CMS-SMC Research committee: I supervise the CMS/SMC summer and winter meetings, and the decisions on each year CMS prize winners of the Krieger-Nelson Prize, the Jeffery-Williams Prize and the Coxeter-James prize as well as the Doctoral Prize.

2005 NSF Division of Mathematical Sciences, grant Review Panel (materials and mechanics), Washington, Feb 9-11, 2005. I reviewed 11 proposals and participated in discussions/write up and gave recommendations during the meeting.

VISITING POSITIONS:

- Univ. de Toulouse, Toulouse, France. September-October 2019
- Univ de Lyon, Lyon, France, November 2019.
- Indiana University, Fall 2017

• Laboratoire Jacques-Louis Lions, Paris VII, Paris, France. September–December 2012
• Laboratoire Jacques-Louis Lions, Paris VI, Paris, France. January–July 2010
• Laboratoire Jacques-Louis Lions, Paris VI, Paris, France. January–July 2003 and January–July 2006.
• Centre pour Mathématiques et leurs Applications, Ecole Normale Supérieure de Cachan, France. January–July, 2000.
• Courant Institute of Mathematical Sciences, New York University, New York City, September–December, 1999.
• Université Claude-Bernard Lyon I, August 1998.
• IAM-SFB 256 (Institute for Applied Mathematics, Bonn),
May 1-May 21, 1997, June 15- July 15, 1996 and May 15-July 2, 1995;
• IMA (Institute for Mathematics and its Applications, Univ of Minnesota), Sept 1-Dec 21, 1995;

Supervisory Committee for Ph.D. and M. Sc. students:

Jamal Shabani (PhD 2021-)
Szymon Sobieszek (PhD 2019-23)
MSc defense of Sullivan Winter 2023
PhD defense of Pritpal Mataru Summer 2022
Aigerim Madiyeva (Msc 2019-21)
Adilbek Kairzhan (PhD 2016-20)
Robert White (MSc 2018-20)
Sean Conley (MSc 2016-2017)
Yusuke Shimabukuro (PhD 2012- 2016)
Qi Gao (PhD 2008-13)
Qi Gao (M. Sc 2007-08)
Qiuping Lu (PhD 2004-08)
Feng Su (PhD 2006-07)
Scott Rodney (M. Sc 2002-04, PhD 2004-07)
Zhengbin Yan (Ph. D 2006-07)
Jeff Mesaric (M.Sc. 2002-03)
Silogini Somasundaram (M. Sc. 2001-02)
Don Hender (M. Sc. 1998-2000)
Robert Smith (Ph. D 1997-01)
J. Bowen (M. Sc. 1997-99)
D. Rusu (Ph. D. 1995-1997)

Written Comprehensive Exam committees (since 2000):

Analysis Exam: 2002, 2003-05 (chair), 2009, 2010, 2012, 2013, 2014, 2015, 2016, 2017, 2018
Applied Mathematics Exam: 2000-02, 2006, 2008–09, 2013, 2020-23

McMaster University, Department of Mathematics & Statistics:

Departmental Committees:

2022-23 Tenure and Promotion committee, Colloquium committee.

2020-21 Appointments committee, Honors and Awards
2019-20 Tenure and Promotion Committee
2018-19 Appointments committee
2017-18 Undergraduate Curriculum
2016-17 Tenure and promotion
2015-16 Tenure and promotion, hiring committee
2012-17: co-organizer of PDE/Analysis seminar
2011-12: graduate curriculum committee; co-organizer of PDE/Analysis seminar
2010-11: graduate curriculum committee; co-organizer of PDE/Analysis seminar
2007-09: Undergraduate curriculum committee; Co-organiser of PDE/Analysis seminar
2005-07: Undergraduate curriculum committee; Co-organiser of PDE/Analysis seminar
2004-05: Chair selection committee (Dept. of Physics and Astr.)
2004-05: Undergraduate curriculum committee; Co-organiser of PDE/Analysis seminar
2003–04: Undergraduate curriculum committee; Co-organiser of PDE/Analysis seminar
2001–02: Co-organiser of PDE/applied math seminar.
1999-00: Co-organiser of Applied Math seminar.
1998-99: Graduate curriculum committee; Co-organizer of Analysis Seminar.
1997-98: Undergraduate curriculum committee; Co-organizer of Analysis Seminar.
1996-97: Graduate curriculum committee; Co-organizer of Analysis Seminar.
1994-95: Appointments committee; Undergraduate curriculum committee; Co-organizer of Applied Analysis Seminar.
1993-94: Graduate Curriculum committee; Co-organizer of Applied Analysis Seminar.

University Committees:

2020-2023 McMaster **Board of Governors,** Senate representative

2020-2023 **Senate member,** Faculty of Science

2018: McMaster-CNRS Steering Committee

2016-17 McMaster Univ. open house, mathematics and statistics representative.

1994-95: Health and safety committee.

1997: McMaster Univ. open house, mathematics and statistics representative.

1998-99: Library representative.