

CURRICULUM VITAE

FRANCO VARGAS PALLETE

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Appointed positions

- Assistant Professor, Arizona State University
August 2025-onwards
- Postdoc, Institut des Hautes Etudes Scientifiques
July 2024 - July 2025
- Adjunct Professor, Arizona State University
July 2024 - July 2025
- Gibbs Assistant Professor, Yale University
July 2019 - June 2024
- NSF Postdoctoral Fellow, Yale University.
August 2020 - July 2023
- Postdoc, Mathematical Sciences Research Institute.
August 2020 - December 2020
Random and Arithmetic Structures in Topology - Virtual Semester
- Member, Institute for Advanced Study
Special program 2018-2019: Variational Methods in Geometry.
Minerva Research Foundation Member.
September 2018 - July 2019

Education

- Ph.D. Mathematics: University of California at Berkeley
August 2012- May 2018 Ph.D. (advisor: Ian Agol).
- Summer Program: Instituto Nacional de Matemática Pura e Aplicada
2008, 2009, 2010, 2011.
- M.S. Mathematics: Instituto de Matemática y Ciencias Afines (ABD)
2010-2011.
- B.S. Mathematics: Pontificia Universidad Católica del Perú
2007-2011.

Research Interests

- 3-manifold topology, hyperbolic geometry, geometric analysis.

Preprints and Publications

- (1) Minimal surface entropy for finite volume hyperbolic 3-manifolds (j. with Ruojing Jiang).
In preparation.
- (2) On reflections of congruence hyperbolic manifolds (j. with Sami Douba)
- (3) Epstein curves and holography of the Schwarzian action (j. with Yilin Wang and Catherine Wolfram).

- (4) Existence of Minimal Surfaces in Infinite Volume Hyperbolic 3-manifolds (j. with Baris Coskunuzer, Zheng Huang and Ben Lowe).
- (5) W-volume for planar domains with circular boundary (j. with Jeffrey Brock) arXiv:2312.00230.
- (6) Universal Liouville action as a renormalized volume and its gradient flow (j. with Martin Bridgeman, Ken Bromberg and Yilin Wang) arXiv:2311.18767 (Accepted, Duke Mathematical Journal).
- (7) Cheeger constant of convex co-compact hyperbolic 3-manifolds (j. with Celso Viana) arXiv:2311.12162 (Submitted).
- (8) On the topology and index of minimal/Bryant framed surfaces (j. with Davi Maximo) arXiv:2309.05742 (Submitted).
- (9) Uniform spectral gap and orthogeodesic counting for strong convergence of Kleinian groups (j. with Beibei Liu) (Accepted, Forum of Mathematics, Sigma).
- (10) Peripheral birationality for 3-dimensional convex co-compact $PSL_2(\mathbb{C})$ varieties (j. with Ian Agol) (Accepted, Annales de l'Institut Fourier).
- (11) Besse projective spaces with many diameters (j. with Ian Adelstein) (Accepted, Journal of Geometric Analysis).
- (12) Volume bounds for the canonical lift complement of a random geodesic (j. with Tommaso Cremaschi, Yannick Krifka, Dídac Martínez-Granado) arXiv:2108.08419 (Accepted, Transactions of the AMS).
- (13) Isoperimetric interpretation for the renormalized volume of convex co-compact hyperbolic 3-manifolds (j. with Celso Viana) arXiv:2105.11540 (Accepted, American Journal of Mathematics).
- (14) Mean curvature flow in homology and foliations of hyperbolic 3-manifolds (j. with Marco A. M. Guaraco, Vanderson Lima) arXiv:2105.07504 (Accepted, American Journal of Mathematics).
- (15) The extremal length systole of the Bolza surface (j. with Maxime Fortier Bourque, Dídac Martínez-Granado) arXiv:2105.01207 (Accepted, Annales Henri Lebesgue).
- (16) Minimal area surfaces and fibered hyperbolic 3-manifolds (j. with James Farre) *Proc. Amer. Math. Soc.* (2022).
- (17) Convergence of the gradient flow of renormalized volume to convex cores with totally geodesic boundary (j. with Martin Bridgeman and Kenneth Bromberg) arXiv:2105.01207 (Accepted, Compositio Mathematica).
- (18) The length of the shortest closed geodesic on positively curved 2-spheres (joint with Ian Adelstein) *Math. Z.* (2021).
- (19) Hyperbolic limits of cantor set complements in the sphere (joint with Tommaso Cremaschi) *Bull. Lond. Math. Soc.* 54 (2022) no. 3, 1104-1119.
- (20) Comparing hyperbolic and extremal lengths for shortest curves (joint with Dídac Martínez-Granado) arXiv:1911.09078 (Submitted).
- (21) Upper bounds on Renormalized Volume for Schottky groups arXiv:1905.03303 (Submitted).
- (22) A differential form approach to the genus of Open Riemann surfaces (joint with Jesús Zapata Samanez) arXiv:1903.06131 (Preprint).
- (23) Embedded Delaunay triangulations for point clouds of surfaces in $\mathbb{R}^3$. *Proc. Amer. Math. Soc.* 148 (2020), no. 12, 5457-5467.
- (24) Additive continuity of the renormalized volume under geometric limits arXiv:1708.04009 (Preprint).
- (25) Continuity of the renormalized volume under geometric limits arXiv:1605.07986 (Preprint).
- (26) Local convexity of renormalized volume for rank-1 cusped manifolds *Math. Res. Lett.* 26 (2019), no. 3, 903-919.

- (27) Hyperbolic groups with few linear representations (A non-published argument of William Thurston) Hyperbolic groups with few linear representations. *Pro Mathematica*, 32(63), 73-81.

Teaching Experience

- Spring 2024: MATH 302 *Vector Analysis and Integration on Manifolds*
MATH 435 *Differential Geometry*
- Fall 2023: MATH 255 *Analysis 1*
- Fall 2022: MATH 255 *Analysis 1*
- Fall 2021: MATH 310 *Introduction to Complex Analysis*.
MATH 544 *Introduction to Algebraic Topology*.
- Spring 2020: MATH 315/515 *Intermediate Complex Analysis*.
- Fall 2019: MATH 310 *Introduction to Complex Analysis*.
MATH 732 *Minimal and CMC surfaces in Hyperbolic Space*.
- Spring 2018: Graduate student instructor, University of California, Berkeley
Analytic Geometry and Calculus (Math 16B).
- Fall 2017: Graduate student instructor, University of California, Berkeley
Analytic Geometry and Calculus (Math 16A).
- Fall 2016: Graduate student instructor, University of California, Berkeley
Methods of Mathematics: Calculus, Statistics, and Combinatorics (Math 10A).
- Fall 2011: Pontificia Universidad Católica del Perú, Instructor
EST219 Probabilidades (Probability).
- Spring 2011: Pontificia Universidad Católica del Perú, Instructor
EST211 Probabilidad y Estadística 1 (Probability & Statistics 1).
- Fall 2010: Pontificia Universidad Católica del Perú, Instructor
EST219 Probabilidades (Probability), *MAT149 Cálculo 4 (Calculus 4)*, *MAT117 Matemáticas Básicas (Basic Mathematics)*.
- Spring 2010: Pontificia Universidad Católica del Perú, Instructor
EST219 Probabilidades (Probability), *EST211 Probabilidad y Estadística 1 (Probability & Statistics 1)*, *MAT129 Cálculo 2 (Calculus 2)*, *MAT119 Cálculo 1 (Calculus 4)*, *MAT117 Matemáticas Básicas (Basic Mathematics)*.

Outreach and Mentoring Experience

- Summer 2024: Mentor, SUMRY (Yale)
Galois rigidity of hyperbolic 3-manifolds
- Spring 2023:
Senior essay, Cristhofer Romani Baltazar (Pontificia Universidad Católica del Perú).
- Summer 2022: Mentor, SUMRY (Yale)
Minimal area splitting disk in the regular ideal hyperbolic octahedra
- Spring 2022: Visiting professor, Pontificia Universidad Católica del Perú (virtual)
Tópicos de Análisis
- Spring 2021:
Senior Essay, Kevin Li *A Proof of Kolomogorov's theorem (Perturbation theory)*. (Yale University)
Senior Essay, Jafer Vito Gutierrez *Variedades cuyas geodésicas son cerradas* (Universidad Nacional de Ingeniería)
- Summer 2018: Mentor, UC Berkeley Geometry and Topology RTG Summer Research Program for Undergraduates.
Fundamental Domains of Hyperbolic 3-manifolds.
- Direct Reading Program:
Hajin Kim (Fall 2023)

Uma Arengo, Jacob Mansfield (Spring 2023)

Philos Kim (Spring 2022)

Derek Chen (Spring 2022)

Krish Desai (Fall 2019)

- Mentor of the Peruvian team at math competitions:
 Olimpiada Iberoamericana de Matemática 2020 (Leader)
 Olimpiada Rioplatense de Matemática 2010 (Deputy Leader)
 Olimpiada del Cono Sur 2009 (Deputy Leader)

Research Positions

- Graduate Student Research Assistant, UC Berkeley
 Fall 2014 - Spring 2015, Spring 2016 - Summer 2016.
- Visiting Ph.D. student, Institute for Advanced Study
 Fall 2015 - Spring 2016.
- Visiting Ph.D. student, Instituto Nacional de Matematica Pura e Aplicada
 July 2016, July 2015, June-August 2013.

Awards

- Travel Support for Mathematicians, Simons Foundation. 09/01/2025-08/31/2030.
- AMS-Simons Travel Grant, American Mathematical Society and the Simons Foundation. 7/1/2019-6/30/2023.
- Outstanding Graduate Student Instructor Award 2016-2017.
- Berkeley Fellowship for outstanding doctoral applicants 2012 (2 year duration).
- Beca de Estudios del Proyecto IMCA del Convenio Brasil-Perú 2011 (*Scholarship for the IMCA Project of the Brazil-Perú Covenant*).
- 1st place Laurent Schwartz Mathematical Olympiad 2011.
- Proyecto de Apoyo a la Iniciacion Cientifica (PAIN) 2010 (*Project to Support Scientific Initiation*).
- Silver Medal, Asian Pacific Mathematics Olympiad 2006.
- Silver Medal, Olimpiada Iberoamericana de Matemática 2006.
- Honorable Mention, International Math Olympiad 2006.
- Gold Medal, Olimpiada del Cono Sur 2006.
- Silver Medal, Olimpiada Iberoamericana de Matemática 2005.
- Bronze Medal, International Math Olympiad 2005.
- Silver Medal, Olimpiada Rioplatense de Matemática 2003

Seminar and Colloquium Talks

- 2025-05-06 Geometry Seminar, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany
On the existence of minimal surfaces in infinite volume hyperbolic 3-manifolds
- 2025-04-16 Metric Analysis Program Seminar, Hausdorff Research Institute for Mathematics
Minimal surface entropy for asymptotically cusped metrics in 3-manifolds
- 2025-04-09 Geometry Day, University of Copenhagen,
On the existence of minimal surfaces in infinite volume hyperbolic 3-manifolds
- 2025-04-07 Séminaire de Géométrie, Université Paris-Cité
On the existence of minimal surfaces in infinite volume hyperbolic 3-manifolds.
- 2025-02-06 London Analysis Seminar, Imperial College
On the topology and index of minimal/Bryant framed surfaces
- 2024-12-02 GT Seminar, Université du Luxembourg.
W-volume for domains with circular boundary
- 2024-11-28 Séminaire Géométrie Topologie Dynamique, Orsay.

- Minimal surface entropy for asymptotically cusped metrics in 3-manifolds*
- 2024-02-08 Geometry/Topology Seminar, The University of Chicago.
Minimal surface entropy for asymptotically cusped metrics in 3-manifolds
- 2024-02 Special Colloquium, University of Missouri
Geometric surfaces in hyperbolic geometry
- 2024-01 Special Colloquium, The University of Texas at Dallas
Geometric surfaces in hyperbolic geometry
- 2024-01 Special Colloquium, Kansas University
Geometric surfaces in hyperbolic geometry
- 2024-01 Special Colloquium, Arizona State University
Geometric surfaces in hyperbolic geometry
- 2024-01 Special Colloquium, Pontificia Universidad Católica de Chile
Superficies geométricas en geometría hiperbólica.
- 2023-11-23 Geometry Day, University of Copenhagen
Isoperimetric profile comparison for convex co-compact hyperbolic 3-manifolds
- 2023-04-27 Differential geometry and symplectic topology seminar, University of Minnesota
Minimal surface entropy for asymptotically cusped metrics in 3-manifolds
- 2023-03-07 Hyperbolic geometry seminar, CUNY Graduate Center.
Renormalized volume for Schottky groups
- 2023-01-18 Special Colloquium, University of Illinois at Urbana-Champaign.
Renormalized volume in hyperbolic geometry
- 2022-12-05 Special Colloquium, The University of Oklahoma.
Renormalized volume in hyperbolic geometry
- 2022-11-30 Special Colloquium, Lehigh University.
Renormalized volume in hyperbolic geometry
- 2022-10-22 Topology Seminar, Wesleyan University
Peripheral birationality for 3-dimensional convex co-compact $PSL_2\mathbb{C}$ varieties
- 2022-10-19 Geometric Analysis: Past, Present and Future, online.
Renormalized volume and isoperimetric profiles
- 2022-09-22 Coloquio Oaxaqueño de Matemáticas
Uniformización y Volumen Renormalizado
- 2022-05-02 Group Actions and Dynamics Seminar, Yale University
Uniform spectral gaps and orthogeodesic counting for strong convergence of geometrically finite Kleinian groups
- 2022-04-22 PATCH at Penn, University of Pennsylvania
Peripheral birationality for 3-dimensional convex co-compact $PSL(2, \mathbb{C})$ varieties
- 2022-04-21 Geometric Group Theory and Topology Seminar, Tufts University
Peripheral birationality for 3-dimensional convex co-compact $PSL(2, \mathbb{C})$ varieties
- 2022-04-06 Geometry/Topology Seminar, Brown University
On the Weil-Petersson gradient flow of renormalized volume
- 2022-03-33 Australian Geometric Topology Webinar
Peripheral birationality for 3-dimensional convex co-compact $PSL(2, \mathbb{C})$ varieties
- 2022-02-22 Geometry & Topology Seminar, Yale University
Peripheral birationality for 3-dimensional convex co-compact $PSL(2, \mathbb{C})$ varieties
- 2021-12-17 Special Math Colloquium, Rice University
Renormalized volume of hyperbolic 3-manifolds and a question of Maldacena
- 2021-11-15 Topology Seminar, Rice University
Peripheral birationality for 3-dimensional convex co-compact $PSL(2, \mathbb{C})$ varieties
- 2021-10-19 Geometry & Topology Seminar, Yale University
On the Weil-Petersson gradient flow of renormalized volume on a Bers slice

- 2021-10-14 Geometric Analysis Seminar, CUNY
Mean curvature flow and foliations in Hyperbolic 3-manifolds
- 2021-09-17 Geometric Analysis and Applications Seminar, Yale University
Mean curvature flow and foliations in Hyperbolic 3-manifolds
- 2021-04-26 Geometry Topology Seminar, Georgia Tech
On the length of the shortest closed geodesic on positively curved 2-spheres
- 2021-04-08 Seminário de Geometria Diferencial, Universidade Federal do Ceará (Brazil)
Desigualdade de Minkowski para esferas horo-convexas no espaço hiperbólico
- 2021-01-14 Seminario de Divulgación Matemática, Universidad Nacional de Ingeniería (Perú)
El Teorema de Rigidez de Mostow
- 2020-09-21 Research Seminar, MSRI
Isoperimetric profiles for quasi-Fuchsian manifolds
- 2019-09-10 Geometry/Topology Seminar, Yale University
Bounds on renormalized volume for Schottky manifolds
- 2019-04-04 Topology Seminar, Princeton University
Renormalized Volume for Hyperbolic 3-manifolds
- 2019-04-02 Geometry/Topology Seminar, Rutgers
Embedded Delaunay triangulations for point clouds of surfaces in $\mathbb{R}^3$
- 2018-12-18 Variational Methods in Geometry Seminar, Institute for Advanced Study
Bounds in Renormalized Volume for Hyperbolic 3-manifolds
- 2018-02-16 Geometry and Topology seminar, Caltech
Minimizing Renormalized Volume.
- 2017-10-31 3-manifold seminar, University of California, Berkeley
Schwarzian derivatives, projective structures, and the Weil-Petersson gradient flow for renormalized volume (a paper by Bridgeman, Brock and Bromberg).
- 2017-10-12 Geometry/Topology seminar, Boston College
Minimizing Renormalized Volume.
- 2016-11-22 Geometric Analysis seminar, University of Chicago
Renormalized Volume.
- 2016-11-01 3-manifold seminar, University of California, Berkeley
Renormalized Volume (global minimums).
- 2015-04-07 3-manifold seminar, University of California, Berkeley
Local convexity of the renormalized volume for acylindrical convex co-compact hyperbolic 3-manifolds at the geodesic class.
- 2014-10-13 3-manifold seminar, University of California, Berkeley
On the renormalized volume of hyperbolic 3-manifolds (a paper by Kirill Krasnov and Jean-Marc Schlenker).
- 2014-04-24 3-manifold seminar, University of California, Berkeley
Heegaard splittings by minimal surfaces (a paper by Daniel Ketover).

Participation in Scientific Conferences

- August 11th-15th, 2025 XXXVIII Coloquio de la Sociedad Matemática Peruana, Pontificia Universidad Católica del Perú, Lima. *Minimización local de borrosidad en alta simetría*
- June 23rd-27th, 2025 Workshop: Low-dimensional phenomena: geometry and dynamics, Higher rank geometric structures Trimester, IHP-Paris. *Local minimization of fuzziness under high symmetry.*
- June 16th-18th, 2025 Meeting on Arithmetic groups, Topology and Automorphic forms, IHES. *On nonseparating reflections of congruence hyperbolic manifolds.*

- April 21st-25th, 2025 Geometry Conference, an ICMAT–IMSA Collaboration, Instituto de Ciencias Matematicas (ICMAT), Madrid. *Epstein curves and the holography of the Schwarzian action.*
- January 6th-17th, 2025 Hyperbolic Manifolds, Their Submanifolds and Fundamental Groups, IMPA. *Renormalized Volume and Isoperimetric profiles.*
- September 30th-October 2nd, 2024 IMPRS Combo Cosmology and Quantum Information Theory Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany. *Introductory Course: Quasiconformal mappings and universal Teichmüller space.*
- July 22nd-26th, 2024 Primer Encuentro Colombiano de Geometría y Topología. Universidad Nacional de Colombia, sede Bogotá. *On the topology and index of minimal/Bryant framed surfaces*
- March 11th-15th, 2024 Differential Geometry and Geometric Analysis. Fortaleza, Brazil. *On the topology and index of minimal/Bryant framed surfaces*
- December 14th-16th, 2023: IMCA 25 Anniversary Conference. *Volumen Renormalizado para curvas de Weil-Petersson.*
- April 18th-22nd, 2022: III Congreso Internacional Multidisciplinario de Matemática CIMM-UNI-2022.

Minicourse, *Aplicación de la fórmula de Bonahon-Schläfli para variedades de $PSL(2, \mathbb{C})$ caracteres.*

- October 19th-23rd, 2020: Encuentro de Investigación, Pontificia Universidad Católica del Perú. *Problemas Variacionales en Geometría Hiperbólica.*
- November 16th-17th, 2019: Workshop on Geometric Analysis. *Bounds on renormalized volume for Schottky manifolds.*
- August 14th-16th 2017: Summer 2017 Wasatch Topology Conference *Local and global minimum of Renormalized Volume.*
- August 2010: Colloquium of the Peruvian Mathematical Society - Poster *Teorema del encaje de Whitney (On Whitney's embedding theorem).*

Language Skills

- Spanish (Native)
- Portuguese (Professional working proficiency)
- English (Professional working proficiency)

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