

# CURRICULUM VITAE

FRANCO VARGAS PALLETE

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## Appointed positions

- 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 Ruoqing Jiang).  
*In preparation.*
- (2) W-volume for planar domains with circular boundary (j. with Jeffrey Brock) arXiv:2312.00230.
- (3) Universal Liouville action as a renormalized volume and its gradient flow (j. with Martin Bridgeman, Ken Bromberg and Yilin Wang) arXiv:2311.18767.
- (4) Cheeger constant of convex co-compact hyperbolic 3-manifolds (j. with Celso Viana)  
arXiv:2311.12162 (Submitted).
- (5) On the topology and index of minimal/Bryant framed surfaces (j. with Davi Maximo)  
arXiv:2309.05742 (Submitted).
- (6) Uniform spectral gap and orthogeodesic counting for strong convergence of Kleinian groups  
(j. with Beibei Liu) (Accepted, Forum of Mathematics, Sigma).

- (7) Peripheral birationality for 3-dimensional convex co-compact  $PSL_2(\mathbb{C})$  varieties (j. with Ian Agol) (Submitted).
- (8) Besse projective spaces with many diameters (j. with Ian Adelstein) (Accepted, Journal of Geometric Analysis).
- (9) 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).
- (10) 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).
- (11) Mean curvature flow in homology and foliations of hyperbolic 3-manifolds (j. with Marco A. M. Guaraco, Vanderson Lima) arXiv:2105.07504 (Submitted).
- (12) The extremal length systole of the Bolza surface (j. with Maxime Fortier Bourque, Dídac Martínez-Granado) arXiv:2105.01207 (Submitted).
- (13) Minimal area surfaces and fibered hyperbolic 3-manifolds (j. with James Farre) *Proc. Amer. Math. Soc.* (2022).
- (14) 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).
- (15) The length of the shortest closed geodesic on positively curved 2-spheres (joint with Ian Adelstein) *Math. Z.* (2021).
- (16) Hyperbolic limits of cantor set complements in the sphere (joint with Tommaso Cremaschi) *Bull. Lond. Math. Soc.* 54 (2022) no. 3, 1104-1119.
- (17) Comparing hyperbolic and extremal lengths for shortest curves (joint with Dídac Martínez-Granado) arXiv:1911.09078 (Submitted).
- (18) Upper bounds on Renormalized Volume for Schottky groups arXiv:1905.03303 (Submitted).
- (19) A differential form approach to the genus of Open Riemann surfaces (joint with Jesús Zapata Samanez) arXiv:1903.06131 (Preprint).
- (20) Embedded Delaunay triangulations for point clouds of surfaces in  $\mathbb{R}^3$ . *Proc. Amer. Math. Soc.* 148 (2020), no. 12, 5457-5467.
- (21) Additive continuity of the renormalized volume under geometric limits arXiv:1708.04009 (Preprint).
- (22) Continuity of the renormalized volume under geometric limits arXiv:1605.07986 (Preprint).
- (23) Local convexity of renormalized volume for rank-1 cusped manifolds *Math. Res. Lett.* 26 (2019), no. 3, 903-919.
- (24) 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

- 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

- 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 *Varietades 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 Mateática 2020 (Leader)  
Olimpiada Rioplatense de Mateática 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

- 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 Iniciación Científica (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 Conor 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

- 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*
- 2022-09-22 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  $PSL(2, C)$  varieties*
- 2022-04-21 Geometric Group Theory and Topology Seminar, Tufts University  
*Peripheral birationality for 3-dimensional convex co-compact  $PSL(2, C)$  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  $PSL(2, C)$  varieties*
- 2022-02-22 Geometry & Topology Seminar, Yale University  
*Peripheral birationality for 3-dimensional convex co-compact  $PSL(2, C)$  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  $PSL(2, C)$  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

- 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  $PSL(2, C)$  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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