Curriculum Vitae

Ivo Terek
Ph.D., Mathematics

October 1, 2024
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Research interests

- Differential Geometry (pseudo-Riemannian, Lorentzian, symplectic).
- Dynamical Systems (smooth dynamics, magnetic flows, hyperbolic systems).

Employment & Education

- **University of California, Riverside — UCR** — Riverside, CA, USA
  Visiting Assistant Professor — (upcoming)
- **Williams College** — Williamstown, MA, USA
  Visiting Assistant Professor of Mathematics — *2024*—present
- **The Ohio State University — OSU** — Columbus, OH, USA
  Ph.D., Mathematics — *2018—2024*
  - Dissertation: *The geometry and structure of compact rank-one ECS manifolds.*
  - Advisor: Andrzej Derdzinski.
- **University of São Paulo — USP** — São Paulo, SP, Brazil
  M.Sc., Mathematics — *2016—2018*
  B.Sc., Mathematics — *2013—2016*
  - Dissertation[1]: *Characterizations of Marginally Trapped Submanifolds in Space-Forms.*
  - Undergraduate research project: Lorentzian Differential Geometry.
  - Advisor: Alexandre Lymberopoulos.

Awards, Grants & Honours

2024 Joint Mathematics Meeting AMS Travel Grant 2024
Special Graduate Assignment – Department Fellowship (OSU) 2024
Graduate Associate Teaching Award[2] (OSU) 2023
Special Graduate Assignment – Department Fellowship (OSU) 2023
Phil Huneke Excellence in Teaching Award (OSU) 2022
Distinguished First-Year Graduate Teaching Associate Award (OSU) 2019
National Council for Scientific and Technological Development (CNPq - grant 134593/2016-2) 2016-2018
Honorable mention for outstanding performance in the Mathematics B.Sc. program (USP) . . . 2016
São Paulo Research Foundation (FAPESP - grant 2014/09781-8) 2014-2016

[1] Original title in Portuguese: *Caracterizações de Subvariedades Marginalmente Aprisionadas em Formas Espaciais.*
[2] This is the highest university-level graduate teaching award offered by The Ohio State University.

Publications & preprints

The items are listed in reverse order of completion. Some DOI codes might still be inactive.

12. **Marked length spectrum rigidity for Anosov magnetic surfaces**
(with V. Assenza, J. de Simoi, and J. Marshall Reber).
e-print arXiv 2409.20545, 21 pages // Submitted for publication.
DOI: https://doi.org/10.48550/arXiv.2409.20545
11. **Nijenhuis geometry of parallel tensors** (with A. Derdzinski and P. Piccione).
e-print arXiv 2407.04539, 20 pages. // Submitted for publication.
DOI: https://doi.org/10.48550/arXiv.2407.04539
10. **Compact plane waves with parallel Weyl curvature**.
e-print arXiv 2407.07261, 22 pages. // Submitted for publication.
DOI: https://doi.org/10.48550/arXiv.2407.07261
9. **Magnetic flatness and E. Hopf's theorem for magnetic systems**
(with V. Assenza and J. Marshall Reber).
e-print arXiv:2404.17726, 23 pages. // To appear in Communications in Mathematical Physics.
DOI: https://doi.org/10.48550/arXiv.2404.17726.
8. **Killing fields on compact pseudo-Kähler manifolds** (with A. Derdzinski).
Journal of Geometric Analysis, vol. **34** (2024), no. 5, article 144.
DOI: https://doi.org/10.1007/s12220-024-01591-z
7. **Codazzi tensor fields in reductive homogeneous spaces** (with J. Marshall Reber).
Results in Mathematics - Resultate der Mathematik, vol. **79** (2024), no. 4, article 137.
DOI: https://doi.org/10.1007/s00025-024-02151-1
6. **Compact locally homogeneous manifolds with parallel Weyl tensor** (with A. Derdzinski).
e-print arXiv 2306.01600, 14 pages // To appear in Advances in Geometry.
DOI: https://doi.org/10.1515/advgeom-2024-0019
5. **The metric structure of compact rank-one ECS manifolds** (with A. Derdzinski).
Annals of Global Analysis and Geometry, vol. **64** (2023), no. 4, article 24.
DOI: https://doi.org/10.1007/s10455-023-09929-6
4. **Rank-one ECS manifolds of dilational type** (with A. Derdzinski).
Portugaliae Mathematica, vol. **81** (2024), no. 1–2, pp. 69–96.
DOI: https://doi.org/10.4171/PM/2110
3. **Conformal flatness of compact three-dimensional Cotton-parallel manifolds**.
Proceedings of the American Mathematical Society, vol. **152** (2024), no. 2, pp. 797–800.
DOI: https://doi.org/10.1090/proc/16446
2. **The topology of compact rank-one ECS manifolds** (with A. Derdzinski).
Proceedings of the Edinburgh Mathematical Society, vol. **66** (2023), no. 3, pp. 789–809.
DOI: https://doi.org/10.1017/S0013091523000408
1. **New examples of compact Weyl-parallel manifolds** (with A. Derdzinski).
Monatshefte für Mathematik, vol. **203** (2024), no. 4, pp. 859–871.
DOI: https://doi.org/10.1007/s00605-023-01908-0

Books

2. **Introduction to Lorentz Geometry: Curves and Surfaces** (with A. Lymberopoulos).

Chapman & Hall/CRC Press, Boca Raton, FL, 2021. ix+340 pp.
(English translation of the Portuguese original.)
DOI: https://doi.org/10.1201/9781003031574, ISBN: 9780367468644.

1. **Introdução à Geometria Lorentziana: Curvas e Superfícies** (with A. Lymberopoulos).
Brazilian Mathematical Society - SBM, Universitary Texts Collection, vol. **21**, Rio de Janeiro, RJ, 2018. 546 pp. (In Portuguese. Errata.)
ISBN: 9788583371397.

Scientific dissemination and other relevant texts

4. **Corrections of minor misstatements in several papers on ECS manifolds** (with A. Derdzinski).
e-print arXiv 2404.09766, 4 pages (not intended for publication)
DOI: https://doi.org/10.48550/arXiv.2404.09766
3. **Mergulhos Clássicos de Variedades Grassmannianas: uma visão geral**.
Revista Matemática Universitária (Brazilian Mathematical Society), vol. **1** (2021), pp. 1-14.
(In Portuguese. English title: *Classical Embeddings of Grassmannian Manifolds: an overview*).
DOI: http://doi.org/10.21711/26755254/rmu20211
2. **Topics in Lorentz Geometry**.
e-print arXiv:1908.01710, 76 pages (lecture notes, not intended for publication).
DOI: https://doi.org/10.48550/arXiv.1908.01710
1. **Usando Geometria Diferencial para classificar trajetórias de fótons na Relatividade Especial**
Acta Legalicus (Institute of Mathematics and Computer Sciences – USP), n° 14 (2018), 14 pp.
(In Portuguese. English title: *Using Differential Geometry to classify trajectories of photons in Special Relativity*).

In preparation

- **Notes on Causality Theory** (with P. Piccione). // Working title, 312 pages.
- **Wave-type spacetimes with parallel Cotton tensor** (with R. Sánchez Galán).

Peer reviewing service

Referee for:

- International Electronic Journal of Geometry.

Reviewer for:

- MathSciNet (1 article).

Talks, mini-courses taught, and poster presentations (22 items)

Links for talk slides or posters are provided when possible.

2025 • Upcoming. Contributed talk. *A magnetic version of E. Hopf's theorem.* AMS Special Session on Metric Geometry and Topology (2025 Joint Mathematics Meeting).

2024 • Contributed talk. *Codazzi tensors in homogeneous spaces*. Graduate Student Topology and Geometry Conference (Michigan State University).
• Poster presentation. *Killing vector fields on compact pseudo-Kähler $\partial\bar{\partial}$-manifolds are holomorphic*. Special Holonomy and Geometric Structures on Complex Manifolds (IMPA).

- Contributed talk. *Compact locally homogeneous manifolds with parallel Weyl curvature*. Symmetry and Geometry in South Florida (Florida International University).
- Contributed talk. *The topology of compact Lorentzian manifolds with parallel Weyl curvature*. XI International Meeting on Lorentzian Geometry (Universidad Autónoma de Yucatán).
- Invited talk. *On compact Cotton-parallel three-manifolds*. AMS Special Session on Metric Geometry and Topology, II (2024 Joint Mathematics Meeting).

2023
- Invited Talk. *An overview of completeness in Lorentzian geometry*. Oklahoma State University MGSS Graduate Student Seminar. // Online.
- Seminar talk. *The bundle structure of compact rank-one ECS manifolds.* University of São Paulo Differential Geometry Seminar.
- Contributed talk. *Compactifying rank-one Weyl-parallel manifolds*. Graduate Student Conference in Algebra, Geometry, and Topology (Temple University).
- Seminar talk. *Conformal flatness and compactness in dimension three.* OSU Geometry, Topology, and Dynamics Student Seminar (The Ohio State University).
- Contributed talk. *On compact rank-one ECS manifolds*. 2023 Midwest Geometry Conference (Kansas State University).

2022
- Mini-course. *Causality and Spacetimes*. 2$^{\text{nd}}$ edition of the OSU Graduate Math Summer Mini-Courses (The Ohio State University).
- Contributed talk. *Magnetic Cotangent Bundles*. Midwest Dynamical Systems Early Career Conference (University of Notre Dame).

2021
- Mini-course. *Symplectic Geometry Crash Course*. 1$^{\text{st}}$ edition of the OSU Graduate Math Summer Mini-Courses (The Ohio State University).
- Poster presentation. *On rigidity of 0-isotropic submanifolds of Lorentzian space forms*. X International Meeting on Lorentzian Geometry (University of Córdoba). // Online.
- Seminar talk. *Guillemin-Kazhdan path marked length spectrum rigidity I.* Ohio State Smooth Dynamics Seminar.

2020
- Invited talk. *Contrasts between Riemannian and Lorentzian Geometry*. First year anniversary of the undergraduate Mathematics Program at *Federal Institute of Ceará* - IFCE. // In Portuguese. Recording available at `https://youtu.be/ywnX95Pqx5Q`.

2019
- Mini-course. MAT6702 - *Topics in Lorentz Geometry* taught at the *University of São Paulo* - USP. Partly supported by the OSU and USP departments of Mathematics, and by a FAPESP-OSU 2015 Regular Research Award (grant 2015/50265-6).
- Seminar talk. *Characterization of non-admissible curves in Lorentz-Minkowski space via a single invariant*. Ohio State MGSA Graduate Student Seminar.

2016
- Poster presentation. *A version of Weierstrass' Representation in Lorentz-Minkowski Space.* 24$^{\text{th}}$ USP *International Symposium of Undergraduate Research* (University of São Paulo).
- Poster presentation. *Curves and Surfaces in Lorentz-Minkowski Space*. 68$^{\text{th}}$ Reunion of the Brazilian Society for the Progress of Science (Federal University of South of Bahia).

2015
- Poster presentation. *Curves and Surfaces in Lorentz-Minkowski Space*[3]. 23$^{\text{th}}$ USP *International Symposium of Undergraduate Research* (University of São Paulo).

Participation at conferences, courses, seminars and other events (27 items)

2024
- *Graduate Student Topology and Geometry Conference* (Michigan State University).
- *Special Holonomy and Geometric Structures on Complex Manifolds* (IMPA).
- *Symmetry and Geometry in South Florida* (Florida International University).

[3]This work received an honorable mention.

- XI *International Meeting on Lorentzian Geometry* (Universidad Autónoma de Yucatán).
- *2024 Joint Mathematics Meeting* (Moscone Convention Center, San Francisco, CA).

2023 • SLMath Summer School: *Topics in Geometric Flows and Minimal Surfaces* (St. Mary's College).
- *Graduate Student Conference in Algebra, Geometry, and Topology* (Temple University).
- *2023 Midwest Geometry Conference* (Kansas State University).

2022 • *2022 Midwest Dynamical Systems Conference* (Indiana University–Purdue University).
- *Pacific Northwest Geometry Seminar* (Seattle University).
- *Lehigh Conference on Differential Geometry* (Lehigh University).
- *Geometric Structures (re)United* (University of Illinois at Chicago).
- *Midwest Dynamical Systems Early Career Conference* (University of Notre Dame).
- 36^{th} *Annual Geometry Festival* (New York University – Courant Institute). // Online.

2021 • Workshop *Modern Techniques in Riemannian Geometry* (Durham University & UNAM). // Online.
- X *International Meeting on Lorentzian Geometry* (University of Córdoba). // Online.

2020 • 5^{th} *Geometry-Topology Summer School* (Istambul Center for Mathematical Sciences). // Online.
- *Pacific Northwest Geometry Seminar* (Lewis and Clark College).
- *Symmetry and Geometry on the Southern Great Plains* (University of Oklahoma).

2019 • *Graduate Student Topology and Geometry Conference* (University of Illinois at Urbana-Champaign).

2018 • *University of São Paulo's Institute of Physics'* 2018 *summer courses.*

2017 • EMALCA: *School of Mathematics for Latin America and Caribbean* (University of Antioquia).

2016 • 24^{th} USP *International Symposium of Undergraduate Research* (University of São Paulo).
- 68^{th} *Reunion of the Brazilian Society for the Progress of Science* (Federal University of South of Bahia).

2015 • 23^{th} USP *International Symposium of Undergraduate Research* (University of São Paulo).
- XLV *ed. of the University of São Paulo's Institute of Mathematics and Statistics' summer courses.*

2014 • XLIV *ed. of the University of São Paulo's Institute of Mathematics and Statistics' summer courses.*

Languages

Portuguese (native), English (fluent), Spanish (intermediate), French (reading).

Teaching experience

2024–2025**:** Visiting Assistant Professor at *Williams College*. Upcoming:

- Spring 2025 - MATH250 - Linear Algebra (Instructor). // Two sections.
- Fall 2024 - MATH426 - Differential Topology (Instructor).
- Fall 2024 - MATH326 - Differential Geometry (Instructor).

2018–2023**:** Graduate Associate in *The Ohio State University*'s College of Arts and Sciences. Courses taught (in any capacity):

- Spring 2022, Autumn 2022, Autumn 2023 - MATH2177 - Mathematical Topics for Engineers (TA).
- Spring 2021 - MATH3345 - Foundations of Higher Mathematics (Grader).
- Autumn 2020 - MATH1150 - Precalculus (TA).
- Spring 2020 - MATH1149 - Trigonometry (TA).
- Autumn 2019 - MATH2173 - Engineering Mathematics B (TA).
- Spring 2019 - MATH1152 - Calculus II (TA).
- Autumn 2018 - MATH1151 - Calculus I (TA).

2018**:** Teaching Assistant at *University of São Paulo* - USP, for:

- 1^{st}sem/2018 - MAT3120 - Differential and Integral Calculus III (Oceanographic Institute).
- XLVII Ed. of the Institute of Mathematics and Statistics' summer courses - MAT5719 - Geometric Differential Calculus in $\mathbb{R}^n$.

2017**:** Higher Education Improvement Program (PAE) internship at *University of São Paulo* - USP, for:

- 2nd sem/2017 - MAT2454 - Differential and Integral Calculus II (Polytechnic School).
- 1st sem/2017 - MAT2453 - Differential and Integral Calculus I (Polytechnic School).

2013–2016**:** Teaching Assistant at *University of São Paulo* - USP, for:

- XLVI Edition of the Institute of Mathematics and Statistics' summer courses - Linear Algebra.
- 2nd sem/2016 - MAT0336 - Differential Geometry II (Institute of Mathematics and Statistics).
- 2nd sem/2016 - MAT0326 - Differential Geometry I (Institute of Mathematics and Statistics).
- 1st sem/2014 - MAT0111 - Differential and Integral Calculus I (Oceanographic Institute).
- 2nd sem/2013 - MAE0116 - Elements of Statistics (Institute of Mathematics and Statistics).

2013**:** Mathematics teacher for middle school at *Youhua Languages Institute*.

Department service and other relevant work experience

2021–2022**:** Writing, editing and proofreading the *Precalculus with Review* online Ximera book for the OSU courses MATH1120 and MATH1121. // Summer 2021, Spring 2022.

2021–2024**:** Member of the OSU Math. Dept. Directed Reading Program committee (chair 2022–2023).

2020–2021**:** Conversion of distance learning Geodetic Science and Mathematics courses to LaTeX beamers, as part of an interdisciplinary project between OSU's Department of Mathematics and the School of Earth Sciences – funded by the National Geospatial-Intelligence Agency (NGA). // Summer 2020, Fall 2021.

Students supervised

At Williams College:

6. David Baron (2024).
   Independent study in Algebraic Topology.
5. Theodore Mollano (2024–2025).
   Honors thesis: TBD.

At Ohio State University, Math. Dept. Directed Reading Program:

4. Pallav Pant (2022–2023).
   Reading projects: *Smooth manifolds and the Frobenius theorem*;
   The Schwarzschild metric and Birkhoff's theorem.
3. Kabir Belgikar (2021).
   Reading project: *A construction of the hyperreals and an introduction to non-standard analysis.*
2. Will Scites (2020–2021).
   Reading projects: *Frames adapted to surfaces*;
   Riemannian Geometry & Lagrangian Mechanics.
1. Maverick Huang (2019–2021).
   Reading projects: *Some metric aspects in Riemannian geometry*;
   The Einstein-Hilbert functional and the Einstein field equations.