EUGENIO LANDI

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PERSONAL INFORMATION

Name: Eugenio
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CURRENT POSITION

A one semester researcher and lecturer position at the Eberly College of Science, Department of Mathematics, Penn State University, August 2022 - December 2022.

EDUCATION

Università degli studi di Roma "La Sapienza"   *2013 - 2016*
Dipartimento di Matematica "Guido Castelnuovo"
Bachelor's degree, Final grade: *110/110 cum laude*

Università degli studi di Roma "La Sapienza"   *2016 - 2018*
Dipartimento di Matematica "Guido Castelnuovo"
Master's degree, Final grade: *110/110 cum laude*

Università di Roma Tre   *2018 - 2022*
Department of Mathematics
Ph.D. degree obtained on the 13/06/2022

THESES

Ph.D. thesis   Advisor: Domenico Fiorenza
Equivariant localization methods, orientations and modularity

Master's thesis   Advisor: Domenico Fiorenza
The Landweber Exact Functor Theorem and Elliptic Cohomology

Bachelor thesis   Advisor: Kieran O'Grady
Il Gruppo di Cremona (The Cremona Group)

PAPERS

An exposition of the topological half of the Grothendieck-Hirzebruch-Riemann-Roch theorem in the fancy language of spectra (with Mattia Coloma and Domenico Fiorenza) [1911.12035]. Published in *Expositiones Mathematicae*
https://doi.org/10.1016/j.exmath.2021.11.003

Abstract: We give an informal exposition of pushforwards and orientations in generalized cohomology theories in the language of spectra. The whole note can be seen as an attempt at convincing the

reader that Todd classes in Grothendieck-Hirzebruch-Riemann-Roch type formulas are not Devil's appearances but rather that things just go in the most natural possible way.

A very short note on the (rational) graded Hori map (with Mattia Coloma and Domenico Fiorenza) [2003.13066]. Published in *Communications in Algebra*
https://doi.org/10.1080/00927872.2021.2005076

Abstract: The graded Hori map has been recently introduced by Han-Mathai in the context of T-duality as a $\mathbb{Z}$-graded transform whose homogeneous components are the Hori-Fourier transforms in twisted cohomology associated with integral multiples of a basic pair of T-dual closed 3-forms. We show how in the rational homotopy theory approximation of T-duality, such a map is naturally realised as a pull-iso-push transform, where the isomorphism part corresponds to the canonical equivalence between the left and the right gerbes associated with a T-duality configuration.

PREPRINTS

The (anti-)holomorphic sector in $\mathbb{C}/\Lambda$-equivariant cohomology, and the Witten class (with Mattia Coloma and Domenico Fiorenza) [2106.14945]

Abstract: Atiyah's classical work on circular symmetry and stationary phase shows how the $\hat{A}$-genus is obtained by formally applying the equivariant cohomology localization formula to the loop space of a simply connected spin manifold. The same technique, applied to a suitable "antiholomorphic sector" in the $\mathbb{C}/\Lambda$-equivariant cohomology of the conformal double loop space $\mathrm{Maps}(\mathbb{C}/\Lambda, X)$ of a rationally string manifold X produces the Witten genus of X. This can be seen as an equivariant localization counterpart to Berwick-Evans supersymmetric localization derivation of the Witten genus.

Integrals detecting degree 3 string cobordism classes (with Domenico Fiorenza) [2209.12933]

Abstract: The third string bordism group is known to be $\mathbb{Z}/24\mathbb{Z}$. Using Waldorf's notion of a geometric string structure on a manifold, Bunke–Naumann and Redden have exhibited integral formulas involving the Chern-Weil form representative of the first Pontryagin class and the canonical 3-form of a geometric string structure that realize the isomorphism $\Omega_3^{\text{String}} \to \mathbb{Z}/24\mathbb{Z}$ (these formulas have been recently rediscovered by Gaiotto–Johnson-Freyd–Witten). We will show how these formulas naturally emerge when one considers certain natural U(1)-valued and $\mathbb{R}$-valued 3d TQFT associated with the classifying stacks of Spin bundles with connection and of String bundles with geometric structure, respectively.

CONFERENCES AND SUMMER SCHOOLS

- Conference "Higher Structures in Holomorphic and Topological Field Theory" at the IHES in Paris in January 2019;
- Summer School "EAST 2019 - European Autumn School in Topology" in Utrecht in September 2019;
- Workshop "Higher Structures and Operadic Calculus" at the CRM in Barcelona in June 2021;
- Masterclass "Topological field theories and factorization homology" in Copenhagen in August 2021;
- Workshop "Homology and homotopy of configuration spaces" in Copenhagen in November 2021;
- Spring School "Spring School on Field Theories and Algebraic Topology" in Utrecht in May 2022;
- "First UMI meeting of PhD students" in Padova in May 2022;

- "Workshop on "Higher Structures" at Penn State" at Pennsylvania State University in State College in December 2022.

INVITED TALKS

- The Witten genus as the "volume" of the double loop space, 18/03/2021, KCL/UCL Junior Geometry seminar. London, online;

- Equivariant localization methods, orientations and modularity, 19/04/2022, GAP (Geometry, Algebra, Physics) Seminar. Pennsylvania State University, online;

- Lecture on Model Categories, 10/05/2022, Preparatory informal seminar on the Geometric Cobordism Hypothesis, online;

- Equivariant localization methods, orientations and modularity, 26/05/2022, First UMI meeting of PhD students. Padova, in person;

- String bordism invariants in dimension 3 from $U(1)$-valued TQFTs, 13/10/2022, Cobordisms, Strings, and Thom Spectra. Oaxaca, online;

- Breve Seminario sugli Spettri (A Short Talk on Spectra), 04/11/2022, Lecture Series on Cyclic Homology. Rome - Tor Vergata, online;

- The Topological Half of the Grothendieck–Hirzebruch–Riemann–Roch Theorem, 09/11/2022, Cohomology in algebra, geometry, physics and statistics. Prague, online;

- The Topological Half of the Grothendieck–Hirzebruch–Riemann–Roch Theorem, 01/12/2022, Workshop on "Higher Structures" at Penn State. Pennsylvania State University, in person.

TEACHING

- Teaching Assistant, *Department of Basic and Applied Sciences for Engineering (SBAI), Università degli studi di Roma "La Sapienza"*, Clinical engineering, 2019-2020. Course: Geometry.

- Teaching Assistant, *Department of Basic and Applied Sciences for Engineering (SBAI), Università degli studi di Roma "La Sapienza"*, Building engineering, 2019-2020. Course: Geometry.

- Lecturer, *Department of Mathematics, Pennsylvania State University*, August 2022-December 2022. Course: Math220 - Matrices

December 2, 2022