Riccardo FINOTELLO

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Personal Data

Place of birth: Torino, Italy Date of birth: July, 13th 1993 Citizenship: Italian

Work address: Commissariat à l'Energie Atomique et aux énergies alternatives,
DES/ISAS/DPC/SEARS/LANIE, Bât. 467 p. 104,
91191 Gif sur Yvette CEDEX,
France

Research interests: machine learning, artificial intelligence, data science, algebraic geometry, string theory, conformal field theory, spectroscopy, chemometrics

Description: I am involved in applications of AI methods for the resolution of mathematical problems, where I introduced models inspired by advancement in computer vision. I am also interested in the application of AI to experimental data, such as in spectroscopy and chemometrics, where the possibility of applying data-driven machine learning models may lead to improvements over state-of-the-art analyses. I studied viable methods for the computation of phenomenological amplitudes in string theory to which I contributed with the analysis of particle physics scenarios and to the study of cosmological backgrounds.

Personal website: https://thesfinox.github.io

Work Experience

02/2021 – present: **Post-doctoral Researcher**
Commissariat à l'Energie Atomique et aux énergies alternatives, Saclay, France
Description: joint post-doc with the *Direction des énergies* (DES/ISAS/DPC/SEARS/LANIE) and the *Direction de la recherche technologique* (DRT/LIST/DIASI/SIALV/LVML).

10/2017 – 12/2020: **Ph.D. Graduate Researcher**
Università degli Studi di Torino, Italy
Description: research in theoretical physics (string theory) and AI applications.

10/2017 – 10/2020: **Scientific Associate Researcher**
I.N.F.N. (*National Institute for Nuclear Physics*), Torino, Italy
Description: scientific association as Ph.D. student.

10/2018 – 07/2020: **Teaching Assistant**
Università degli Studi di Torino, Italy
Description: tutorship and exercise sessions for students of the B.Sc. in Physics.

Education

10/2017 – 12/2020 **Ph.D. Fellow in Physics and Astrophysics**
Università degli Studi di Torino, Italy
Advisor: Igor Pesando
Thesis: *D-branes and Deep Learning: Theoretical and Computational Aspects In String Theory*
Defended: December, 18th 2020

10/2015 – 10/2017: **M.Sc. in Physics**
Università degli Studi di Torino, Italy
Curriculum: theoretical physics
Dissertation: *Standard Model–like Scenarios in String Theory: Non Abelian D-brane Rotations and the Classical Bosonic String*
Final grade: 110/110 *cum laude*

10/2012 – 07/2015: **B.Sc. in Physics**
Università degli Studi di Torino, Italy
Dissertation: *Perturbative Analysis: Resurgent Transeries and Hyperasymptotics*
Final grade: 110/110 *cum laude*

Visits, Training and Internships

12/2018 **Winter school and research visit**
Location: Galileo Galilei Institute for Theoretical Physics (Arcetri, Firenze, Italy)
Description: Attendance to the winter school and field training in string theory for three weeks. I trained with several students and experts on topics over mathematical and phenomenological aspects of particle physics.

12/2017 - 01/2018 **Winter schools and research visit**
Location: Galileo Galilei Institute for Theoretical Physics (Arcetri, Firenze, Italy)
Description: Participation to winter schools and field training in physics for six weeks. I focused my activity on theoretical and mathematical aspects of string theory and their applications to phenomenology of particle physics, astrophysics and cosmology.

01/2017 - 10/2017: **I.N.F.N. training for the M.Sc. degree**
Location: National Institute for Nuclear Physics (I.N.F.N., Torino, Italy)
Description: Study, training and preparation of the thesis and dissertation for the B.Sc. in Physics. I studied the construction of viable formulations of phenomenological models in string theory. This training period led to the dissertation held to obtain the M.Sc. degree in physics.

04/2015 - 06/2015: **I.N.F.N. training for the B.Sc. degree**
Location: National Institute for Nuclear Physics (I.N.F.N., Torino, Italy)
Description: Study, training and preparation of the thesis and dissertation for the B.Sc. in Physics. I studied methods for analytical resummation of asymptotic series using resurgence and hyperasymptotic series. The training led to the discussion of the work valid to get the B.Sc. degree in physics.

Fellowships, Grants and Distinctions

2020: grant as teaching assistant of the *Università degli Studi di Torino* (6 months, from 01/2020)

2019: student elected in the *Department Council* as Ph.D. representative

2018: student elected in the *Department Council* as Ph.D. representative

2017: Ph.D. scholarship assigned by the *Università degli Studi di Torino* (3 years, from 10/2017)

Teaching Experience and Outreach Activity

01/2020 – 07/2020: **Teaching Assistant in Physics**
Grant: *Università degli Studi di Torino*
Course: *Physics 1* (1st year B.Sc. in Physics)
Competences: tutorials and exercise sessions

01/2019 – 07/2019: **Teaching Assistant in Physics**
Course: *Waves, Fluids and Thermodynamics* (1st year B.Sc. in Physics)
Competences: tutorials and exercise sessions

11/2015: **Teaching Staff**
Course: *Physics at LHC* (outreach project for high school students)
Funds: *Piedmont* regional grant for Italian scientific schools
Competences: lectures and exercises on high energy physics (in English)

Coursework and Certifications

12/2020: **Reinforcement Learning**
University of Alberta (via Coursera.org — credential ID: X6QTKFZDEGB2)

Fundamentals of Reinforcement Learning	(credential ID: SA4PFAGGR6B5)
Sample-based Learning Methods	(credential ID: KCPZAVVUT98A)
Prediction and Control with Function Approximation	(credential ID: 3L9BL5LH9K4H)
A Complete Reinforcement Learning System (Capstone)	(credential ID: C5JFZB5AGF4C)

10/2020: **Data Science Specialisation**
John Hopkins University (via Coursera.org — credential ID: QDGGFSKG8VVS)

The Data Scientist's Toolbox	(credential ID: J6VC2AZMGGUG)
R Programming	(credential ID: 8D7TP7FHQWK2)
Getting and Cleaning Data	(credential ID: E3KT2J9HPKGR)
Exploratory Data Analysis	(credential ID: 3GYQ9UQQS3JX)
Reproducible Research	(credential ID: 84LX7JZYKR9W)
Statistical Inference	(credential ID: 2CSSYG79AQ2W)
Regression Models	(credential ID: YGGYSZZXM46R)
Practical Machine Learning	(credential ID: J9MXMYRQ47ZD)
Developing Data Products	(credential ID: 2CEYYPDYG7PB)
Data Science Capstone	(credential ID: SCJFP5JM34HR)

06/2020: **AI for Medicine**
deeplearning.ai (via Coursera.org — credential ID: ZXW8Y3UU4UCY)

AI for Medical Diagnosis	(credential ID: GPNE8X3862JX)
AI for Medical Prognosis	(credential ID: 8NPQDS4UFMJF)
AI for Medical Treatment	(credential ID: 52YHADQMZCM8)

05/2020: **Deep Learning**
deeplearning.ai (via Coursera.org — credential ID: N2FWFZ9W42V2)

Neural Networks and Deep Learning	(credential ID: XFKPYRXVVEKN)
Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization	(credential ID: ED599JTBLVX2)
Structuring Machine Learning Projects	(credential ID: 8KXABGGZWRER)
Convolutional Neural Networks	(credential ID: 2ZBR9Q9JLVAL)
Sequence Models	(credential ID: LP9WPTVB4KV3)

04/2020: **Machine Learning**
University of Standford (via Coursera.org — credential ID: SDLSE9NP4XMH)

Graduate Courses

Internal graduate courses with final examination (schools and workshops excluded):

2018 – 2019: Introducing Supersymmetry (20 hours)
Introduction to the Large N Limit (20 hours)

2017 – 2018: Introduction to Lattice Field Theory (20 hours)
Introduction to the Physics of the Quark–Gluon Plasma (20 hours)
Introduction to Flavour Physics (10 hours)

Talks and Posters

2021: **Computer Vision and Algebraic Geometry: AI for Theoretical Physics**
Poster — *IDAI 2021* (video conference)

Intelligenza Artificiale tra Geometria e Fisica (Artificial Intelligence between Geometry and Physics)
Seminar — *Escuela Alessandro Manzoni*, Buenos Aires, Argentina (online)

An AI Perspective on Phenomenology and Strings
Seminar — *Commissariat à l'Energie Atomique et aux énergies alternatives*, Saclay, France

2020: **Time Dependent Defect CFT and Excited Spin Fields**
Poster — *Cortona Young* (video conference)

2019: **Spin Fields as Point–like Defects on the Worldsheet**
Short talk and poster — *Università Federico II*, Napoli, Italy

Exploring Particle Physics in 2D BCFT: D-branes, Twist Fields and Defect CFT
Talk (Ph.D midterm seminar) — *Università degli Studi di Torino*, Italy

Schools, Workshops and Conferences

Courses and lectures can be found at the corresponding web page

07/2021: **INRIA-DFKI European Summer School on Artificial Intelligence**
Online event — https://idessai.inria.fr

05/2020: **Cortona Young**
Online event — https://www.ggi.infn.it/showevent.pl?id=377

12/2019: **XV Avogadro Meeting on Strings, Supergravity and Gauge Theories**
Napoli, Italy — https://agenda.infn.it/event/19816/overview

10/2019: **TFI 2019: Theories of Fundamental Interactions**
Torino, Italy — https://agenda.infn.it/event/20096/overview

03/2019: **String Theory from a Worldsheet Perspective**
Firenze, Italy — https://www.ggi.infn.it/showevent.pl?id=289

12/2018: **LACES 2018 – Lezioni Avanzate di Campi e Stringhe**
Firenze, Italy — http://laces.web.cern.ch/laces/LACES18/index18.html

05/2018: **XXXVI Convegno Nazionale di Fisica Teorica – New Frontiers in Theoretical Physics**
Cortona, Italy — https://agenda.infn.it/event/14362/

01/2018: **GGI Lectures on the Theory of Fundamental Interactions**
Fireze, Italy — http://webtheory.sns.it/ggilectures2018/

12/2017: **LACES 2017 – Lezioni Avanzate di Campi e Stringhe**
Firenze, Italy — http://laces.web.cern.ch/laces/LACES17/index17.html

Language Skills

Italian:	native speaker	
English:	proficient user	
	Certifications:	Cambridge *First Certificate in English* (pass with A), EFCELT at European level C2
French:	beginner level	

IT Skills

Programming languages:	Python, R, C++, PHP, Javascript, SQL, bash, ROOT, Matlab/Octave, Maxima, Wolfram Mathematica, Java
Markup languages:	HTML, Markdown, RMarkdown
Operating Systems and Distributions:	Arch Linux (main distribution), Ubuntu, Debian, CentOS, Microsoft Windows
Shell:	bash, zsh, PowerShell
Modules and libraries:	Scipy ecosystem, Scikit-learn, Scikit-optimize, Tensorflow (Keras), PyTorch, LightGBM, XGBoost, Tidyr, Caret, Leaflet, Plotly, GMP, MPFR
Frameworks:	Jupyter Lab and Notebook, RStudio, wxMaxima, Mathematica for scientific programming; VIM (with plugins), Eclipse for software developments; Git for version control; GitBook for documentation
System Administration:	personal instance of Nextcloud on a Raspberry Pi server (Raspbian OS), administration and web design of the journal club webpage (`https://torinophd.ddns.net/`) on a Raspberry Pi Apache+PHP+MariaDB installation (GitHub)
Other certifications:	ECDL Core Full (*European Computer Driving Licence*, 04/2012)

Personal Interests

- Diploma in musical theory and melodic dictation (*Diploma di Solfeggio e Teoria Musicale*), and diploma in complementary piano studies (*Diploma di Pianoforte Complementare*) for violin
- 10 years experience as basketball player and 2 years experience as basketball coach for youth teams
- Blood donor for the AVIS (*Italian Association of Volunteer Blood Donors*)

Publications

Author profiles:

ArXiv ID:	finotello_r_1
InSpireHEP:	R.Finotello.1
OrcID:	0000-0002-8472-9004
ResearchGate:	Riccardo_Finotello2

List of publications (authors are in **alphabetical order**):

Preprints:

H. Erbin, **R. Finotello**, R. Schneider, M. Tamaazousti, *Deep multi-task mining Calabi-Yau four-folds*, arXiv:2108.XXXXX9.

Published:

H. Erbin, **R. Finotello**, *Inception neural network for complete intersection Calabi-Yau 3-folds*, *Mach. Learn. Sci. Tech. 2 (2021) 2, 02LT03*.

H. Erbin, **R. Finotello**, *Machine learning for complete intersection Calabi-Yau: a methodological study*, *Phys. Rev. D 103 (2021) 12, 126014*.

R. Finotello, I. Pesando, *2D fermion on the strip with boundary defects as a CFT with excited spin fields*, *Nucl. Phys. B 969 (2021) 115464*.

A. Arduino, **R. Finotello**, I. Pesando, *On the origin of divergences in time-dependent orbifolds*, *Eur. Phys. J. C 80 (2020) 5, 476*.

R. Finotello, I. Pesando, *The classical solution for the bosonic string in the presence of three D-branes rotated by arbitrary SO(4) elements*, *Nucl. Phys. B 941 (2019), 158–194*.

Personal notes on various subjects (mostly hand written) available at `https://github.com/thesfinox/personal-notes`.