

Nicolò Riva

POSTDOCTORAL RESEARCHER AT MASSACHUSETTS INSTITUTE OF TECHNOLOGY

✉ nicoriva@mit.edu 📄 Nicolò Riva 📧 nicolorivaprina

🔗 Google Scholar 🌐 Research Gate 🆔 orcid.org/0000-0002-3359-7013

Employment History

Massachusetts Institute of Technology

Cambridge, USA

POSTDOCTORAL RESEARCHER

June 2021 - Now

- Multiphysics simulations and manufacturing of non-planar and planar superconducting (HTS) coil for stellarators (Type One Energy and Fusion Technology Institute (FTI) at the University of Wisconsin–Madison) and tokamaks (SPARC and Commonwealth Fusion Systems)

École polytechnique Fédérale de Lausanne

Lausanne, Switzerland

POSTDOCTORAL RESEARCHER

February 2021 - May 2021

- Research activities on REBCO modeling: electro-magneto thermal (SFCL, inhomogeneous tapes)

Hyperloop Team EPFLoop (<https://hyperloop.epfl.ch/>)

Lausanne, Switzerland

AERODYNAMICS AND FEM SIMULATION LEAD - PROPULSION TEAM

October 2017 - May 2021

- CFD, thermal, mechanical and EM FEM analysis of various components (carbon fiber aeroshell, linear induction motor, analysis on chassis, pressure vessels, brakes)

École Polytechnique Montreal

Montreal, Canada

SUMMER INTERN

July 2017 - September 2017

- Summer Internship at PM (Polytechnique Montreal) with Prof. Frédéric Sirois: Quench measurements with ultra-fast pulser technique on 2G-REBCO tapes

OHB System-CGS (Compagnia generale per lo Spazio)

Milano, Italy

INTERN

October 2016 - May 2017

- Study and design of an FLL for the SQUID based Cryogenic Anti-Coincidence of X-IFU for the ATHENA X-Ray space telescope(ESA)

FermiLab National Accelerator Laboratory

Chicago, USA

SUMMER INTERN

July 2015 - October 2015

- Summer Internship at Fermilab (Chicago) with Prof. Dr. Emanuela Barzi: Feasibility study of a surface impedance characterization (SIC) system for superconducting thin films

Antonio Rosmini High School

Domodossola (VB), Italy

PHYSIC'S TEACHER

October 2015 - October 2016

- Physic's teacher at Antonio Rosmini High School
-

Education

École polytechnique Fédérale de Lausanne - Karlsruhe Institute for Technology

Lausanne - Karlsruhe

PHD STUDENT IN ELECTRONIC ENGINEERING AND APPLIED SUPERCONDUCTIVITY

May 2017 - Feb 2021

- Quench behaviour of High-Temperature Superconductor tapes for power applications: a strategy toward resilience
Thesis director: Dr. Bertand Dutoit, EPFL - **Thesis advisor:** Priv.-Doz. Dr. Francesco Grilli

Università degli Studi di Milano

Milano-Genova, Italy

M.S. IN PHYSICS ACCELERATOR AND APPLIED SUPERCONDUCTIVITY - 110/110 CUM LAUDEM

October 2014 - October 2016

- Thesis : Study of a superconducting magnetic diverter for the Athena X-Ray space telescope

Università degli Studi di Milano

Milano, Italy

B.S. IN PHYSICS - 104/110

October 2010 - April 2014

- Thesis: study of quench propagation in a superconducting magnet having non linear effects due to the saturation of the iron yoke

Awards

2019	Awarded graduate study fellowship , In recognition of academic excellence and achievement in the area of applied superconductivity (IEEE CSC Website)	IEEE Council on Superconductivity
2019	Awarded IC School Special Prize , Award in recognition of the excellent achievements in the SCI IC (Computer Science) Doctoral School	SCI IC EPFL
2019	Best Poster at the COMSOL Conference 2019 Cambridge , Fluid Damper Optimization Through CFD and Multi-Body Simulations of The Prototype Dynamic Response to Stochastic Excitation in the framework of the SpaceX Hyperloop Competition, Jerome Harray, Lorenzo Benedetti and Nicolò Riva	Cambridge, COMSOL
2018 and 2019	Team 3rd Place , At the worldwide SpaceX Hyperloop Competition https://www.spacex.com/hyperloop	Los Angeles, U.S.A

Positions and Research Projects

European Cost Action CA19108

DISSEMINATION MANAGER AND SWISS MANAGEMENT COMMITTEE MEMBER

Europe

February 2021-Now

- The cost action aim to tackle the major challenges preventing HTS technologies from mass penetration in the electrical system. We want to raise industry and society awareness demonstrating the sustainability of HTS technologies

Project AURORA (leArning sUpeRcOnductivity thRough Apps)

CO-FOUNDER AND APP DEVELOPER WITH FRANCESCO GRILLI AND BERTRAND DUTOIT

EPFL Servers - KIT

2020-Now

- AURORA is a COMSOL server that uses web application to teach and explain to students the potential use and benefits of superconductors

La settimana della Scienza

COLLABORATOR

Italy

January 2020-Now

- Collaboration with Marconi-Galletti school (Domodossola) for the organization of the annual event "La settimana della Scienza"

Supervision of Junior Researchers

MASTER STUDENTS:

- Dec. 2021 - Now MIT, Tutoring of master/PhD students involved various modeling aspects of HTS tapes (AC losses and design of pancake coils for a student project)
- Dec. 2017 Hyperloop project, Tutoring of master students involved on Aerodynamic and Carbon Fiber aspects (Zsofia Sajò - Jerome Harray)
- Oct. 2019

Teaching Activities

Ecole Polytechnique Federale de Lausanne

TEACHING ASSISTANT

Lausanne, Switzerland

September 2017 - September 2018

- Teaching assistant at EPFL for the courses of *Classical Mechanics* and *Analysis I*

Antonio Rosmini High School

PHYSICS TEACHER

Domodossola(VB), Italy

October 2015 - October 2016

- Physic's teacher at Istituto Antonio Rosmini in Domodossola (Italy)

Reviewing Activities

- 2022 - Now Technical Reviewer, Reviewer of SBIR/STTR proposals for the Department of Energy (DOE, USA)
- 2021 Technical Editor, Editorial Team for the EUCAS conference
- 2017-Now Reviewer, Conference proceedings and peer-reviewed articles for IEEE/IEEE TAS

Active Memberships

- 2018-Now IEEE Council on Superconductivity, Member
- 2018 IEEE Power & Energy Society Membership, Member

General Skills

PROFESSIONAL SKILLS:

- Software skills** COMSOL, MATLAB, Blender, SparseLizard, C/C++, ARDUINO, LabView, PSPICE, Adobe Suite, Audacity, LogicPro
- Data processing** FEM (magneto/electro/thermal, superconductors, basic CFD), data regularization/processing, genetic algorithm
- Experimental skills** General electronics, pulsed current measurements, cryogenic equipment, 3D printing, mechanical workshop
- Languages** English (C1), French (B1), Italian (mother tongue)
- Hobbies** Running, planetary and Deep Sky observation (Telescope Dörr N 200/1000 Orion EQ-5), Cooking, Home-brewing

EXTRACURRICULAR ACTIVITIES:

MUSIC

ORCHESTRA AND BAND PERFORMER (PIANO AND TROMBONE)

Italy-Europe-USA

2004 - Now

- Blues4People, Giovani Musicisti Ossolani, White Spirit Gospel Choir, New Tone Trombone Quartet, Accademia Big Band, MIT Wind Ensemble, NEXT Act Musical and others

C.O.S.A.

VOLUNTEER

Italy

2009 - Now

- C.O.S.A. Africa di Milano e Amici di Gabriele Riva

PUBLICATIONS IN PEER-REVIEWED CONFERENCES AND SCIENTIFIC JOURNALS

- 2022 **A. Akbar, N. Riva**, B. Dutoit - *Optical fiber based quench detection in HTS applications using feature extraction on response signal*, Submitted in Physica C: Superconductivity and its Applications ([Link to publication](#))
- 2021 **N. Riva**, F. Grilli, B. Dutoit - *AURORA: a public applications server to introduce students to superconductivity*, Journal of Physics Conference Series, ([Link to publication](#))
- 2021 **N. Riva**, F. Sirois, B. Dutoit, F. Grilli, C. Lacroix - *A wide range E-J constitutive law for simulating REBCO tapes above their critical current*, Superconductor Science and Technology, ([Link to publication](#))
- 2021 **N. Riva**, F. Grilli, F. Sirois, C. Lacroix, A. Akbar and B. Dutoit - *Optimization Method for Extracting Stabilizer Geometry and Properties of REBCO Tapes*, IEEE Transactions on Applied Superconductivity, ([Link to publication](#))
- 2021 **N. Riva**, F. Grilli, B. Dutoit - *Superconductors for power applications: an executable and web application to learn about resistive fault current limiters*, European Journal of Physics ([Link to publication](#))
- 2021 **A. Akbar, N. Riva**, Z. Yang, B. Dutoit - *Fast Hotspot Detection in SFCLs by Exploiting Strain Response in Optical Fiber Sensing*, IEEE Transactions on Applied Superconductivity, ([Link to publication](#))
- 2020 **N. Riva**, F. Grilli, F. Sirois, B. Dutoit, C. Lacroix, W.B.T. de Sousa - *Resistivity of HTS tapes in overcritical current regime: impact on Superconducting Fault Current Limiter modeling*, Superconductor Science and Technology, ([Link to publication](#))
- 2020 **F. Grilli**, A. Morandi, E. Pardo, V. M. R. Zermeno, R. Brambilla, T. Benkel, **N. Riva** - *Electromagnetic Modeling of Superconductors with Commercial Software: Possibilities with Two Vector Potential-Based Formulations*, IEEE Transactions on Applied Superconductivity, ([Link to publication](#))
- 2019 **N. Riva**, S. Richard, F. Sirois, C. Lacroix, B. Dutoit, F. Grilli - *Over-Critical Current Resistivity of YBCO Coated Conductors through Combination of Pulsed Current Measurements and Finite Element Analysis*, IEEE Transactions on Applied Superconductivity, ([Link to publication](#))
- 2018 **N. Riva**, V. Calvelli, R. Musenich, S. Farinon, S. Lotti, P. Saracco - *Study of a Superconducting Magnetic Diverter for the ATHENA X-Ray Space Telescope*, IEEE Transactions on Applied Superconductivity, ([Link to publication](#))

PUBLICATIONS IN CONFERENCE PROCEEDINGS

- 2019 **M. Seydoux, N. Riva**, S. Rametti, L. Benedetti - *Design and Manufacturing of A Linear Induction Motor for the 2019 EPFLoop Prototype in the Framework of the SpaceX Hyperloop Competition*, Cambridge COMSOL Conference 2019, ([Link to publication](#))
- 2018 **Z. Sajó**, L. Benedetti, **N. Riva** - *Modeling The Hyperloop With COMSOL Multiphysics: On The Design Of The EPFLoop Pressurized Systems*, Lausanne COMSOL Conference 2018, ([Link to publication](#))
- 2018 **N. Riva**, L. Benedetti, Z. Sajó - *Modeling The Hyperloop With COMSOL Multiphysics®: On The Aerodynamics Design Of The EPFLoop Capsule*, Lausanne COMSOL Conference 2018, ([Link to publication](#))

OTHER ARTIFACTS WITH DOCUMENTED USE

- 2021 **N. Riva**, *Quench behavior of high-temperature superconductor tapes for power applications: a strategy toward resilience*, PhD Thesis - ([Link to the report](#))
- Summer 2015 **N. Riva**, M. Graffiedi, D. Turrioni, E. Barzi *Design and project of a Surface Impedance Characterization system (SIC) for thin film of advanced superconductors*, Final report for the FermiLab Summer School - ([Link to the report](#))

UNPUBLISHED AND UNDER PREPARATION WORK

- 2022 **N. Riva**, D. Anderson, R. Volberg, P. Harris, C. Hegna, L. Chen, B. Faber, T. Kruger, A. Bader, R.S. Granetz - *Design and modeling of a non-planar REBCO coil for stellarators based on the VIPER cable*, Under preparation
- 2022 **B. LaBombard**, K. Uppalapati, A. Sattarov, S. Kuznetsov, S. Shiraiwa, **N. Riva** - *EM Design and Performance of the SPARC Toroidal Field Model Coil*, Under preparation
- 2022 **M. Lyly**, D. Sotnikov, **N. Riva**, A. Halbach, J. Ruuskanen, T. Salmi, V. Lahtinen - *Three-dimensional FEM simulations of quench in 2G HTS-tapes: the effect of eddy currents on quench behavior*, Under preparation
- 2022 **A. Halbach**, N. Riva, M. Lyly, V. Lahtinen, **N. Riva** - *H-V-formulation-based simulation tool for modeling stacks of REBCO tapes and non-planar REBCO coils*, Under preparation
- 2022 **E. Salazar**, K. Uppalapati, **N. Riva**, Z. Hartwig *Quench dynamics FEM simulation of the HTS VIPER cable*, Under preparation
- 2022 **J. Bang**, W. Jang, G. Kim, J.T. Lee, A. Musso, **N. Riva**, S. Hahn *Experimental and numerical analysis of the temperature dependency on the contact resistance of a NI HTS coil*, Under preparation
- 2022 **R. Ibekwe**, **N. Riva**, D. Whyte, Z. Hartwig *Defect-induced electric field and current distribution in REBCO cables*, Under preparation

CONTRIBUTIONS TO INTERNATIONAL CONFERENCES

Oral Presentations

- November 2021 **N. Riva**, F. Grilli, B. Dutoit - *Modeling stabilizer and superconducting inhomogeneities of commercial REBCO tapes with a 1-D electro-thermal model*, Oral presentation at the Online 27th International Conference on Magnet Technology
- July 2021 **N. Riva**, F. Grilli, B. Dutoit - *AURORA: leArning sUpeRcOnductivity thRough Apps*, Oral presentation at the Online HTS Modeling Workshop 2021
- October 2020 **N. Riva**, F. Sirois, F. Grilli, C. Lacroix, B. Dutoit *Optimization method for extracting stabilizer geometry and properties of REBCO tapes using an optimization procedure based on the finite element method and pulsed current experimental data*, Oral presentation at the Online Applied Superconductivity Conference, ([Link to video presentation](#))
- September 2020 **N. Riva**, F. Grilli, B. Dutoit - *Teaching future engineers about superconductors for power applications with an App*, Oral presentation at the Online COMSOL Conference 2020 Europe, ([Link to video presentation](#))
- September 2019 **M. Seydoux**, **N. Riva**, S. Rametti, N. Bollier, L. Benedetti, A. Hodder, T. Dimier, M. Jufer - *Design and Manufacturing of A Linear Induction Motor for the 2019 EPFLoop Prototype in the Framework of the SpaceX Hyperloop Competition*, Oral presentation at the Cambridge COMSOL Conference 2019 (UK), ([Link to presentation](#))
- September 2019 **L. Benedetti**, J. Harray, **N. Riva**, Z. Sajo, A. Gimonet - *SpaceX Hyperloop Competition: Design and Manufacturing of A Carbon Fiber Composite Chassis for the 2019 Epfloop Prototype Using COMSOL Multiphysics® Composite Materials Module*, Oral presentation at the Cambridge COMSOL Conference 2019 (UK), ([Link to presentation](#))
- September 2019 **N. Riva**, F. Grilli, F. Sirois, B. Dutoit, C. Lacroix, W.B.T. de Sousa, *Resistivity of HTS tapes in overcritical current regime: Impact on Superconducting Fault Current Limiter*, Oral presentation at the European Conference on Applied Superconductivity, Glasgow (UK), ([Link to presentation](#))
- July 2019 **N. Riva**, F. Grilli, B. Dutoit, M. Masse, F. Sirois, C. Lacroix - *1D and 2D finite-element approaches to extract the resistivity of the superconductor material from pulsed current measurements on HTS commercial tapes*, Oral presentation at CHATS on Applied Superconductivity, Warsaw (Poland), ([Link to presentation](#))
- October 2018 **N. Riva**, S. Richard, F. Grilli, F. Sirois, B. Dutoit, C. Lacroix, *Isothermal Resistivity Curves of HTS Coated Conductors: A Synergy Between Experiment and Simulation*, Oral presentation at the Applied Superconductivity Conference, Seattle (USA)
- October 2018 **L. Benedetti**, Z. Sajó and **N. Riva** - *Modeling the Hyperloop with COMSOL®: on the Mechanical Design of the EPFLoop Capsule*, Oral presentation at the Lausanne COMSOL Conference 2018, ([Link to presentation](#))
- September 2018 **N. Riva**, S. Richard, F. Grilli, F. Sirois, B. Dutoit, C. Lacroix, *Isothermal Resistivity Curves of HTS Coated Conductors: A Synergy Between Experiment and Simulation*, Oral presentation at the MSE congress, Darmstadt (Germany)

OUTREACH ACTIVITIES

- December 2021 **N. Riva**, *Una Stella in Bottiglia: sulla strada per la fusione commerciale*, Invited panelist at the Annual Meeting of Giovani Imprenditori Confindustria Alto Milanese
- September 2021 **N. Riva**, R. Granetz, R. Vieir, *Modeling of non-planar High Temperature Superconductor (HTS) coils for stellarators: A renewed path to fusion energy*, Oral presentation at the Carolus Magnus Summer School
- September 2021 **N. Riva**, *Superconductivity: A not so Resistant but very Resilient Superhero*, Invited seminar at Rice University
- May 2021 **L. Benedetti**, **N. Riva**, S. Rametti, F. Tagarelli - *Moving Fast and Breaking Records*, Seminar at University of Brescia
- April 2021 **N. Riva**, *The overcritical current regime of commercial REBCO tapes: A strategy toward resilience*, Invited seminar at CERN
- March 2021 **N. Riva**, *Parliamo di Superconduttività: Un Supereroe poco Resistente ma molto Resiliente* Seminar at University of Brescia
- January 2020 **N. Riva**, *I superconduttori ed il futuro della tecnologia: Dalla fusione nucleare ad Hyperloop, il treno supersonico*, Science dissemination event at Institutes Marconi-Einaudi-Galletti for the Settimana della Scienza, Domodossola (Italy)
- January 2020 **N. Riva**, *My Thesis in 180 Seconds*, Competition at EPFL
- December 2019 **N. Riva**, F. Grilli, F. Sirois, B. Dutoit - *A better knowledge of High Temperature Superconductor for power applications: a strategy toward resilience*, Poster at Scientastic EDEE day at EPFL, Lausanne (Switzerland)
- June/July 2019 **N. Riva**, *Moving fast and breaking records: On the physics and challenges of the Hyperloop concept*, Outreach activities in multiple seminars (Cambridge-Karlsruhe seminar/SupraSeminar in Karlsruhe)
- September 2018 **EPFLoop Team**, M. Paolone, L. Benedetti, **N. Riva**, Z. Sajó - *Use Simulation to Design a Hyperloop Pod*, Invited Keynote COMSOL Conference Lausanne (Switzerland), ([Link to video](#))
- September 2018 **EPFLoop Team**, M. Paolone, L. Benedetti, **N. Riva**, Z. Sajó - *Inspiring Young Engineers to Design for the Future at EPFL*, Invited article on Comsol magazine, ([Link to article](#))
- March 2018 **N. Riva**, L. Benedetti, EPFLoop Team - *EPFL SpaceX Hyperloop Pod Competition: Mechanical Design Challenges*, Unveiling event of the EPFLoop 2018 Hyperloop prototype Lausanne (Switzerland), ([Link to video](#))