

# FRANCESCO RIVA

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Born July 31st, 1979 in Locarno, Switzerland  
Nationality: Swiss

## - CURRICULUM VITÆ -

### EDUCATION

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|-------------------|--|--------|
| 10.2004 - 10.2008 | DPhil in Theoretical Physics, University of Oxford (Merton College). Supervisors: Prof John March-Russell. | Oxford |
| 10.1998 - 2.2004  | ETHZ - Diploma with distinction in Theoretical Physics   | Zürich |

### EMPLOYMENT HISTORY

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|------------------|---|-----------|
| 3.2018           | SNF Assistant Professor, University of Geneva               | Geneva    |
| 8.2015 - 2.2018  | CERN - EU Organization for Nuclear Research (plus COFUND)   | Geneva    |
| 8.2012 - 7.2015  | EPFL - Ecole Polytechnique Fédérale                         | Lausanne  |
| 1.2011 - 7.2012  | IFAE - Institut de Fisica des Altes Energias                | Barcelona |
| 10.2009 -12.2010 | University of Padua - Theoretical Physics Department        | Padova    |
| 12.2008 - 9.2009 | Sabbatical: cycling expedition from Cambodia to Switzerland |           |

### INSTITUTIONAL RESPONSABILITIES

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|-----------|---|
| 2017-2018 | Convener of the LHC High-Luminosity/High-Energy Working Group (WG) and editor of the Higgs Physics chapter of the respective CERN Yellow Report |
| 2017-2018 | Convener of CLIC New Physics Potential WG and editor of the Higgs/Electroweak Physics chapter of the respective CERN Yellow Report              |
| 2017-2018 | Convener of WG2 (Higgs Properties): Higgs Cross Section WG (HXSWG)  |
| 2017-2018 | Higgs Physics convener of the Les Houches 2017 ongoing workshop   |

### AWARDED PROJECTS

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|------|--|-------------------|
| 2017 | Swiss National Fund (SNF) Professorship (~1'450'000 CHF, PI)                                   | Universite Geneve |
| 2016 | Agora (SNF outreach) for <a href="#">UNSOLVeD</a> - (~180'000 CHF, <a href="#">cofounder</a> ) | Switzerland       |
| 2016 | European COST Action VBSCan (participant)  |                   |
| 2011 | SNF Ambizione Grant (~328'000 CHF, PI)   | EPFL, Lausanne    |
| 2007 | SNF Chercheur Debutant Grant ( <i>Declined</i> , PI)   | Oxford            |

### SUPERVISIONS

- |           |  |                 |
|-----------|--|-----------------|
| 2018-     | PhD: Davide Maria Lombardo   | UNIGE, Geneva   |
| 2017-2018 | Master: Giulia Albonico  | EPFL, Lausanne  |
| 2012-2016 | PhD: Dr. Marc Montull  | IFAE, Barcelona |
| 2012-2015 | Master: Thibaud Vantalou, Max Carrell, Tony Mercury, Sebastian Brugisser | EPFL, Lausanne  |

## TEACHING

2017-2018	Quantum Field Theory I ~ 30h/semester	Universite Geneve
8.2016	Dark Matter, PSI Summer School Exothiggs ~2h	Zuoz (Switzerland)
11.2015	Higgs Physics, Ukrainian students school ~4h	CERN, Geneva
9.2015	Higgs Physics, CERN - EU School of High Energy Physics ~3h	Bansko (Bulgaria)
2014-2017	Quantum Fields, Electrodynamics (substitute teacher) ~18h	EPFL, Lausanne
2013-2014	Reading course (Electrodynamics/QFT); ~10h	EPFL, Lausanne
10.2012	Discussion Leader at the first CERN Asia-Europe-Pacific School on High-Energy Physics (AEPSHEP); ~60h	Fukuoka (Japan)
2014	Qualification aux Fonctions de Professeur des Universités	France
2010	Habilitation Maitre de Conference	France

## PANEL MEMBERSHIPS, REVIEWING ACTIVITIES

	PhD Examination Boards:	Davide Racco, Univeristé de Génève (10.9.2018)
		Marc Riembau, UAB Barcelona (4.7.2018)
2013-2017		Elena Vigiani, University of Pisa (23.6.2017)
		Nicolas Bizot, University of Montpellier (31.10.2016)
		Joan Elias Miro, UAB Barcelona (10.2015)
		Laurent Canetti, EPFL Lausanne (9.2013)
2010-Now	Referee for PRL, JHEP, EPJC, PRD, PLB ( $\gtrsim 10$ articles/year); book reviewer for CERN courier	

## ORGANIZATION OF CONFERENCES AND WORKSHOPS

2017-2018	High-Lumi/High-Energy LHC physics workshops at CERN ( <a href="#">10.2017</a> , <a href="#">6.2018</a> , <a href="#">10.2018</a> )	Geneva
2017-2018	Physics at CLIC Workshops at CERN ( <a href="#">7.2017</a> , <a href="#">8.2018</a> )	Geneva
2017-2018	Several meetings of the HXSWG (e.g. <a href="#">7.2017</a> ), CERN	Geneva
12.2017	<a href="#">Sinergia meeting</a> , EPFL	Lausanne
5.2017	<a href="#">HEFT 2017</a>	Durham, UK
7.2016	<a href="#">Charting the Unknown</a> , CERN	Geneva

## PRIZES, FELLOWSHIPS

2009	CARIPARO Excellence Grant (approx. 150'000 EUR)	Padova, Italy
2004	Merton College, Greendale Scholarship (~60'000 GBP)	University of Oxford
2003	Polya Funds Prize from the Department of Mathematics	ETH, Zürich
2003	Stefano Franscini Prize (3'000 CHF)	ETH, Zürich
1998-2003	Margherite Lang Scholarship (4'000 CHF) and the Achille Isella Bursary (4'000 CHF)	ETH, Zürich

## - MAJOR SCIENTIFIC ACHIEVEMENTS -

### **Development of a Global Framework for Higgs Data interpretation at LHC**

In Refs. [1–3] (see essential bibliography below) I gave an important contribution towards the development of a tool to systematically interpret experimental measurements of Higgs physics in a theoretical framework. This is based on the idea of effective field theories (EFTs) that allow to parametrise entire universality classes of specific models with a handful of effective parameters, that can be measured by experiments. In these works, I point out, in the most general terms, what observables can be modified by the leading EFT effects, and identify the experiments that can potentially be more sensitive to discover new physics. My results have been adopted by the Higgs Cross Section Working Group (HXS WG) [4], the platform for theory-experiment communication in the context of the Large Hadron Collider (LHC), and form an important part in the assessment of the capabilities of future colliders (e.g. CLIC and HL/HE-LHC). It has also led to my nomination as Higgs Physics convener in the context of the HXS WG, as well as Higgs and electroweak convener in the context of planning for future colliders, such as CLIC and the High-Luminosity-High-Energy (HL-HE) LHC upgrade, in view of the 2019 European Strategy for Particle Physics.

### **Development of a Beyond-Standard-Model perspective for Precision measurements**

Precision measurements at colliders are considered an important tool to search for new physics beyond the standard model (BSM). In Refs. [5, 6, 6–9] I provide a complete map of such new physics: of how the Standard Model (SM) can emerge as the low-energy description of different microscopic dynamics. This perspective is important for two reasons: it provides concrete hypotheses to be tested at colliders, and it sheds light on the question of *validity of EFT interpretation* in the context of precision tests. The latter is discussed at length in my work [11] (and previously in [10]), which has become the standard reference for EFT interpretation.

### **Non-interference Theorem and Development of dedicated precision BSM measurements**

In Ref. [12] I point out a class of non-interference theorems that imply, grossly, that SM and BSM processes are different (they have different helicity). This has major implications for the search of new physics via SM precision tests. In fact, it was believed that measurements of the SM, more and more precise, could be used also to search for new physics, more and more precisely. The theorems imply instead that dedicated searches are necessary. The properties that these searches have to possess, have been outlined in my Ref. [13]. Specific measurements to overcome non-interference are being developed to assess the sensitivity of future colliders such as CLIC and the HL-HE LHC.

## References (for more information see “Scientific Output”)

- [1] A. Pomarol and F. Riva, JHEP **1401** (2014) 151.
- [2] R. S. Gupta, A. Pomarol and F. Riva, Phys. Rev. D **91** (2015) no.3, 035001.
- [3] A. Falkowski and F. Riva, JHEP **1502** (2015) 039.
- [4] D. de Florian *et al.* [LHC Higgs Cross Section Working Group], arXiv:1610.07922 [hep-ph].
- [5] D. Liu, A. Pomarol, R. Rattazzi and F. Riva, JHEP **1611** (2016) 141.
- [6] S. Bruggisser, F. Riva and A. Urbano, SciPost Phys. **3** (2017) no.3, 017.
- [7] S. Bruggisser, F. Riva and A. Urbano, JHEP **1611** (2016) 069.
- [8] B. Bellazzini, F. Riva, J. Serra and F. Sgarlata, JHEP **1711** (2017) 020.
- [9] B. Bellazzini and F. Riva, accepted for publication in PRD, arXiv:1806.09640 [hep-ph].
- [10] A. Biekötter, A. Knochel, M. Krämer, D. Liu and F. Riva, Phys. Rev. D **91** (2015) 055029.
- [11] R. Contino, A. Falkowski, F. Goertz, C. Grojean and F. Riva, JHEP **1607** (2016) 144.
- [12] A. Azatov, R. Contino, C. S. Machado and F. Riva, Phys. Rev. D **95** (2017) no.6, 065014.
- [13] G. Panico, F. Riva and A. Wulzer, Phys. Lett. B **776** (2018) 473.