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Ennio Salvioni

CURRICULUM VITAE

INFORMAZIONI PERSONALI (NON INSERIRE INDIRIZZO PRIVATO E TELEFONO FISSO O CELLULARE)

COGNOME	SALVIONI
NOME	ENNIO
DATA DI NASCITA	07/09/1985

Ennio Salvioni

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(last updated on March 16, 2021)

EMPLOYMENT

- Since 11/2019: Senior Research Fellow in the **CERN** Theory Department.
- 10/2016 – 10/2019: Postdoctoral Scholar in the Theoretical Particle Physics at Colliders group of Andreas Weiler, **Technical University of Munich**. From 12/2016 onwards: appointment as Akademischer Rat (A13), equivalent to RTDb according to DM 662.
- 10/2013 – 09/2016: Postdoctoral Scholar in the High Energy Theory group of the **University of California, Davis** (faculty mentors: Markus Luty and Hsin-Chia Cheng).

EDUCATION

- 01/2010 – 09/2013: Ph.D. in theoretical high-energy physics, **University of Padova**. Thesis “Phenomenology of Compositeness at the LHC,” supervisors: Christophe Grojean and Fabio Zwirner.
- 10/2007 – 09/2009: M.S. in Physics, University of Padova. Specialization in theoretical physics, grade 110/110 *cum laude*. Thesis “ $U(1)$ extensions of the Standard Model,” supervisor: Fabio Zwirner; co-supervisor: Giovanni Villadoro.
- 10/2004 – 09/2007: B.S. in Physics, University of Padova. Grade 110/110 *cum laude*. Thesis “Quasicristalli Unidimensionali” (“One-dimensional Quasicrystals”), supervisor: Pieralberto Marchetti.
- 07/2004: graduated from Liceo Classico E. Montale, San Donà di Piave (Venice), Italy. Grade 100/100 with highest honors.

HONORS AND PRIZES

- 07/2018: national habilitation to Associate Professor position in Italian universities, valid until July 2024 (ASN di II Fascia, settore concorsuale 02/A2).
- 04/2015: special mention awarded by the committee of the 2014 INFN “S. Fubini” Prize to the Ph.D. thesis “Phenomenology of Compositeness at the LHC.”
- 07/2010: “G. Bernardini” Prize for young graduates in Physics, received from SIF (Italian Physical Society).
- 04/2010: awarded by the Scientific Committee of IFAC 2010 (Rome) one of four prizes for the best presentations by Ph.D. students at the conference.
- 06/2009: selected by US-Italy Fulbright Commission as one of three Italian candidates to the Fulbright International Science and Technology Award 2010-2011.
- 07/2008: INFN National Scholarship for first-level graduates in Physics (renewed in 2009).

RESEARCH FUNDING

- 11/2019 – 10/2021: two-year CERN Senior Research Fellowship. Research in any area of theoretical physics of relevance to the Laboratory. Total value: 193k CHF.
- 10/2010 – 09/2013: three-year Early Stage Researcher position in the CERN Theory Group, to pursue research in physics beyond the Standard Model while enrolled as PhD student at the University of Padova. Local supervisor: Christophe Grojean, funding through his shared ERC grant. Total value: 144k CHF.
- 04/2010: Fulbright “Self-Placed” Scholarship for the academic year 2010-2011. Full support for the first year of graduate school at a US institution (38k USD). Award declined.
- 02/2010: MacCracken Graduate Fellowship for 2010 – 2014, NYU, Physics Department. Full support for the 9-month academic year (total of 95k USD) plus summer support for the first year (10.5k USD). Award declined.
- 11/2009 – 12/2009: post-lauream Fellowship, Physics Department, University of Padova. Research on “ $U(1)$ extensions of the Standard Model,” total value: 2k EUR.

INVITED PLENARY TALKS AT CONFERENCES AND WORKSHOPS

- “Searching for elusive dark sectors at the LHC.” ATLAS Exotics Plenary Meeting, 03/2021.
- “ Z portal to a confining hidden sector.” Workshop “Stealth physics at LHCb,” Santiago de Compostela, 02/2020; Workshop “Probing BSM Physics at different scales,” Magnus Haus, Berlin, 01/2020; 3rd FCC Physics and Experiments workshop, CERN, 01/2020.
- “Neutral naturalness, VBS and VBF.” Review talk at the workshop on BSM theories in Vector Boson Scattering processes, Lisbon, 12/2019.
- “Light Hidden Mesons through the Z portal.” LFC2019, ECT* Trento, 09/2019; 15th Rencontres du Vietnam, Quy Nhon, 09/2019.
- “Faint, Hidden, or Dark: New Paths to Physics beyond the Standard Model.” Max Planck Research Group Selection Symposium, Berlin, 02/2019.
- “Composite pNGB dark matter.” 7th Joint Rome Workshop, Frascati, 12/2018.
- “Dark matter shifts away from direct detection.” 14th VCES, “Global and local symmetries,” Austrian Academy of Sciences and TU Wien, 11/2018.
- “Neutral Naturalness.” Review talk at the workshop “Beyond Standard Model: where do we go from here?,” GGI Florence, 09/2018; Review talk/discussion leader at the CERN-Korea TH Institute “Physics at the LHC and beyond,” CERN, 07/2018.
- “SUSY neutral naturalness: the Triple Top.” Workshop “Confronting naturalness: from LHC to future colliders,” DESY Hamburg, 04/2018; 12th MC4BSM workshop, IPPP Durham, 04/2018.
- “Extended composite Higgs sectors and dark matter.” Review talk at the 2nd FCC Physics workshop, CERN, 01/2018.
- “Boosted and off-shell Higgs at the FCC-hh.” 1st FCC Physics workshop, CERN, 01/2017.
- “Probing the ultraviolet completion of the Twin Higgs.” 3rd NPKI workshop, Seoul, 06/2016.
- “Strong tW scattering at the LHC.” HEFT 2015, U. of Chicago, 11/2015.
- “Composite Higgs.” Review talk at the 9th MC4BSM workshop, Fermilab, 05/2015.

- “Phenomenology of induced EWSB.” 2nd NPKI workshop, Jeju Island, South Korea, 09/2014.
- “Single top + Higgs, theory.” CMS Single Top workshop, Naples, 12/2013.
- “Double Higgs production via gluon fusion in composite models.” Higgs Hunting 2012, Paris, 07/2012.
- “A weakly constrained W' at the early LHC.” Meeting of the CNRS/CEA Groupement de Recherche Terascale, Lyon, 04/2011.

INVITED SEMINARS

- “Hunting for elusive dark sectors at the LHC.” CPPM Marseille, 02/2021.
- “The present and future of four tops.” U. of Bologna, 02/2021; Technion, 12/2020; CFTP Lisbon, 12/2020.
- “Dark matter from new strong interactions.” U. of Sussex, 11/2020.
- “Split SIMPS with decays.” CERN, 07/2020.
- “Dark meson dark matter.” Humboldt U. Berlin/DESY Zeuthen, 06/2020; Scuola Normale Superiore, Pisa, 05/2020.
- “Dark matter shifts away from direct detection.” SISSA, Trieste, 04/2019.
- “New physics in LHC and dark matter searches: challenging standard assumptions.” U. of Padova, 11/2018.
- “Charged composite scalar dark matter.” Joint Particle Physics Seminar, Weizmann Institute, 03/2018; L2C Montpellier, 11/2017; U. of Maryland, 09/2017; NYU, 09/2017.
- “Going beyond the Standard Model Higgs at the LHC.” MLL-Kolloquium, LMU&TUM, Munich, 12/2016.
- “Probing the ultraviolet completion of the Twin Higgs.” UC Irvine, 05/2016.
- “Exotic quarks in Twin Higgs models.” UC Santa Cruz, 02/2016; U. of Oregon, 10/2015.
- “Phenomenology of induced EWSB.” SLAC, 05/2015; U. of Chicago, 05/2015; Northwestern U., 05/2015; UC Berkeley, 01/2015; U. of Heidelberg, 12/2014; U. of Mainz, 11/2014.
- “Boosted or cascading: chasing BSM Higgses at LHC14.” NYU, 03/2014; Cornell U., 03/2014.
- “Uncovering the Higgs’ identity through subleading production channels.” L2C Montpellier, 04/2013.
- “Shedding light on the Higgs’ identity through subleading production channels.” LAPTh, Annecy, 12/2012.
- “Higgs Low-Energy Theorem (and its corrections) in Composite Models.” Harvard U., 07/2012; MIT, 07/2012; UC Berkeley, 05/2012; U. of Granada, 05/2012.
- “A weakly constrained W' at the early LHC.” CERN, 03/2011.

TEACHING ACTIVITY

- Summer semester 2019 + Summer semester 2018: main assistant for the Master’s course “Quantum Field Theory II” (non-Abelian gauge theories, spontaneous symmetry breaking, anomalies; instructor: A. Weiler), TU Munich. Duties: preparation of exercise sheets, exams and solutions; tutorial sessions (8 classroom hours), lectures on special topics (9 h).

- Winter semester 2018/2019: main assistant for the Master’s course “Quantum Field Theory I” (path integrals, renormalization, Poincaré group and fermions; instructor: A. Weiler), TU Munich. Duties: preparation of exercise sheets, exams and solutions; tutorial sessions (4 h).
- Summer semester 2017: main assistant for the Master’s course “Relativity, Particles and Fields” (special relativity, classical field theory, canonical quantization; instructor: A. Weiler), TU Munich. Duties: preparation of exercise sheets, exams and solutions; tutorial sessions (22 h), lectures on special topics (2 h).

STUDENT MENTORSHIP

- Mentorship through collaboration: Matthias Schlaffer (then Ph.D. candidate at DESY with A. Weiler, currently postdoc at U. Chicago) on Ref. [8], Jeff Dror (then Ph.D. candidate at Cornell with Y. Grossman, currently postdoc at UC Santa Cruz) on Ref. [12], Reuven Balkin (then Ph.D. candidate at TUM with A. Weiler, currently postdoc at the Technion) on Refs. [16, 19]. Extensive interaction with the students, ranging from frequent discussions to help develop their big-picture view, to detailed comparisons of the results of numerical computations.
- Co-supervision of Master’s thesis projects (unofficial): Maximilian Ruhdorfer, TU Munich 2017, and Tobias Theil, TU Munich 2019. In each case the project led to a research article: Ref. [16] with M. Ruhdorfer, and Ref. [24] with T. Theil.

PROFESSIONAL SERVICE

- Theory Expert within the joint ATLAS-CMS-Theory Task Force on off-shell Higgs measurements at the LHC (since 03/2020).
- Organizer of a Discussion on the physics of Four Tops, 02/2021.
- Organizer of the First EuCAPT Annual Symposium, CERN, 05/2021.
- BSM Forum organizer, CERN, 2019 – present; Group seminar/journal club organizer, TU Munich, 2018 – 2019; Seminar organizer, UC Davis, 2014 – 2016.
- Organizer of the SUSY 2015 Conference, 08/2015, Tahoe City.
- Regular referee for Journal of High Energy Physics, European Physical Journal C, Physics Letters B, SciPost Physics, Physical Review D.

PUBLIC ENGAGEMENT

- Moderator for International Masterclasses (introduction to particle physics for high school students around the world), CERN, 03/2020 and 03/2021.
- “Il bosone di Higgs e i misteri della fisica fondamentale,” talk at Collegio Pio X, Treviso, 04/2017.
- “LHC e lo stato attuale della fisica delle particelle,” talk at Liceo Classico E. Montale, San Donà di Piave, 05/2009.

LANGUAGES

- Italian (native), English (C1/C2), French (B1), Spanish (B1), German (A2).
Reference: http://www.coe.int/t/dg4/linguistic/cadre1_en.asp.

The up-to-date list is available at

<https://inspirehep.net/authors/1077871>

from where the full texts are openly accessible via arXiv and/or the journal websites, except where marked. Please note that in particle physics it is customary to list authors in alphabetical order. Citation data as of March 2021, restricted to published articles: approximately 1300 total citations, on average 55 per paper, $h = 18$.

PUBLISHED ARTICLES

- [24] G. Banelli, E. Salvioni, J. Serra, T. Theil and A. Weiler, “The present and future of four top operators,” JHEP 02 (2021) 043, [arXiv:2010.05915](#) [hep-ph].
- [23] A. Katz, E. Salvioni and B. Shakya, “Split SIMPs with decays,” JHEP 10 (2020) 049, [arXiv:2006.15148](#) [hep-ph].
- [22] U. Haisch, M. Ruhdorfer, E. Salvioni, E. Venturini and A. Weiler, “Singlet night in Feynmanville: one-loop matching of a real scalar,” JHEP 04 (2020) 164 [Erratum: JHEP 07 (2020) 066], [arXiv:2003.05936](#) [hep-ph].
- [21] M. Ruhdorfer, E. Salvioni and A. Weiler, “A global view of the off-shell Higgs portal,” SciPost Physics 8 (2020) 027, [arXiv:1910.04170](#) [hep-ph].
- [20] H.-C. Cheng, L. Li, E. Salvioni and C. Verhaaren, “Light hidden mesons through the Z portal,” JHEP 11 (2019) 031, [arXiv:1906.02198](#) [hep-ph].
- [19] R. Balkin, M. Ruhdorfer, E. Salvioni and A. Weiler, “Dark matter shifts away from direct detection,” JCAP 11 (2018) 050, [arXiv:1809.09106](#) [hep-ph].
- [18] H.-C. Cheng, L. Li, E. Salvioni and C. Verhaaren, “Singlet scalar top partners from accidental supersymmetry,” JHEP 05 (2018) 057, [arXiv:1803.03651](#) [hep-ph].
- [17] L. Li, E. Salvioni, Y. Tsai and R. Zheng, “Electroweak-charged bound states as LHC probes of hidden forces,” PRD 97 (2018) 015010, [arXiv:1710.06437](#) [hep-ph].
- [16] R. Balkin, M. Ruhdorfer, E. Salvioni and A. Weiler, “Charged composite scalar dark matter,” JHEP 11 (2017) 094, [arXiv:1707.07685](#) [hep-ph].
- [15] H.-C. Cheng, E. Salvioni and Y. Tsai, “Exotic electroweak signals in Twin Higgs,” PRD 95 (2017) 115035, [arXiv:1612.03176](#) [hep-ph].
- [14] A. Azatov, C. Grojean, A. Paul and E. Salvioni, “Resolving gluon fusion loops at current and future hadron colliders,” JHEP 09 (2016) 123, [arXiv:1608.00977](#) [hep-ph].
- [13] H.-C. Cheng, S. Jung, E. Salvioni and Y. Tsai, “Exotic quarks in Twin Higgs models,” JHEP 03 (2016) 074, [arXiv:1512.02647](#) [hep-ph].
- [12] J. Dror, M. Farina, E. Salvioni and J. Serra, “Strong tW scattering at the LHC,” JHEP 01 (2016) 071, [arXiv:1511.03674](#) [hep-ph].
- [11] R. Primulando, E. Salvioni and Y. Tsai, “The Dark Penguin Shines Light at Colliders,” JHEP 07 (2015) 031, [arXiv:1503.04204](#) [hep-ph].

- [10] S. Chang, J. Galloway, M. Luty, E. Salvioni and Y. Tsai, “Phenomenology of Induced Electroweak Symmetry Breaking,” JHEP 03 (2015) 017, [arXiv:1411.6023](#) [hep-ph].
- [9] A. Azatov, C. Grojean, A. Paul and E. Salvioni, “Taming the off-shell Higgs boson,” ZhETF 147 (2015) 410 [JETP 120 (2015) 354] (special issue in honor of the 60th birthday of V. Rubakov), [arXiv:1406.6338](#) [hep-ph].
- [8] C. Grojean, E. Salvioni, M. Schlaffer and A. Weiler, “Very boosted Higgs in gluon fusion,” JHEP 05 (2014) 022, [arXiv:1312.3317](#) [hep-ph].
- [7] M. Montull, F. Riva, E. Salvioni and R. Torre, “Higgs Couplings in Composite Models,” PRD 88 (2013) 095006, [arXiv:1308.0559](#) [hep-ph].
- [6] M. Farina, C. Grojean, F. Maltoni, E. Salvioni and A. Thamm, “Lifting degeneracies in Higgs couplings using single top production in association with a Higgs boson,” JHEP 05 (2013) 022, [arXiv:1211.3736](#) [hep-ph].
- [5] M. Gillioz, R. Gröber, C. Grojean, M. Mühlleitner and E. Salvioni, “Higgs Low-Energy Theorem (and its corrections) in Composite Models,” JHEP 10 (2012) 004, [arXiv:1206.7120](#) [hep-ph].
- [4] M. Farina, C. Grojean and E. Salvioni, “(Dys)Zphilia or a custodial breaking Higgs at the LHC,” JHEP 07 (2012) 012, [arXiv:1205.0011](#) [hep-ph].
- [3] C. Grojean, E. Salvioni and R. Torre, “A weakly constrained W' at the early LHC,” JHEP 07 (2011) 002, [arXiv:1103.2761](#) [hep-ph].
- [2] E. Salvioni, A. Strumia, G. Villadoro and F. Zwirner, “Non-universal minimal Z' models: present bounds and early LHC reach,” JHEP 03 (2010) 010, [arXiv:0911.1450](#) [hep-ph].
- [1] E. Salvioni, G. Villadoro and F. Zwirner, “Minimal Z' models: present bounds and early LHC reach,” JHEP 11 (2009) 068, [arXiv:0909.1320](#) [hep-ph].

WORKING GROUP REPORTS

- 4. M. Gallinaro et al., editors, “Beyond the Standard Model in Vector Boson Scattering Signatures,” [arXiv:2005.09889](#) [hep-ph].
- 3. J. Alimena et al., editors, “Searching for long-lived particles beyond the Standard Model at the Large Hadron Collider,” J. Phys. G 47 (2020), [arXiv:1903.04497](#) [hep-ex].
- 2. T. Golling et al., editors, “Physics at a 100 TeV pp collider: beyond the Standard Model phenomena,” CERN Yellow Report (2017) Vol. 3, [arXiv:1606.00947](#) [hep-ph].
- 1. L. Linssen et al., editors, “Physics and Detectors at CLIC: CLIC Conceptual Design Report,” CERN Yellow Report (2012) Vol. 3, [arXiv:1202.5940](#) [physics.ins-det].

PUBLISHED CONFERENCE PROCEEDINGS

- 5. E. Salvioni, “ Z portal to a confining hidden sector,” LFC 2019, Trento, September 2019. Published in Frascati Physics Series, Vol. LXX.
- 4. E. Salvioni, “Some Z' and W' models facing current LHC searches,” DIS 2012, Bonn, March 2012. Published in DESY-PROC-2012-02.

3. [not OA] E. Salvioni, "Relevance of the decay $W' \rightarrow W\gamma$ at the early LHC," IFAE 2011, Perugia, April 2011. Published in *Il Nuovo Cimento C* **34**, 06 (195).
2. E. Salvioni, "Minimal Z' models and the early LHC," 2nd Young Researchers Workshop, Frascati, May 2010. Published in *Frascati Physics Series*, Vol. LI, arXiv:1007.0490 [hep-ph].
1. [not OA] E. Salvioni, "Minimal Z' models and the early LHC," IFAE 2010, Rome, April 2010. Published in *Il Nuovo Cimento C* **33**, 06 (160).

PH.D. THESIS

- E. Salvioni, "Phenomenology of Compositeness at the LHC," University of Padova, July 2013. Available at <http://paduaresearch.cab.unipd.it/6166/>.

Giuseppe, 16/03/2021