
Erik Tonni

Date of birth: January 16th, 1980
Place of birth: Brescia, Italy
Citizenship: Italian
Languages: Italian (native), English (fluent)
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CURRICULUM VITAE ET STUDIORUM

Post doctoral non-permanent employment

- 01/2017 - present [SISSA](#) (International School for Advanced Studies), Trieste assistant professor (italian “ricercatore di tipo B”).
- 10/2011 - 12/2016 [SISSA](#) (International School for Advanced Studies), Trieste postdoc.
- 09/2009 - 08/2011 [Center for Theoretical Physics, Massachusetts Institute of Technology](#) postdoc, “Bruno Rossi” fellowship (INFN & MIT).
- 09/2007 - 08/2009 [Department of Physics, University of Pisa](#) postdoc.
- 08/2006 - 07/2007 [Scuola Normale Superiore](#), Pisa postdoc.

Education

- 01/2003 - 12/2005 [Scuola Normale Superiore](#), Pisa. PhD student in Physics. Degree awarded in 12/2006 with 70/70 cum laude. PhD thesis title: *Perturbative Liouville field theory*. Advisor: prof. Pietro Menotti.
- 10/1998 - 11/2002 ◇ [Scuola Normale Superiore](#), Pisa. Undergraduate student in Physics. Degree awarded in 12/2003 with 70/70 cum laude (diploma di licenza).
◇ [University of Pisa](#). Undergraduate student in Physics. Degree awarded in 11/2002 with 110/110 cum laude (italian “laurea” nel vecchio ordinamento, equivalente a “laurea specialistica”).

Research interests

- Entanglement in quantum systems
- Conformal Field Theory
- AdS/CFT correspondence
- String Theory and Quantum Gravity

Qualifications

- 4/2017 - present Italian national endorsement as associate professor of theoretical physics (italian “abilitazione scientifica nazionale a professore associato, settore 02/A2: fisica teorica delle interazioni fondamentali”).
- 11/2013 - present [Associated researcher, Instituto de Física Teórica, Madrid](#) (Severo Ochoa excellence program).

Publications and citations summary

List of publications available on [ArXiv](#) or [Inspire](#).

Publications summary:

- 38 publications on international journals.
- 1 proceeding for an international conference.

Bibliometric parameters according to [Google Scholar](#):

- more than 2100 total citations.
- h index: 21
- 1 paper with > 400 citations [31];
3 papers with > 150 citations each one [32, 29, 25];
2 papers with > 100 citations each one [28, 21];
6 papers with > 50 citations each one [23, 22, 20, 17, 14, 13].

Publications

- [1] *Corner contributions to holographic entanglement entropy in $AdS_4/BCFT_3$* ,
D. Seminara, J. Sisti and E. Tonni,
JHEP 1711 (2017) 076, [arXiv:1708.05080 [hep-th]].
- [2] *Entanglement spectrum degeneracy and Cardy formula in 1+1 dimensional conformal field theories*,
V. Alba, P. Calabrese and E. Tonni,
J. Phys. A: Math. Theor. **51** (2017) 024001, [arXiv:1707.07532 [hep-th]].
 - Invited contribution to the J. Phys. A special issue:
John Cardy's scale-invariant journey in low dimensions: a special issue for his 70th birthday.
- [3] *A contour for the entanglement entropies in harmonic lattices*,
A. Coser, C. De Nobili and E. Tonni,
J. Phys. A: Math. Theor. **50** (2017) 314001, [arXiv:1701.08427 [cond-mat.stat-mech]].
 - Invited contribution to the J. Phys. A special issue:
John Cardy's scale-invariant journey in low dimensions: a special issue for his 70th birthday.
- [4] *Entanglement hamiltonians in two-dimensional conformal field theory*,
J. Cardy and E. Tonni,
J. Stat. Mech. (2016) 123103, [arXiv:1608.01283 [cond-mat.stat-mech]].
- [5] *Entanglement negativity in a two dimensional harmonic lattice: Area law and corner contributions*,
C. De Nobili, A. Coser and E. Tonni,
J. Stat. Mech. (2016) 083102, [arXiv:1604.02609 [cond-mat.stat-mech]].
- [6] *Spin structures and entanglement of two disjoint intervals in conformal field theories*,
A. Coser, E. Tonni and P. Calabrese,
J. Stat. Mech. (2016) 053109, [arXiv:1511.08328 [cond-mat.stat-mech]].
- [7] *On shape dependence of holographic entanglement entropy in AdS_4/CFT_3* ,
P. Fonda, D. Seminara and E. Tonni,
JHEP 1512 (2015) 037, [arXiv:1510.03664 [hep-th]].
- [8] *Towards entanglement negativity of two disjoint intervals for a one dimensional free fermion*,
A. Coser, E. Tonni and P. Calabrese,
J. Stat. Mech. (2016) 033116, [arXiv:1508.00811 [cond-mat.stat-mech]].
- [9] *Partial transpose of two disjoint blocks in XY spin chains*,
A. Coser, E. Tonni and P. Calabrese,
J. Stat. Mech. (2015) P08005, [arXiv:1503.09114 [cond-mat.stat-mech]].
- [10] *Entanglement entropy and negativity of disjoint intervals in CFT: Some numerical extrapolations*,
C. De Nobili, A. Coser and E. Tonni,
J. Stat. Mech. (2015) P06021, [arXiv:1501.04311 [cond-mat.stat-mech]].
- [11] *On shape dependence of holographic mutual information in AdS_4* ,
P. Fonda, L. Giomi, A. Salvio and E. Tonni,
JHEP 1502 (2015) 005, [arXiv:1411.3608 [hep-th]].

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- [12] *Entanglement negativity after a global quantum quench*,
A. Coser, E. Tonni and P. Calabrese,
J. Stat. Mech. (2014) P12017, [arXiv:1410.0900 [cond-mat.stat-mech]].
- [13] *Finite temperature entanglement negativity in conformal field theory*,
P. Calabrese, J. Cardy and E. Tonni,
J. Phys. A48 (2015) 015006 (IOPselect), [arXiv:1408.3043 [cond-mat.stat-mech]].
• Highlighted in Europhysics News Vol. 46 No. 2 (2015);
• Selected for Journal of Physics A Highlights of 2015.
- [14] *Holographic thermalization with Lifshitz scaling and hyperscaling violation*,
P. Fonda, L. Franti, V. Keranen, E. Keski-Vakkuri, L. Thorlacius and E. Tonni,
JHEP 1408 (2014) 051, [arXiv:1401.6088 [hep-th]].
- [15] *On Rényi entropies of disjoint intervals in conformal field theory*,
A. Coser, L. Tagliacozzo and E. Tonni,
J. Stat. Mech. (2014) P01008, [arXiv:1309.2189 [hep-th]].
• Invited contribution to JSTAT special issue *Quantum Entanglement in Condensed Matter Physics*.
- [16] *Global properties of causal wedges in asymptotically AdS spacetimes*,
V. E. Hubeny, M. Rangamani and E. Tonni,
JHEP 1310 (2013) 059, [arXiv:1306.4324 [hep-th]].
- [17] *Holographic entanglement plateaux*,
V. E. Hubeny, H. Maxfield, M. Rangamani and E. Tonni,
JHEP 1308 (2013) 092, [arXiv:1306.4004 [hep-th]].
- [18] *Entanglement negativity in the critical Ising chain*,
P. Calabrese, L. Tagliacozzo and E. Tonni,
J. Stat. Mech. (2013) P05002, [arXiv:1302.1113 [cond-mat.stat-mech]].
- [19] *Thermalization of causal holographic information*,
V. E. Hubeny, M. Rangamani and E. Tonni,
JHEP 1305 (2013) 136, [arXiv:1302.0853 [hep-th]].
- [20] *Entanglement negativity in extended systems: A field theoretical approach*,
P. Calabrese, J. Cardy and E. Tonni,
J. Stat. Mech. (2013) P02008, [arXiv:1210.5359 [cond-mat.stat-mech]].
- [21] *Entanglement negativity in quantum field theory*,
P. Calabrese, J. Cardy and E. Tonni,
Phys. Rev. Lett. 109 (2012) 130502, [arXiv:1206.3092 [cond-mat.stat-mech]].
- [22] *Holographic evolution of the mutual information*,
A. Allais and E. Tonni,
JHEP 1201 (2012) 102, [arXiv:1110.1607 [hep-th]].
- [23] *Aspects of AdS/BCFT*,
M. Fujita, T. Takayanagi, E. Tonni,
JHEP 1111 (2011) 043, [arXiv:1108.5152 [hep-th]].

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- [24] *The $D^{2k}R^4$ Invariants of $\mathcal{N} = 8$ Supergravity*,
D. Z. Freedman and E. Tonni,
JHEP 1104 (2011) 006, [arXiv:1011.1672 [hep-th]].
- [25] *Entanglement entropy of two disjoint intervals in conformal field theory II*,
P. Calabrese, J. Cardy and E. Tonni,
J. Stat. Mech. (2011) P01021, [arXiv:1011.5482 [hep-th]].
- [26] *Holographic entanglement entropy: near horizon geometry and disconnected regions*,
E. Tonni,
JHEP 1105 (2011) 004, [arXiv:1011.0166 [hep-th]].
- [27] *Warped black holes in 3D general massive gravity*,
E. Tonni,
JHEP 1008 (2010) 070, [arXiv:1006.3489 [hep-th]].
- [28] *A boundary stress tensor for higher-derivative gravity in AdS and Lifshitz background*,
O. Hohm and E. Tonni,
JHEP 1004 (2010) 093, [arXiv:1001.3598 [hep-th]].
- [29] *Entanglement entropy of two disjoint intervals in conformal field theory*,
P. Calabrese, J. Cardy and E. Tonni,
J. Stat. Mech. (2009) P11001, [arXiv:0905.2069 [hep-th]].
- [30] *Giant magnons and spiky strings on the conifold*,
S. Benvenuti and E. Tonni,
JHEP 0902 (2009) 041, [arXiv:0811.0145 [hep-th]].
- [31] *Bounding scalar operator dimensions in 4D CFT*,
R. Rattazzi, S. Rychkov, E. Tonni and A. Vichi,
JHEP 0812 (2008) 031, [arXiv:0807.0004 [hep-th]].
- [32] *$\mathcal{N} = 8$ superconformal gauge theories and M2 branes*
S. Benvenuti, D. Rodriguez-Gomez, E. Tonni and H. Verlinde,
JHEP 0901 (2009) 078, [arXiv:0805.1087 [hep-th]].
- [33] *Near-flat space limit and Einstein manifolds*,
S. Benvenuti and E. Tonni,
JHEP 0802 (2008) 022, [arXiv:0707.1676 [hep-th]].
- [34] *Liouville field theory with heavy charges. II: The conformal boundary case*,
P. Menotti and E. Tonni,
JHEP 0606 (2006) 022, [arXiv:hep-th/0602221].
- [35] *Liouville field theory with heavy charges. I: The pseudosphere*,
P. Menotti and E. Tonni,
JHEP 0606 (2006) 020, [arXiv:hep-th/0602206].
- [36] *Quantum Liouville theory on the pseudosphere with heavy charges*,
P. Menotti and E. Tonni,
Phys. Lett. B 633 (2006) 404, [arXiv:hep-th/0508240].

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- [37] *Standard and geometric approaches to quantum Liouville theory on the pseudosphere*,
P. Menotti and E. Tonni,
Nucl. Phys. B 707 (2005) 321, [arXiv:hep-th/0406014].
- [38] *The tetrahedron graph in Liouville theory on the pseudosphere*,
P. Menotti and E. Tonni,
Phys. Lett. B 586 (2004) 425, [arXiv:hep-th/0311234].

Proceedings

- [39] *Quantum Liouville theory with heavy charges*,
P. Menotti and E. Tonni,
Proceedings of the *11th Marcel Grossman Meeting on General Relativity*,
editors: H. Kleinert, R. T. Jantzen and R. Ruffini, World Scientific, Singapore, 2008.
[arXiv:hep-th/0612107].

Preprints

- [40] *Entanglement hamiltonian and entanglement contour in inhomogeneous 1D critical systems*,
E. Tonni, Javier Rodríguez-Laguna and Germán Sierra,
arXiv:1712.03557 [cond-mat.stat-mech].

Refereeing activity

Funding agencies:

- NWO Physics, Netherlands
- CONICYT, Ministerio de Educación, Gobierno de Chile

PhD thesis:

- Clément Berthiere PhD 2017, Université de Tours
- Javier Abajo Arrastia PhD 2016, Instituto de Física Teórica, Madrid

Scientific journals:

- Physical Review Letters
- Physical Review D
- Classical and Quantum Gravity
- Annals of Physics
- Physics Letters B
- Physics Letters A
- International Journal of Modern Physics D
- Journal of High Energy Physics (JHEP)
- Journal of Statistical Mechanics (JSTAT)
- Journal of Physics A
- SciPost
- Nuclear Physics B
- European Physical Journal C

Mentoring activity

PhD advisor of the following students at SISSA:

- Jacopo Sisti expected PhD 2019.
- Cristiano De Nobili PhD 2016.
- Piermarco Fonda PhD 2015.
- Andrea Coser PhD 2015.

Undergraduate master thesis advisor of the following student:

- Pier Vittorio Larocca graduated 10/2013, University of Torino.

Teaching activity

- PhD course at SISSA (26 front hours), *Introduction to holography*
Academic years: 2016/17, 2015/16, 2014/15, 2013/14, 2012/13, 2011/12.

Organizing activity

International events:

- *Entanglement in Quantum Systems*
Two months program to be held in June/July 2018 at [Galileo Galilei Institute](#), Florence, Italy.
Organizers: P. Calabrese, I. Cirac, J. Moore, R. Myers, M. Rangamani, T. Takayanagi and E. Tonni.

National events:

- *X Avogadro meeting on strings, supergravity and gauge theories*
December 17-19, 2014, Scuola Normale Superiore, Pisa, Italy. Organizers: ★.
- *IX Avogadro meeting on strings, supergravity and gauge theories*
December 18-20, 2013, SISSA, Trieste, Italy. Organizers: ★.
- *VIII Avogadro meeting on strings, supergravity and gauge theories*
December 19-21, 2012, Scuola Normale Superiore, Pisa, Italy. Organizers: ★.
★ M. Caldarelli, M. Cirafici, V. Forini, D. Francia, E. Tonni and R. Valandro.

Fundraising

- [MISTI Global Seeds Funds](#) (faculty funds): 15.200 \$.
Title of the project: *New approaches to Quantum Many-Body systems via Entanglement*.
Period: 01/2018 - 08/2019. Principal investigators: Hong Liu (MIT) and Erik Tonni (SISSA).
- [ACRI - Young Investigator Training Program 2017](#): 48.750 €.
Funds obtained from [ACRI](#) (a consortium of Italian banks) to support young researchers through individual fellowships (3.000 ÷ 4.000 € each one) in order to attend the program *Entanglement in Quantum Systems* at the Galileo Galilei Institute in June/July 2018 and to visit another research institute in Italy.

Invited talks at international conferences and workshops

- 1/2018 Instituto Balseiro, Bariloche. *It from Qubit workshop*
- 7/2017 École Normale Supérieure, Paris. *Integrability in Gauge and String Theory (IGST 2017)*
- 7/2017 Ruder Bosković Institute, Zagreb. *First Zagreb School on Theoretical Physics*
- 12/2016 Simons Center for Geometry and Physics, Stony Brook.
Entanglement in field theory and gravity
- 12/2016 Delta Institute for Theoretical Physics, Amsterdam. *Delta ITP Entanglement workshop*
- 7/2016 International Centre for Theoretical Physics, Trieste.
Entanglement and Non-Equilibrium Physics of Pure and Disordered Systems
- 6/2016 Yukawa Institute for Theoretical Physics, Kyoto. *Holography and Quantum Information*
- 1/2016 Instituto de Física Teórica, Madrid. *Iberian Strings 2016*
- 1/2016 Lorentz Center, Leiden. *Gravity, Quantum Fields and Entanglement*
- 11/2015 University College London. *New Trends in Strongly Entangled Many-Body Systems 2015*
- 9/2015 Sestri Levante. *Physics on the riviera 2015*
- 9/2015 University of Southampton. *2nd Workshop on holography, gauge theories and black holes*
- 8/2015 International Institute of Physics, Natal.
Strongly coupled field theories for condensed matter and quantum information theory
- 6/2015 Kavli Institute for Theoretical Physics, Santa Barbara.
Closing the entanglement gap: quantum information, quantum matter and quantum fields
- 2/2015 Instituto de Física Teórica, Madrid. *Entangle this: Space, Time & Matter*
- 8/2014 Reykjavík. *Holographic Methods and Applications (HoloGrav 2014)*
- 6/2014 Princeton. *Strings 2014* (parallel session)
- 6/2014 Universidad de Colima. *Mextrings*
- 6/2014 King's college, London. *Entanglement entropy in many body quantum systems*
- 5/2014 Cortona. *New Frontiers in Theoretical Physics. XXXIV Convegno di Fisica Teorica*
- 3/2014 International Institute of Physics, Natal.
Quantum Integrability, Conformal Field Theory and Topological Quantum Computation
- 12/2013 Instituto de Física Teórica, Madrid. *XIX IFT Xmas workshop*

Invited lectures

- 5/2016 Yukawa Institute for Theoretical Physics, Kyoto.
Quantum Information in String Theory and Many-body Systems
Lectures on *Entanglement in QFT* (3 hours)
- 8/2015 International Institute of Physics, Natal. School:
Strongly coupled field theories for condensed matter and quantum information theory
Lectures on *Entanglement measures from conformal field theory and AdS/CFT* (6 hours)
- 7/2014 Instituto Superior Técnico, Lisbon. *Summer school on String Theory and Holography*
Lectures on *Entanglement and Holography* (4 hours)

Invited seminars

- 11/2017 University of Florence
- 3/2017 University of Milan, Bicocca
- 2/2017 Albert Einstein Institute, Potsdam
- 2/2017 Freie University, Berlin
- 2/2017 Humboldt University, Berlin
- 12/2016 Eidgenössische Technische Hochschule (ETH), Zürich
- 10/2016 SISSA, Trieste. SISSA - ICTP joint seminar
- 10/2016 University of Florence
- 10/2016 Trinity College, Dublin
- 8/2016 NORDITA, Stockholm. Program: *Black Holes and Emergent Spacetime*
- 5/2016 University of Pisa
- 5/2016 Yang Institute for Theoretical Physics, Stony Brook University
- 4/2016 Stanford University
- 4/2016 University of California, Berkeley
- 4/2016 University of California, Davis
- 4/2016 Brandeis University
- 3/2016 Massachusetts Institute of Technology, Boston
- 3/2016 Princeton University
- 2/2016 Complutense University of Madrid
- 2/2016 University of Oviedo
- 2/2016 Instituto de Física Teórica, Madrid
- 10/2015 SISSA, Trieste. *Informal workshop on Statistical Field Theory and related topics*
- 5/2015 Kavli Institute for Theoretical Physics, Santa Barbara.
Program: *Entanglement in strongly-correlated quantum matter*
- 3/2015 Galileo Galilei Institute, Florence.
Program: *Holographic methods for strongly coupled systems*
- 3/2015 International Centre for Theoretical Physics, Trieste
- 2/2015 University of Amsterdam
- 12/2014 Scuola Normale Superiore, Pisa.
X Avogadro meeting on Strings, Supergravity and Gauge Theories
- 12/2014 University of Roma, Tor Vergata
- 12/2014 Uppsala University
- 6/2014 Massachusetts Institute of Technology, Boston
- 5/2014 University of Perugia
- 2/2014 Crete Center for Theoretical Physics, Heraklion
- 12/2013 Leuven. ULB - VUB - KUL - UMONS - Solvay joint seminar
- 12/2013 King's College, London. *The London triangle seminar*
(Imperial College - King's College - City University - Queen Mary joint seminar)
- 11/2013 Perimeter Institute, Waterloo. String seminar
- 10/2013 Perimeter Institute, Waterloo. String/Condensed Matter joint seminar
- 9/2013 Isaac Newton Institute, Cambridge.
Program: *Mathematics and Physics of the Holographic Principle*

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- 9/2013 University of Southampton
 - 6/2013 Galileo Galilei Institute, Florence. Meeting of the INFN section FI11
 - 5/2013 University of Torino
 - 5/2013 Niels Bohr Institute, Copenhagen
 - 3/2013 SISSA, Trieste. Mathematical Physics seminar
 - 3/2013 Durham University
 - 12/2012 Scuola Normale Superiore, Pisa
 - 11/2012 University of Parma
 - 11/2012 Institut de Ciències Fotòniques (ICFO), Barcelona
 - 9/2012 University of Florence
 - 6/2012 University of Padova
 - 4/2012 Galileo Galilei Institute, Florence.
Program: *New quantum states of matter in and out of equilibrium*
 - 1/2012 Oxford University
 - 12/2011 Galileo Galilei Institute, Florence.
VII Avogadro meeting on Strings, Supergravity and Gauge Theories
 - 12/2011 International Centre for Theoretical Physics, Trieste
 - 12/2011 University of Amsterdam
 - 11/2011 École Normale Supérieure, Paris
 - 10/2011 Laboratoire de Physique Théorique et Modélisation, Cergy-Pontoise, Paris
 - 6/2011 Aspen. Program:
Quantum Information in Quantum Gravity and Condensed Matter Physics
 - 1/2011 University of Pennsylvania, Philadelphia
 - 12/2010 Massachusetts Institute of Technology, Boston
 - 10/2010 Galileo Galilei Institute, Florence.
Program: *AdS₄/CFT₃ and the holographic states of matter*
 - 9/2009 Massachusetts Institute of Technology, Boston
 - 6/2009 University of Pisa
 - 11/2007 University of Parma
 - 11/2007 University of Bologna
 - 4/2007 University of Pisa. *Festa per Pietro Menotti* (meeting for his 70th birthday)
 - 3/2007 University of Pisa. Workshop: *Supersymmetry, Supergravity, Superstrings*
 - 11/2006 Niels Bohr Institute, Copenhagen

Contributed seminars and presentations

- 5/2006 Cortona. *XXVIII Convegno di Fisica Teorica*
- 5/2005 SISSA, Trieste. *EUCLID 2005: New paths in Theoretical Physics*
- 6/2004 Oporto. *Modern Trends in String Theory II* (poster)
- 5/2004 Cortona. *XXVI Convegno di Fisica Teorica*

Invited long term visits

- 8/2016 NORDITA, Stockholm (3 weeks).
Program: *Black Holes and Emergent Spacetime*
- 6/2016 Yukawa Institute for Theoretical Physics, Kyoto (1 month).
Long term workshop: *Quantum Information in String Theory and Many-body Systems*
- 2/2016 Instituto de Física Teórica, Madrid (1 month).
- 4/2015 Kavli Institute for Theoretical Physics, Santa Barbara (3 months).
Program: *Entanglement in strongly-correlated quantum matter*
- 10/2013 Perimeter Institute, Waterloo, Canada (1 month).
- 9/2013 Isaac Newton Institute, Cambridge, UK (1 month).
Program: *Mathematics and Physics of the Holographic Principle*