

Curriculum Vitae et Studiorum of Silvia Penati

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1 PERSONAL DATA

Name: Silvia Penati

Academic position: Full professor in Theoretical Physics

Institution: Dipartimento di Fisica, Università degli studi di Milano-Bicocca, piazza della Scienza 3, 20126 Milano.

2 STUDIES AND JOBS

1980-1984 Laurea in FISICA, Università degli studi di Milano (Laurea cum lode).

1985-1988 PhD in FISICA, Università degli studi di Milano. Thesis : *On some aspects of string theory*, (Advisor: prof. L. Girardello).

1988-1990 Postdoc fellowship at Brandeis University, Waltham, USA.

1991-1992 Postdoc fellowship at Università degli studi di Milano.

1992-1999 Permanent researcher position in Theoretical Physics at Università degli Studi di Milano.

1999-2003 Permanent researcher position in Theoretical Physics at Università degli Studi di Milano-Bicocca.

1998-1999 Visiting professor at University of Maryland, College Park, MD, USA.

2003-2017 Associate Professor in Theoretical Physics at Università degli studi di Milano-Bicocca.

Present position Full Professor in Theoretical Physics at Università degli studi di Milano-Bicocca (Unimib)

Since 1985 Associate member of INFN (Istituto Nazionale di Fisica Nucleare).

3 SCIENTIFIC RESPONSABILITIES IN INTERNATIONAL RESEARCH PROGRAMS

2004-2008 Unimib contact person in the RTN project MRTN-CT-2004-005104 "Constituents, Fundamental Forces and Symmetries of the Universe"

2013-2017 Chair of the European COST Action MP1210 "The string theory Universe", duration 4 years.

http://www.cost.eu/domains_actions/mpns/Actions/MP1210

4 GRANTS

Italian PRIN 1997 Teorie di campo e teorie di superstringhe (Fields and Superstring Theories)

Italian PRIN 1999 Aspetti perturbativi e non perturbativi in teoria di stringa e in teorie di gauge. Cosmologia di stringa (Perturbative and non-perturbative aspects in string and gauge theories)

Italian PRIN 2001 Teorie di stringa e di gauge (String and gauge theories)

Italian PRIN 2003 Teorie di gauge e di stringa (Gauge and String theories)

Italian PRIN 2005 Campi di gauge, stringhe e dualità (Gauge fields, strings and dualities)

Italian PRIN 2007 Campi di gauge, stringhe e dualità (Gauge fields, strings and dualities)

Italian PRIN 2009 Simmetrie dell'universo e delle interazioni fondamentali (Symmetries of the Universe and of fundamental interactions)

1996-2000 TMR project "Quantum aspects of gauge theories, supersymmetry and unification"

2000-2004 RTN project "The quantum structure of spacetime and the geometric nature of fundamental interactions"

2004-2008 RTN project "Constituents, Fundamental Forces and Symmetries of the Universe" 2013-2017

2013-2017 COST Action MP1210, "The String Theory Universe" (Chair and Grant Holder)

2018 University Reward Grant for an ITN proposal that passed, but was not funded (Chair)

5 ORGANIZATION OF INTERNATIONAL CONFERENCES

In the recent past I have been (and I am presently) part of the organizing or scientific committees for the following Workshops and Conferences:

- "The String Theory Universe - 19th European Workshop on String Theory, AEC Workshop and 1st COST MP1210 Meeting", September 2-6 2013, Bern (<http://www.strings13.unibe.ch/>)
- Workshop "Black Holes and Quantum Information", January 12-17, 2014, The Weizmann Institute of Science, Rehovot, Israel (<http://www.weizmann.ac.il/stringuniverse/workshop>)
- Summer School on "String Theory and Holography", July 14-26 2014, Lisbon/Porto (<http://faraday.fc.up.pt/cfp-pages/School/>)
- "2nd COST MP1210 Meeting and 20th European Workshop on String Theory and Conference of the MITP programme", September 22-26 2014, Mainz (<https://indico.mitp.uni-mainz.de/event/15/>)
- "First Workshop on String Theory and Gender", July 6-7 2015, Valencia (<http://www.uv.es/genderstring/>)
- "The String Theory Universe, 21st European string workshop and 3rd COST MP1210 meeting", September 7-11 2015, Leuven (<https://iks32.fys.kuleuven.be/indico/event/29/>)
- "2nd Workshop on String Theory and Gender", June 9-10 2016, Paris (<https://indico.in2p3.fr/event/12356/>)
- President of the local and international organizer committees of the final Conference of the COST project "The String Theory Universe - 22nd European String Workshop and final COST MP1210 Conference", February 20-24 2017, Milano-Bicocca (<https://indico.cern.ch/event/555921/>)
- "First Workshop on High Energy Theory and Gender", September 26-28 2018, CERN (Geneve)
- "Women in sciences", May 13-14 2019, U. Milano-Bicocca
- "Great Lessons from Exact techniques and Beyond", June 8-12 2020, Padova
- MITP Program BQFT2020 "Quantum Field Theory at the Boundary", Sept. 14 - Oct. 2 2020, Mainz
- Member of the International Advisory Board of Strings 2020 - South Africa
- Member of the International Advisory Board of pre-Strings 2021 - Natal, Brazil

6 TEACHING ACTIVITY

6.1 BACHELOR/MASTER ACTIVITY

- 2000-2003, 2008/09 - 2014/15 GENERAL RELATIVITY** at Master Degree in Physics, Milano–Bicocca
- 2002-2005 THEORETICAL PHYSICS** at Master Degree in Physics, Università Cattolica, Brescia.
- 2003-2008 SPECIAL RELATIVITY** at Bachelor Degree in Physics, Milano–Bicocca
- 2003-2008 ADVANCED QUANTUM MECHANICS** at Master Degree in Physics, Milano-Bicocca.
- 2003-2008 ADVANCED THEORETICAL PHYSICS** at Master Degree in Physics, Milano-Bicocca.
- 2005 INTRODUCTION TO STRING THEORY** at Master Degree in Physics, Università Cattolica, Brescia.
- 2008/09 - 2014/15 and 2017/18 - 2018/19 MATHEMATICS FOR PHYSICISTS**, at Bachelor Degree in Physics, Milano–Bicocca.
- 2013/14 - 2014/15 SPECIAL RELATIVITY**, at the TFA programme for the university training of high school teachers.
- 2015/16 - 2016/17 and 2019/20 THEORETICAL PHYSICS I AND II**, at Master Degree in Physics, Milano-Bicocca.
- 2015/16 - present QUANTUM GRAVITY**, at Master Degree in Physics, Milano-Bicocca.

6.2 PHD SCHOOL ACTIVITY

- 1996 CONFORMAL FIELD THEORIES AND INTEGRABLE MODELS** PhD School in Physics, Milano.
- 1997-2000 QUANTUM FIELD THEORY** PhD School in Physics, Milano.
- 2000, 2004-2005 QUANTUM FIELD THEORY AND STRINGS** PhD School in Physics, Milano–Bicocca.
- 2003 SPONTANEOUS BREAKING OF SYMMETRY** PhD School in Physics, Università of Palermo.
- 2016 AN INTRODUCTION TO RIGID SUPERSYMMETRY**, LACES 2016, Galileo Galilei Institute (<http://laces.web.cern.ch/laces/LACES16/index16.html>).

7 PHD ADVISOR ACTIVITY

I have acted as advisor for about 45 Bachelor stages, 25 Master thesis and for the following PhD dissertations:

- 2005** Alberto Romagnoni, *Non(anti)commutative geometry: Renormalization of $N=1/2$ field theories*
- 2006** Gabriele Tartaglino-Mazzucchelli, *On supersymmetry and superspaces in 4 & 6 dimensions*
- 2007** Liuba Mazzanti, *Topics in noncommutative integrable field theories and holographic brane-world cosmology*
- 2007** Marco Pirrone, *On marginally deformed AdS/CFT*
- 2010** CarloAlberto Ratti, *Topics in SYM theories: AdS/CFT and mesonic spectra; Superspace and scattering amplitudes*
- 2011** Massimo Siani *Perturbative and non-perturbative infrared behavior os supersymmetric gauge theories*
- 2012** Marco Stefano Bianchi *Superspace computation 3D.*
- 2018** Luca Cassia *Aspects of Compactifications and Dualities in Superconformal Theories*

2020 Stefano Baiguera *Developments in non-relativistic field theory and complexity*

2020 Carolina Gomez *Wilson loops in supersymmetric gauge theories*

I am presently supervising two PhD students, Nicola Gorini and Daniele Bielli (IDD with Surrey).

8 ACADEMIC DUTIES

1999 Member of the committee for the admission to the PhD school in Physics, Università di Milano.

2002 Member of the committee for a researcher position in theoretical physics, Università degli Studi di Palermo.

2001-2003 Researcher representative in “Senato Accademico Integrato”, Milano–Bicocca.

2005-2006 Member of the committee for an INFN researcher position in theoretical physics.

2006-2007 Member of the committee for INFN fellowships.

2004-2012 Lead organizer of Master in Physics, Università di Milano–Bicocca.

2006-present Member of the Professor Council of the PhD school in Physics, Milano–Bicocca.

2007-2012 Local Coordinator of the INFN theoretical group, Milano-Bicocca.

2007-2009 President of the Committee for the INFN “Premio Fubini” for the best PhD italian dissertation.

19/02/2009 Member of the committee for the final defense of PhD dissertations, Università degli studi di Perugia.

2009 Member of the committee for INFN fellowships.

2012 Member of committees for the final defense of PhD dissertations, Università degli studi di Torino, Università degli studi di Parma, Università degli studi di Roma Tor Vergata.

2012-2018 President of the Consiglio di Coordinamento Didattico di Fisica e Astrofisica, Dipartimento di Fisica, Università degli studi di Milano–Bicocca.

2018 Member of the committee for INFN positions as research leader (highest INFN level).

2018 Member of the committee for one RTDB researcher position, 02/A2, SSD FIS02, at the Università di Bari.

2018 - 2019 - 2020 Member of committees for Associate Professor positions, 02/A2, SSD FIS02, at Università di Milano, Napoli, Padova and Bergamo.

2018 - 2019 Member of committees for Full Professor positions, 02/A2, SSD FIS02, at Università di Perugia, SISSA and Lecce.

2019 Official Representative for the Physics Department in ABCD - Interdepartmental center for gender studies.

2020 Official Representative for the Physics Department in the University Committee for International activities, and member of the restricted operative core.

2020 Member of the UNIMIB Committee for coordination with the penitentiary Pole for university studies.

9 COLLABORATIONS

Paul Townsend Full Professor, Department of Applied Math. and Theor. Physics, Cambridge University, UK;

Paul Howe Full Professor, Department of Mathematics, Kings College London, UK;

Andrew Strominger Full Professor, Harvard University, Cambridge, USA;

Robert Myers Full Professor, Perimeter Institute for Theoretical Physics, Waterloo, Canada;

Marc Grisar Senior professor, Department of Physics, McGill University, Montreal, Canada;

Daniela Zanon Full Professor, University of Milano, Italy;

Alberto Santambrogio INFN researcher, Milano, Italy;

Tassos Petkou Associate Professor, University of Thessaloniki, Greece;

Alberto Romagnoni Postdoc, Orsay LPT et Ecole Polytechnique CPHT, Paris, France;

Olaf Lechtenfeld Full Professor, Hannover University, Germany;

Alexander Popov Professor, Hannover University, Germany;

Emery Sokatchev Professor, Annecy, LAPTH, CERN;

Gleb Arutyunov Professor, Utrecht University, The Netherlands;

Jim S. Gates Full professor, University of Maryland, USA;

Matias Leoni Olivera Researcher, University of Buenos Aires, Argentina;

Marco S. Bianchi Professor, Valdivia University, Chile;

Gaston Giribet Professor, University of Buenos Aires, Argentina;

Dmitri Sorokin INFN, Padova, Italy;

Jeff Murugan Cape Town University, South Africa;

Martin Wolf Surrey, UK;

Linus Wulff Masaryk University, Czech Republic;

Luca Griguolo Associate Professor, Parma University, Italy;

Domenico Seminara Associate Professor, Firenze University, Italy;

Jun-bao Wu Professor, Tianjin University, China;

Jiaju Zhang Postdoc SISSA;

Hao Ouyang Postdoc Nordita, Sweden;

Roberto Auzzi Researcher, Catholic University, Brescia, Italy;

Giuseppe Nardelli Associate Professor, Catholic University, Brescia, Italy;

Nadav Drukker Professor, King's College, UK;

Diego Trancanelli Associate Professor, University of Modena, Italy;

Pietro Antonio Grassi Associate Professor, University of Piemonte Orientale, Italy.

10 INVITED TALKS

A selection of invited talks is the following:

- 1988 *Soft dilaton theorem in string field theory*, Brandeis University, Maltham, MA, USA.
- 1988 *N-extended spinning particle*, Brandeis University, Maltham, MA, USA.
- 1990 *Quantum properties of generalized Toda field theories*, UCSB, Santa Barbara, CA, USA.
- 1992 *Teorie Toda supersimmetriche*, convegno informale di fisica teorica, Marciana Marina, LI, Italy.
- 1993 *Solitons in topological field theories*, Bologna, Italy.
- 1994 *Solitons in topological field theories*, Theoretical physics meeting, Paris, France.
- 1994 *Solitons in 2d topological field theories*, RTN workshop "Topological and conformal field theories and their applications", Torino, Italy.
- 1995 *Quantum integrability in 2d systems with boundary*, workshop "CFT and integrable models", Bologna, Italy.
- 1996 *Correzioni gravitazionali alle funzioni del gruppo di rinormalizzazione nei modelli sigma*, "Convegno informale di Fisica Teorica", Cortona, AR, Italy.
- 1997 *Correzioni gravitazionali alle funzioni del gruppo di rinormalizzazione nei modelli sigma*, meeting "Problemi attuali di fisica teorica", Vietri sul mare, SA, Italy.
- 1997 *Duality in N=2 nonlinear sigma-models*, RTN workshop "Quantum aspects of gauge theories, supersymmetry and unification" Neuchatel, Switzerland.
- 1998 *N=2 supersymmetric theories with nonminimal matter*, "Convegno informale di Fisica Teorica", Cortona, AR, Italy.
- 1998 *N=2 supersymmetric theories with nonminimal matter*, University of Maryland, College Park, MD, USA.
- 2001 *Chiral anomalies in 4D SYM theories*, meeting "Problemi attuali di fisica teorica", Vietri sul mare, SA, Italy.
- 2001 *Noncommutative geometry in superspace*, "Convegno informale di Fisica Teorica", Cortona, AR, Italy.
- 2002 *Checking AdS/CFT correspondence on the composite operators of N=4 SYM theory*, Sissa, Trieste, Italy.
- 2002 *Testi e sviluppi della corrispondenza AdS/CFT*, Università di Pavia, Italy.
- 2002 *Sine-Gordon in geometria non commutativa*, meeting "Problemi attuali di fisica teorica", Vietri sul mare, SA, Italy.
- 2002 *A noncommutative generalization of the sine-Gordon system*, LAPTH Annecy, France.
- 2003 *NAC superspace and N=1/2 WZ model*, RTN workshop "The quantum structure of spacetime and the geometric nature of fundamental interactions", Copenhagen, Denmark.
- 2003 *Nonanticommutative superspace and N=1/2 models*, Università di Napoli, Italy.
- 2004 *Nonanticommutative superspace and N=1/2 models*, Università di Parma, Italy.
- 2004 *Supersymmetric field theories in NAC geometries*, meeting "Recent advances in noncommutative geometry: spheres, instantons, sigma models", Firenze, Italy.
- 2005 *Exact results in the beta-deformed AdS/CFT correspondence*, PRIN meeting, Pisa, Italy.
- 2007 *Mesons in marginally deformed AdS/CFT*, PRIN meeting, Pisa, Italia.
- 2008 *Verso una teoria del tutto: La teoria delle stringhe* meeting "Le donne nella scienza", Napoli, Italy.
- 2008 *Direct calculation of scattering amplitudes in N=4 SYM*, INFN meeting in String theory, Villa Mondragone, Roma, Italy.

- 2009** *N=2 Chern–Simons theories: RG flows and IR behavior*, Katholieke Universiteit of Leuven, Belgium.
- 2010** *N=2 Chern–Simons theories: RG flows and IR behavior*, PRIN meeting, Perugia, Italy.
- 2012** *Scattering in AdS₄/CFT₃*, Miniworkshop on String Theory, Oviedo University
- 2013** *Scattering in AdS₄/CFT₃*, Queen Mary College of London, UK.
- 2013** *A survey on ABJM: scattering amplitudes and Wilson loops*, PRIN meeting, Pisa, Italy.
- 2014** *BPS Wilson Loops and Bremsstrahlung in ABJM: an exact prediction*, Holoday: A Short Journey Into the Holographic Correspondence, Perugia, Italy and Padova University, Italy.
- 2015** *BPS Wilson Loops and an exact result for the Bremsstrahlung function in ABJM model*, GGI Workshop “Gauge/Gravity duality”, Florence, Italy and Cape Town University, Cape Town, ZA.
- 2015** *Fermionic T-duality in superstring models*, Workshop “Physics on the Riviera 2015”, Sestri Levante, Italy.
- 2016** *Wilson Loops in ABJ(M): From localization to Bremsstrahlung function through framing*, Workshop “Current Themes in Holography”, NBI Copenhagen.
- 2017** *Surveying 4D SCFTs twisted on Riemann surfaces*, GGI Workshop “New Developments in AdS₃? CFT₂”, Florence, Italy.
- 2017** *Puzzles in 3D Chern-Simons-matter theories*, International Conference on “String Theory and Quantum Gravity”, Ascona, Switzerland and Workshop “Topological solitons, Nonperturbative Gauge Dynamics and Confinement”, Pisa, Italy
- 2018** *ABJM theory: A Matrix Model for latitude Wilson loops*, Surrey University, UK.
- 2019** “*A Galilean Wess-Zumino model in three dimensions*”
Workshop “Topological solitons, Nonperturbative Gauge Dynamics and Confinement 2”, July 18-20 2019, Pisa, Italy
- 2019** “*BPS Wilson loop in AdS₄/CFT₃*”
Workshop “Boundaries and defects in Quantum Field Theory”, August 6-9 2019, Perimeter Institute, Waterloo (Canada)
- 2019** *BPS Wilson loops in AdS₄/CFT₃*
Workshop “Exact computations in AdS/CFT”, August 19-30 2019, CERN (Geneve)
- 2019** “*Wilson line defects in ABJM theory*”
Workshop “Challenges in Theoretical High-Energy Physics”, September 23-27 2019, Nordita (Stockholm)

11 REFEREE EXPERIENCE

I regularly review papers for the following International Journals:

- JHEP (Journal of High Energy Physics)
- Nuclear Physics B
- Physics Letters B
- Int. J. Mod. Phys.
- Jour. Phys. A: Math. Theor.
- Jour. Phys. G: Nuclear and Particle Physics
- Class. Quant. Gravity
- Physical Review D

- Physical Review Letters
- Letters in Mathematical Physics

Moreover, I act regularly as external referee for the following projects:

- ERC Grants
- COST Actions
- ARC Grants (Australian Research Council)
- FWO Grants (Research Foundation - Flanders)
- Italian FIRB Grants

I have acted as referee for the Italian VQR 2011-2014 (National Evaluation of research products)

12 SCIENTIFIC ACTIVITY

My research activity develops in the area of theoretical high energy particle physics. It is mainly focused on string theory, supersymmetric quantum field theory applied to the study of the fundamental interactions and continuum statistical models.

String theory is one of the most promising candidates for a fundamental, microscopic theory of Nature. In fact, it provides a consistent description of quantum gravity and black holes, it contains the standard model of particle physics as an effective low energy theory and allows for possible (supersymmetric and higher dimensional) extensions of the standard model beyond the electroweak scale, so giving a possible explanation to the hierarchy problem and to the unification of the fundamental interactions.

In the last decade, one of the main products of string theory has been the AdS/CFT correspondence. The correspondence states that a quantum field theory describing interacting particles in strong coupling regime in d dimensions is equivalent to a weakly coupled gravity (or string) theory in $(d+1)$ dimensions. This opens the possibility to use string theory for modeling strongly coupled systems via an holographic perturbative description, in many areas of physics. Applications in particle physics point towards the direction of understanding QCD confinement and quark-gluon plasma phase transition, while applications have been recently attempted in condensed matter systems where a quantum critical point is present (high-T superconductors, superfluids etc..).

In the past, important results have been obtained in the area of (supersymmetric and non-supersymmetric) two dimensional Conformal Field Theories, Integrable models, Theories with boundaries which describe statistical models with defects, Topological theories, Nonlinear sigma models. Very important results have been obtained for the quantization of the extended supersymmetric spinning particle and its connections with string theory (two papers, one topcite 100 and one topcite 50).

The main topics of my recent research activity are:

- AdS/CFT correspondence: In order to prove the correspondence, there are a number of tests which can be performed on the predictions coming from the dual gravity theory on some quantities of physical interest of the corresponding 4d field theory (correlation functions and anomalous dimensions of composite operators). Main results have been obtained by performing some of these tests from the field theory side.

It is important to extend the correspondence beyond its original formulation which predicts a dual gravity description only for supersymmetric conformal field theories. My main contributions in this direction concern the study of deformations of the correspondence which partially or totally breaking of supersymmetry.

- AdS/Chern–Simons correspondence: AdS/CFT correspondence can be formulated in different dimensions. When studying AdS solutions of gravity in four dimensions we obtain a dual description of a supersymmetric three dimensional Chern–Simons theory. The study of these models are motivated by the attempt to increase our knowledge on the correspondence and its range of applications, but also by the direct attempt to apply it to condensed matter systems. Within this context, my main results are the determination of the complete spectrum of conformal fixed points which should have a dual gravity description and the study of their properties under renormalization group flows.

- Non(anti)commutative Quantum Field Theories: In one of its phases, string theory gives rise at low energies to non(anti)commutative fields theories, that is theories defined on (super)spaces with non(anti)commuting bosonic or spinorial coordinates. A crucial contribution has been given in this context with the formulation of the nonanticommutative superspace. Our paper has been the inspiring paper which has opened the interest in this subject.

I have developed a systematic investigation of nonanticommutative theories at quantum level. Since nonanticommutativity partially breaks supersymmetry it is not an easy task to formulate theories which are renormalizable. I have found various classes of renormalizable theories which are nontrivial generalizations of ordinary theories of some physical interest (WZ model, Yang–Mills theories).

- Scattering amplitudes and Wilson loops in 3D: An important realization of the AdS/CFT correspondence is the one that involves a three dimensional N=6 supersymmetric Chern-Simons-matter theory, the so-called Aharony-Bergman-Jafferis-Maldacena theory, which is dual to M-theory on the $\text{AdS}_4 \times S^7/Z_k$ background or type IIA string theory on $\text{AdS}_4 \times \text{CP}^3$. This duality, not only allows to describe the 3D field theory at strong coupling with far-reaching applications to condensed matter, but it also opens the possibility to describe 4D quantum gravity in terms of a 3D weakly coupled theory. In this context I have investigated renormalizability properties of the ABJM theory, its fixed points and the RG trajectories, as well as the stability of IR fixed points. The main finding is the existence of RG trajectories that are globally stable but locally unstable.

My activity has been also devoted to the study of scattering amplitudes in ABJM theory, correlation functions of composite operators and light-like Wilson loops. The main results concern the discovery of a duality relation between scattering amplitudes, correlation functions and light-like Wilson loops already discussed by other authors for 4D N=4 SYM theory. Our results are the proof that also in the three dimensional formulation of the AdS/CFT correspondence there is an integrability structure emerging in the on-shell sector of the field theory. This supports the conjecture that integrability is a deep property of the correspondence, which is independent of its particular realization. i

- Supersymmetric Wilson loops in the AdS/CFT correspondence: A systematic study of supersymmetric (BPS) Wilson loops has been undertaken for $N > 2$ supersymmetric Chern-Simons-matter theories in 3D. These operators are in general non-protected and undergo a non-trivial RG flow between strong and weak coupling. They have a holographic description at strong coupling in terms of string or M2 brane configurations. Moreover, since localization techniques can be used for computing them exactly at quantum level and at finite couplings, they can be used for highly non-trivial checks of the AdS/CFT correspondence. Finally, these operators have important relations with physical quantities like cusp anomalous dimensions and Bremsstrahlung functions, which can be also computed using integrability techniques (TBA equations). Therefore, they belong to the set of non-trivial quantities that can be exploited to dig out integrability from the correspondence.

My main results in this context are: study, computation and physical interpretation of framing factors (topological phases rigging in 3D Wilson loops); general classification of parametric BPS Wilson loops in N=6 and N=4 supersymmetric Chern-Simons-matter theories through a Higgsing mechanism; Determination of the corresponding M2-brane dual configurations. Definition and study of BPS Wilson loops depending on a "latitude" parameter; Exact prescription for computing the Bremsstrahlung function in terms of latitude Wilson loops; Perturbative checks up to three loops; Matrix Model that computes exactly latitude Wilson loops and the Bremsstrahlung function.

- Fermionic T-duality: Within the context of the AdS/CFT correspondence, duality properties of the string model translate into duality properties of the corresponding conformal field theory. The most striking example is the self-duality of the type IIB string on $\text{AdS}_5 \times S^5$ background under a combination of bosonic and fermionic T-dualities that explains the identity between scattering amplitudes and light-like Wilson loops in N=4 super Yang-Mills theory at perturbative level, and ultimately explains the on-shell integrability of the theory. It is then important to generalize the study of such dualities to other realizations of the correspondence in different dimensions and with a different degree of supersymmetry. We have proved the self-duality of the Green-Schwarz string action on backgrounds of the form $\text{AdS}_3 \times S^3 \times T^4$, $\text{AdS}_2 \times S^2 \times T^6$, $\text{AdS}_3 \times S^3 \times S^3 \times S^1$ and $\text{AdS}_2 \times S^2 \times S^2 \times T^4$ including all degrees of freedom and without fixing kappa symmetry.
- Dimensional flows from four to two dimensions: We have performed a systematic survey of all possible two-dimensional superconformal field theories with different degree of supersymmetry obtained by partial topologically twisted reduction from superconformal field theories in four dimensions. These results contribute to the classification of all superconformal theories in two dimensions, interesting also for the $\text{AdS}_3/\text{CFT}_2$ version

of the correspondence, and can be used to better understand properties of non-lagrangian four dimensional superconformal field theories near an IR fixed point. In particular, for theories arising from the twisted compactification of four dimensional toric theories, we have found a general prescription for computing the 2d central charge as a function of the geometric properties of the toric diagram of the original 4d theory.

13 PUBLICATIONS

Please, visit the website

http://inspirehep.net/search?ln=en&p=a+penati&of=hb&action_search=Search