

## Curriculum Vitae of Marialuisa Frau

### ACADEMIC TITLES AND POSITIONS

- 1985: Laurea in Physics at the University of Torino (110/110 magna cum laude)
- 1985 – 1986: High school teacher in Mathematics and Physics
- 1987 – 1988: INFN fellow at Niels Bohr Institute (Copenhagen, DK)
- 1988 – 1990: INFN fellow at INFN, Sez. di Torino
- 1990 – 1991: Advanced NATO-CNR fellow at the Department of Physics, Brandeis University, Waltham, MA (USA)
- 1991 – 1992: Research Associate at the Laboratoire de Physique Theorique, Ecole Normale Superieure de Lyon (France)
- 1992 – 1994: High school teacher in Physics
- 1994 – 2006: Researcher at the Department of Theoretical Physics of the University of Torino
- 1994 – today: Research associate to INFN at Sezione di Torino
- 2006 – today: Associate Professor of Theoretical Physics at the Department of Physics of the University of Torino

### ACADEMIC SERVICES

- Advisor to several undergraduate and graduate students, and member of many final examination committees for Ph.D
- Member of many selection committees for post-doc and permanent positions
- Referee for the Levi-Montalcini and FIRB projects

### ORGANIZATION OF SCHOOLS AND CONFERENCES

- Member of the organizing committee of the “RTN Winter School on Strings, Supergravity and Gauge Theories” (Torino, January 7-11, 2003)
- Member of the organizing committee of the “TMR Winter School on Quantum aspects of gauge theories, supersymmetry and quantum gravity”, (Torino, January 26 – February 2, 2000)
- Member of the organizing committee of the workshop “From dual models to strings and branes”, (Torino, October 28-29, 2011)
- Chair of the organizing committee of the workshop "New Frontiers in Theoretical Physics, Cortona 2018", Cortona, May 23-26, 2018
- Member of the organizing committee of the online conference “Cortona Young”, organized by the “Galileo Galilei Institute” (May 27-29, 2020)

### GRANTS

- Principal Investigator of the research project MAST “Modern Applications of String Theory”, project of “Excellent Science” of Torino University funded by Compagnia di San Paolo (268.000 Euros) 2013-2016
- Primary coordinator of the FP7-PEOPLE-2009-IEF project n. 253534 CMADS “Condensed Matter Applications of the AdS/CFT correspondence” 2009-2011
- Local coordinator of the MIUR-PRIN contract 2015MP2CX4 “Non-perturbative Aspects of Gauge Theories and String”
- Member of the MIUR-PRIN contract 2009KHZKRX-007 “Symmetries of the Universe and of the Fundamental Interactions”
- Member of the MIUR-PRIN contract 2005023102, "Strings, D-branes and Gauge Theories"
- Member of the MIUR-PRIN contract 2003023852 project "Physics of fundamental interactions: gauge theories, gravity and strings"
- Member of the MIUR-PRIN contract 2001-1025492 project "Field Theories, Superstrings and Supergravity”
- Member of the COST EU project MP 1210 “The String Theory Universe” (workgroups

"Gauge/Gravity Duality, String Phenomenology, Gender and Outreach)

- Member of the European RTN network HPRN-CT-2000-00131 "The quantum structure of spacetime and the geometric nature of fundamental interactions"
- Member of the European TMR network project ERBFMRX-CT96-0045 "Quantum Aspects of Gauge Theories, Supersymmetry and Unification"
- Member of the SCI\*-CT92-0789 European Research Program "Gauge Theories, Applied Supersymmetry and Quantum Gravity"

#### PUBLICATIONS

Author of more than 70 papers. The complete list can be obtained from INSPIRE at the following web address:

<https://inspirehep.net/literature?sort=mostcited&size=25&page=2&q=a%20frau%2C%20m&ui-citation-summary=true>

The citations record on Inspire (as of October 2020) is:

Total number of citations 2670

h=30

#### RESEARCH ACTIVITY

The main research subjects are string theory, conformal field theory and supersymmetric field theory.

The most relevant results concern:

- String perturbation theory and multi-loop calculations in the BRST invariant operator formalism, with the construction of the the N-point and g-loop vertex  $V_{\{N,g\}}$ , which is the generator of the N-particle g-loops amplitudes, and the computation of the explicit expression of the integration measure on the moduli space of an arbitrary Riemann surface.
- The study of D-branes with the boundary state formalism, with the construction of the BRST invariant boundary states describing BPS D-branes and the proof that the D-brane classical solutions are generated by the boundary state, and the extension of this result also to the case of Non BPS D-branes.
- The gauge/gravity correspondence for non-maximally supersymmetric gauge theories, with the computation of classical solutions for systems of fractional D- branes in type II theories dual to N=2 Super Yang-Mills theories in four dimensions, and the proof that these classical solutions encode the complete perturbative quantum information about the dual gauge theories, such as the running of the coupling constant and the chiral anomaly.
- The study of non-perturbative aspects of gauge theories and instanton corrections from string theory with the description of 4-dimensional instantons of gauge theories in terms of D(-1) brane systems and the proof that the classical profile of the super-instanton and the ADHM measure on moduli space are reconstructed from the correlation functions on disks with mixed boundary conditions.

The most recent research activity concerns the study of the perturbative and non perturbative properties N=2 Super Yang-Mills theories. It has been investigated the possibility of computing exact results for the physical observables, thanks to the combined use of the S-duality property of the theory and explicit instanton calculus a la Nekrasov, even in presence of extended defects. In particular, it has been possible to compute the exact expressions for the coefficients of the mass expansion of the prepotential of various superconformal N=2 theories and the expression of the chiral superpotential induced by the presence of surface operators.