



COST

The String Theory Universe MP1210



Start date: 04/03/2013

End date: 03/03/2017

Year: 2



Silvia Penati Chair (U. Milano-Bicocca, Italy)

Yolanda Lozano vice-Chair (Oviedo U., Spain)

Scientific context and objectives

- **STRING THEORY** = Powerful mathematical FRAMEWORK where several **long-standing fundamental problems** in theoretical physics can be addressed and many **new ideas** for applications **well outside String Theory** can be formulated. The Action aims at exploring the role played by String Theory in

Particle Physics

Cosmology

Condensed Matter Physics

- **Brief reminder of MoU objectives:**
- Coordinate the research activity of different groups working in String Theory;
- Encourage knowledge transfer;
- Foster contacts with communities in broader areas of Physics;
- Promote the emergence of young talent;
- Counteract the considerable gender imbalance in String Theory;
- Promote scientific culture and motivate new generations to undertake a scientific carrier.

Scientific context and objectives

- **Research directions:**
- This Action is currently the **biggest string network** in Europe. It includes almost all the European researchers working in String Theory and related topics
(**528 members, 14% women, 47% ESR**)
- It integrates **nonCOST** countries (**Argentina, Chile, South Africa, USA**) and **CERN** (European Body).
- Annual Workshop in Bern (**interplay between all WGs**), **WG1/WG3 event** at Weizmann Inst. (Israel), **WG2 event** at Newton Inst. (Cambridge).
- A broader talk on Cosmology and their possible implications for Fundamental Physics was organized in Bern (Prof. Licia Verde, Barcelona U.). Cross-disciplinary talks in WG events.
- Interactions with other Networks (Holograv (ESF), ITN GATIS, UNIFY IRSES)

- 
- **ESR** (47% of the Action's members) benefited from the cross-disciplinary WG1/WG3 event, WG2 discussion session organized in Cambridge and educational WG1/WG3 and WG2 discussion sessions organized in Bern.

Talks: Bern: 60% ESR WIS: 32.4% ESR Cambridge: 72.2% ESR

- **27 STSM**, 89% carried out by ESR.
- **Joint Postdoctoral Recruitment meeting** (Leuven): coordinated selection procedure for postdoctoral positions.
- **WG5 activities** have been organized to discuss common politics for overcoming the considerable gender imbalance. More visibility of women scientists within the Action and in organization of events. Participation at “Career Development workshop for women in physics“, Trieste, 16-19 September 2013.
- **Outreach activities** in schools and for general public delivered locally by Action's members.

Highlight of the Action's innovative work

- New black hole solutions relevant for the dual description of strongly coupled systems, dual description of entanglement entropy, higher-spin theories, exact methods for solving integrable theories.
 - Double Field Theory, Exceptional Field Theory, F-theory compactifications useful for extensions of the Standard Model; String cosmological inflation.
 - New Black Holes solutions also relevant for the gravity/condensed matter duality; instantons and effective field theories; entanglement entropy and the spacetime structure.
- About 1000 publications in high-impact international journals
 - About 180 publications by MC members
 - About 20 publications as a result of STSMs
 - Invited talks at International Conferences worldwide
 - About 10 ERC Advanced and Ideas Grants

Working groups

WG1: Gauge/Gravity duality (291 members)



Johanna Erdmenger

(Max-Planck-Inst., München)



Anastasios Petkou

(Thessaloniki U.)

WG2: String Phenomenology (135 members)

Madrid)



Michela Petrini

(Jussieu U., Paris)



Angel Uranga

(UAM/CSIS,

WG3: Cosmology and Quantum Gravity (233 members)



Roberto Emparan

(ICREA, Barcelona)



Jan De Boer

(Amsterdam U.)

Working groups

**WG4: Cross-activities and
exchange of knowledge
(48 members)**



Anna Ceresole
(INFN-Torino)



Elias Kiritsis
(Crete U.)

**WG5: Gender issue and outreach
(31 members)**



Marian Lledo'
(Valencia U.)



Jose' Edelstein
(Santiago de Compostela U.)



Future Plans and Challenges

- **Scientific publications** in journals with peer review;
- **First Training School** for ESR and young researchers (Lisbon/Porto 14-26 July, 2014);
- **Annual Workshop** “The String Theory Universe” (Mainz 22-26 September, 2014);
- **WGs activities:** String Conference at GGI-Florence, WG1/WG3 activity at Paris 7 U. “Holographic Renormalization Group and Entanglement”, WG2 activity at Max Planck Inst-Munich “Physics and Geometry of F-theory” ;
- Participation at the **“Gender Summit 2014”**, June 30- July 1, 2014;
- **Joint Postdoctoral Recruitment meeting** (Leuven, December 16-17, 2014);



Future Plans and Challenges

- **STSM** primarily devoted to young researchers;
- Organization of **joint seminars** available on the Action webpage;
- Creation of a **scientific forum** on the webpage for ESR and young researchers;
- Creation of a **public forum** on the webpage primarily devoted to scientific questions and gender issue;
- More involvement of women scientists at all levels;
- Interactions with Actions MP1006, Fundamental Problems in Quantum Physics, and MP1209, Thermodynamics in the Quantum Regime.