# Science Meeting – Scientific Report

**The scientific report (WORD or PDF file - maximum of seven A4 pages) should be submitted online within two months of the event. It will be published on the ESF website.**

***Proposal Title:***

***Application Reference N°:*** 5175

## 1) Summary (up to one page)

The conference covered wide range of subjects in quantum field theory, string theory and statistical mechanics. Topics will include Gauge-String Duality, AdS/CFT correspondence, Integrability Supersymmetric Field Theories, Conformal Field Theory, Disordered Systems, Random Matrices

## 2) Description of the scientific content of and discussions at the event (up to four pages)

V.Kazakov (ENS) and I.Kostov (Sacley) are very influential mathematical physicists of their generation. Their work has a lot of common threads, and has spurred immense activity worldwide, that continues to this day. They are about to turn 60, and we believe this is a perfect opportunity to honor their contributions, and learn about the most recent developments they have inspired.

V.Kazakov is a quantum field theorist with ground-breaking contributions to numerous areas of theoretical physics. He is one of the creators and world expert in the subject of matrix models, a field with far reaching applications from nuclear physics to non-abelian gauge theories. To name a few impressive examples, he solved the 2D Ising model on a random lattice, found the first example of an exactly solvable string theory with the help of matrix models, and found the equation that govern non-perturbative spectrum of super-Yang-Mills theory in four dimensions. V.Kazakov is among the key figures in the subject of integrability in the AdS/CFT correspondence. His work has set the directions that this field has followed in recent years.

I.Kostov showed how random fluctuation surfaces with or without coupled matter could be discretized in terms of matrix models. He introduced and solved various statistical

models on random surfaces, which contribute the basis of the discretized approach to the 2D gravity. These methods were used to find critical exponents of polymers on random lattices. The discretized approach proved to be particularly powerful in studying the boundary critical phenomena. He solved c-1 string in terms of Matrix Quantum Mechanics in the black hole background. Recently he has made important contributions to integrability in gauge and string theory.

The broadness and the importance of the speakers contributions is reflected in their talk titles. The slides are available in the open access on the specially created web page of the conference (http://www.nordita.org/~zarembo/Paris2014/index.html).

**Sergey Alexandrov:** Calabi-Yau compactifications: results, relations and problems pdf pps
**Niklas Beisert:** Metastable Spinning Strings pdf
**Eldad Bettelheim:** Large N Limit of Bethe Ansatz Wavefunction Overlaps pdf
**Michael Douglas:** Matrix models, the double scaling limit, and multivariate statistics pdf
**Gregory Falkovich:** Operator product expansion and symmetries of turbulence pptx
**Nikolay Gromov:** QCD Pomeron from AdS/CFT Quantum Spectral Curve pptx
**Sergey Gukov:** A new exactly solvable model of confinement
**Jens Hoppe:** Noncommutative Surfaces
**Gregory Korchemsky:** Energy-energy correlations: integrability meets experiment pdf
**David Kutasov:** ADE matrix models in Four Dimensional QFT pdf pptx
**Andrey Marshakov:** Quiver gauge theories and 2d CFT pdf
**Alexander Migdal:** Two Complementary Schools of Thought
**Andrei Okounkov:** Membranes, sheaves, strings, and matrices
**Hubert Saleur:** Exact overlaps in the Kondo problem pdf
**Nathan Seiberg:** Generalized Global Symmetries pdf
**Stephen Shenker:** Holographic Chaos pdf
**Matthias Staudacher:** Scattering Amplitudes, Graßmannian Matrix Models, and Integrability pdf
**Ivan Todorov:** A mathematical physicist's view on perturbative QFT
**Anton Zabrodin:** Classical-Quantum "Duality" of Integrable Models pdf

## 3) Assessment of the results and impact of the event on the future directions of the field (up to two pages)

The focus of the workshop was on scientific exchange and on feedback on the draft papers and recently published papers. The scientific program of the workshop meeting was based on intensive talks sessions followed by question of the participants. The talks were presented by the leading experts in the modern theoretical and mathematical physics with diverse background. This format allows for an efficient dissemination of the participants results. Broadness of the interests of the participants may lead to many fruitful interdisciplinary results in the future.

Materials of the conference are collected on the web-page (http://www.nordita.org/~zarembo/Paris2014/index.html) in free access. Height quality slides available online are crucial for the young researchers to structure their own thoughts into height quality talks.

## 4) Annexes 4a) and 4b): Programme of the meeting and full list of speakers and participants

### Annex 4a: Programme of the meeting

| | Monday, August 18<br>École Normale Supérieure<br>Salle 236 | Tuesday, August 19<br>École Normale Supérieure<br>Salle 236 | Wednesday, August 20<br>École Normale Supérieure<br>Salle 236 |
|---|---|---|---|
| 9:45-10:00 | **Brezin** | | |
| 10:00-10:45 | **Shenker** | **Falkovich** | **Todorov** |
| 10:45-11:15 | Coffee | Coffee | Coffee |
| 11:15-12:00 | **Gukov** | **Bettelheim** | **Okounkov** |
| 12:00-12:45 | **Alexandrov** | **Douglas** | **Korchemsky** |
| 12:45-15:00 | Lunch | Lunch | Lunch |
| 15:00-15:45 | **Gromov** | **Kutasov** | **Marshakov** |
| 15:45-16:30 | **Staudacher** | **Beisert** | **Zabrodin** |
| 16:30-17:00 | Coffee | Coffee | **Migdal** |
| 17:00-17:45 | **Saleur** | **Seiberg** | |
| 17:45-18:30 | **Hoppe** | | |
| 19:00 | | Conference Dinner | |
| | | (Montparnasse 1900) | |
| | | **Registration required** | |

### Annex 4b: Full list of speakers and participants

**Speakers:**

Sergey Alexandrov
Niklas Beisert
Eldad Bettelheim
Michael Douglas
Gregory Falkovich
Nikolay Gromov
Sergey Gukov
Jens Hoppe
Gregory Korchemsky
David Kutasov
Andrey Marshakov
Alexander Migdal
Andrei Okounkov
Hubert Saleur
Nathan Seiberg
Stephen Shenker
Matthias Staudacher
Ivan Todorov
Anton Zabrodin

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