

Final Report for ESF on Physics-Mathematics Summer Institute

Cargèse (Corsica-France)
4-16 July 2011

Summary

The interdisciplinary Physics-Mathematics Summer Institute brought together experts in the mathematical and physical aspects of affine and double affine Hecke algebras, the Langlands program, affine flag varieties, conformal field theory, super Yang-Mills theory and the AdS-CFT correspondence.

This present report covers the second half of the program, which was held in Cargèse. More specifically, it was focused on conformal field theory, super Yang-Mills theory and the AdS/CFT correspondence, and the ESF was one of the main sources of funding for this event.

The first part of the conference which took place in Luminy, and the second part which was in Cargèse (which the current report is dedicated to), were both recognised by all participants as an outstanding interdisciplinary event that is expected to have a lasting effect in these areas of mathematics and physics. The conference greatly stimulated the search for new directions of research and reinforce the cooperation between the physicists and mathematicians often working on the related problems. The whole program attracted about 140 leading specialists (69 only for the Cargèse part) in these and neighbouring fields including many junior investigators; 52 participants (38%) were from the USA, 38(28%) from France, 9(7%) from Canada and several other participants came from 10 other countries.

Out of 69 participants of the conference, 5 were women, mathematicians and physicists, Louise Dolan (speaker), Natalia Saulina (speaker), Marie-France Vigneras; Didina Serban (an organiser), Chiara Nappi. Quite a few leading specialists came without talks.

The participants greatly appreciated the format, the excellent scientific quality of the conference, a broad and at the same time detailed exposition of various topics and a very good general organisation of the meeting. Our webpage <http://www.mathphys.info/> was very important for the success of the conference; it was appreciated by the participants, especially the overview [mathphys.info/overview.html](http://www.mathphys.info/overview.html), which contains a brief (but nevertheless sufficiently

comprehensive) scientific description of the topics of the conference and the related directions.

A part of the ESF support was used for the secretary and the webpage support. The organisers decided against publishing the proceedings of the conference.

Scientific Content

Among the speakers, there were the world experts in their areas, such as E. Witten (Fields medal, specialist in string theory and knot theory), A. Okounkov (Fields medal, specialist in enumeration theory and integrability), V. Kac (specialist in algebra and group theory), A. Tseytlin (specialist in string theory), P. Wiegmann (specialist in applications of integrability to solid state physics), etc. Their talks contained not only the reviews of the state of art in their field of interests but also freshly obtained results, sometimes prior to publication.

The areas of AHA-DAHA (affine and double affine Hecke algebras), the Langlands Program, p-adic (LP) and geometric (LG), CFT (conformal field theory) and SYM (super Yang-Mills theory) are certainly among the most active areas of current research in mathematics and physics. They are so deeply interconnected that experts in one of these fields need to monitor constantly the progress in the others; our conference has provided a great opportunity for that.

Meeting program

	9h45- 10h45	11h-12h	14h-15h	15h15-16h
Tues 5 July	S. Shatashvili	A. Kapustin	V. Kac	B. Eynard
Wed 6 July	E. Witten	B. Dubrovin	D. Bernard	V. Schomerus
Thu 7 July	A. Okounkov	N. Gromov	L. Dolan	M. Staudacher
Fri 8 July	E. Witten	S. Gukov	J. Teschner	G. Arutyunov
Mon 11 July	K. Zarembo	A. Tseytlin	R. Janik	N. Drikker
Tue 12 July	E. Sokatchev	G. Kormchemsky	P. Vieira	
Wed 13	I. Krichever	P. Wiegmann	P. Pearce	F. Smirnov
Thur 14	N. Saulina	S. Giombi	S. Alexandrov	T. Okuda
Fri 15	I. Kostov	V. Pasquier	K. Sakai	A. Schwarz