

Isaac Newton Institute for Mathematical Sciences

Representation of Surface Groups and Higgs Bundles

A Satellite Meeting at the Mathematical Institute, University of
Oxford

14 - 18 March 2011

Organisers: Professor O García-Prada (*CSIC, Madrid*), Professor W Goldman (*Maryland*),
Professor PE Newstead (*Liverpool*), Dr T Hausel (*Oxford*) and Professor N Hitchin (*Oxford*)

SCIENTIFIC REPORT

The workshop was a satellite meeting of the semester on Moduli Spaces taking place at the Isaac Newton Institute for Mathematical Sciences in Cambridge during 4 January–1 July 2011, organized by P Newstead (Liverpool), L Brambila-Paz (CIMAT, Mexico), O Garcia-Prada (CSIC, Spain) and R Thomas (Imperial College London).

The workshop concentrated on the relationship of moduli spaces to topology, Teichmüller theory and hyperbolic geometry - this relationship takes place in the study of representations of a surface group in a real Lie group and involves Higgs bundle theory, bounded cohomology, Anosov systems, cluster varieties, tropical algebraic geometry; there is a very rich geometric structure and the various points of view are complementary, the relationship between them yet to be understood. This is one of the main topics of the ITGP Network.

The meeting covered topics such as the topology of moduli spaces of Higgs bundles and representation varieties, Anosov representations and generalized Teichmüller spaces, convexity properties of energy on Teichmüller space, Donaldson–Thomas invariants, Local rigidity for complex hyperbolic lattices, topological quantum field theory, irregular connections, parabolic bundles, etc.

The meeting was a real success. The list of speakers included many of the main experts in the field and the talks were of the highest quality. There was a lot of interaction and discussion about the various points of view. There was a significant number of research students and postdoctoral researches that benefited from the event. Many of the participants will have the opportunity to continue making progress in extended activities on the subject that will take place at the Institut Henri Poincaré in Paris (January–March 2012) and the Centre de Recerca Matemàtica in Barcelona (March–June 2012).

We should add that the support giving by the Isaac Newton Institute as well as the Mathematical Institute and Wadham in Oxford made the conditions of the meeting ideal.

**Representations of Surface Groups and Higgs Bundles (A Satellite Meeting at the University of Oxford)
14-18 March 2011**

Name	Subsistence	Sponsor	Travel	Sponsor	
Andersen, JE	£545.00	LMS	£452.98	LMS	Speaker
Boalch, P	£545.00	ITGP	£229.93	ITGP	Speaker
Bradlow, S	£545.00	INI			Speaker
Brambila-Paz, GL	£545.00	INI			
Burger, M	£546.00	ITGP	£310.17	ITGP	Speaker
Choi, K	£545.00	LEVERHULME			Speaker
Choi, S	£545.00	LMS			Speaker
Daskalopoulos, G	£545.00	NSF			
Diaconescu, DE	£545.00	INI	£52.58	INI	Speaker
Eyssidieux, P	£545.00	INI	£200.00	INI	Speaker
Fantechi, B	£545.00	INI			
Florentino, CAA	£545.00	INI			Speaker
Franco Gómez, E	£545.00	ITGP	£170.00	ITGP	
Gama Oliveira, A	£545.00	INI			
García-Prada, O	£545.00	INI			Organiser
Goldman, W	£545.00	INI	£100.00	INI	Organiser
Groechenig, M	£200.00	ITGP			
Guichard, OC	£545.00	INI	£173.58	INI	Speaker
Gunningham, STP	£545.00	NSF			
Hausel, T	£200.00	INI			Organiser
Heinloth, J	£545.00	INI			Speaker
Heller, S	£545.00	ITGP			
Hernandez-Lamonedá, L	£545.00	INI			
Hitchin, N	£200.00	INI			Organiser
Ho, NK	£0.00	Self-supported			
Iozzi, A	£545.00	LMS	£386.17	LMS	Speaker
Klingler, B	£545.00	ITGP	£242.97	ITGP	Speaker
Labourie, F	£545.00	INI	£200.00	INI	Speaker
Lange, H	£545.00	INI			
Lawton, SD	£545.00	NSF			
Lawton, SD	£0.00		£100.00	INI	
Le, I	£545.00	NSF			
Lee, G-S	£545.00	INI			
Logares, M	£545.00	ITGP	£146.17	ITGP	
Mandini, A	£545.00	ITGP			
Martens, J	£545.00	ITGP			
Mase, M	£0.00	Self-supported			
Meir Ben Efraim, E	£545.00	INI			
Mozgovoy, S	£200.00	ITGP			
Mundet i Riera, I	£545.00	INI			
Newstead, PE	£545.00	INI			Organiser
Ott, AMJ	£545.00	INI			
Pantev, T	£545.00	INI			Speaker
Peón Nieto, A	£545.00	ITGP	£34.60	ITGP	
Rayan, S	£200.00	ITGP			
Roeser, MK	£200.00	ITGP			
Romao, N	£545.00	ITGP			
Rubio, R	£200.00	ITGP			
Schaffhauser, FMR	£545.00	INI			
Schaposnik Massolo, LP	£200.00	ITGP			
Serman, O	£545.00	ITGP			
Sikander, S	£545.00	ITGP			
Simpson, C	£545.00	INI	£76.85	INI	Speaker
Streater, R	£300.00	ITGP			
Sutherland, TA	£200.00	ITGP			
Szabo, S	£545.00	ITGP			
Szenes, A	£545.00	INI	£40.00	INI	
Tanaka, H	£545.00	NSF			
Toledo, D	£545.00	INI	£100.00	INI	Speaker
Wentworth, R	£545.00	INI	£100.00	INI	Speaker
Wilkin, G	£545.00	NSF			
Zamora Saiz, A	£545.00	ITGP	£150.00	ITGP	

Representations of surface groups and Higgs Bundles

14-18 March

Timetable

09:00-09:55	Registration at Mathematical Institute
09:55-10:00	Welcome
10:00-11:00	Bradlow, S (<i>Illinois at Urbana-Champaign</i>) Higgs bundles and surface group representations in non-compact real groups
11:00-11:30	Morning Coffee at Mathematical Institute
11:30-12:30	Mundet i Riera, I (<i>Barcelona</i>) Generalizations of parabolic bundles related to Higgs bundles
13:00-14:00	Lunch served at Wadham College
14:00-15:00	Free time
15:00-16:00	Labourie, F (<i>Paris-Sud 11</i>) An Algebra of Observables for Cross Ratios
16:00-16:30	Afternoon Tea at Mathematical Institute
16:30-17:30	Florentino, C (<i>Técnica de Lisboa</i>) Topology and singularities of free group character varieties
17:45-18:30	Wine reception at Mathematical Institute
10:00-11:00	Diaconescu, E (<i>Rutgers</i>) BPS states, Donaldson-Thomas invariants, and Hitchin pairs
11:00-11:30	Morning Coffee at Mathematical Institute
11:30-12:30	Pantev, T (<i>Pennsylvania</i>) Self-duality of of reducible $GL(n)$ Hitchin fibers
13:00-14:00	Lunch served at Wadham College
14:00-15:00	Free time
15:00-16:00	Heinloth, J (<i>Amsterdam</i>) On the motives of moduli spaces of Higgs bundles
16:00-16:30	Afternoon Tea at Mathematical Institute
16:30-17:30	Wentworth, R (<i>Maryland</i>) Topology of some representation varieties of surface groups
10:00-11:00	Guichard, O (<i>Paris-Sud 11</i>) Domains of Discontinuity for Anosov Representations and Generalized Teichmüller Spaces

11:00-11:30	Morning Coffee at Mathematical Institute
11:30-12:30	Toledo, D (<i>Utah</i>) Convexity Properties of Energy on Teichmüller Space
13:00-14:00	Lunch served at Wadham College
14:00-15:00	Free time
15:00-16:00	Klingler, B (<i>Institut de mathématiques de Jussieu</i>) Local rigidity for complex hyperbolic lattices
16:00-16:30	Afternoon Tea at Mathematical Institute
16:30-17:30	Eyssidieux, P (<i>CNRS</i>) Linear coverings of complex projective manifolds
10:00-11:00	Iozzi, A (<i>ETH Zürich</i>) Surfaces and bounded cohomology
11:00-11:30	Morning Coffee at Mathematical Institute
11:30-12:30	Burger, M (<i>ETH Zürich</i>) Causal representations of surface groups
13:00-14:00	Lunch served at Wadham College
14:00-15:00	Free time
15:00-16:00	Andersen, JE (<i>Aarhus</i>) Asymptotics in TQFT
16:00-16:30	Afternoon Tea at Mathematical Institute
16:30-17:30	Choi, S; Choi, K (<i>Korea Advanced Institute of Science and Technology</i>) Deforming convex real projective 3-orbifolds
18:45-19:30	Wine reception at Wadham College (sponsored by Oxford University Press)
19:30-21:00	Conference dinner at Wadham College
10:00-11:00	Boalch, P (<i>ENS</i>) Irregular connections, Dynkin diagrams and fission
11:00-11:30	Morning Coffee at Mathematical Institute
11:30-12:30	Simpson, C (<i>Nice Sophia Antipolis</i>) Fibrations on the moduli of parabolic connections on P^1 minus 4 points
13:00-14:00	Lunch served at Wadham College
14:00-17:30	Free afternoon

Representations of surface groups and Higgs Bundles

14-18 March

Name	Home Institution	Period	Nationality	Co of Res.	Sex	Age
Andersen, JE	Aarhus Universitet	13 Mar - 19 Mar		Denmark	M	-
Boalch, P	École Normale Supérieure	13 Mar - 18 Mar		France	M	-
Bradlow, S	University of Illinois at Urbana-Champaign	13 Mar - 19 Mar	USA	USA	M	54
Brambila-Paz, GL	Centro de Investigación en Matemáticas	13 Mar - 19 Mar	Mexico	Mexico	F	58
Burger, M	ETH Zürich	14 Mar - 19 Mar	Switzerland	Switzerland	M	52
Choi, K	Korea Advanced Institute of Science and Technology (KAIST)	13 Mar - 19 Mar	Korea, Republic Of	Korea, Republic Of	M	29
Choi, S	Korea Advanced Institute of Science and Technology (KAIST)	13 Mar - 19 Mar	Korea, Republic Of	Korea, Republic Of	M	48
Daskalopoulos, G	Brown University	13 Mar - 19 Mar	Greece	USA	M	48
Diaconescu, DE	Rutgers, The State University of New Jersey	13 Mar - 19 Mar		USA		-
Eyssidieux, P	CNRS (Centre national de la recherche scientifique)	13 Mar - 19 Mar	France	France	M	42
Fantechi, B	SISSA	13 Mar - 19 Mar	Italy	Italy	F	45
Florentino, CAA	Universidade Técnica de Lisboa	13 Mar - 19 Mar	Portugal	Portugal	M	43
Franco Gómez, E	ICMAT	13 Mar - 19 Mar	Spain	Spain	M	28
Gama Oliveira, A	University of Trás-os-Montes and Alto Douro	13 Mar - 19 Mar	Portugal	Portugal	M	35
García-Prada, O	Consejo Superior de Investigaciones Científicas	13 Mar - 19 Mar	Spain	Spain	M	51
Goldman, W	University of Maryland	13 Mar - 19 Mar	USA	USA	M	56
Groechenig, M	University of Oxford	14 Mar - 18 Mar	Austria	United Kingdom	M	23
Guichard, OC	Université Paris-Sud 11	14 Mar - 18 Mar	France	France	M	34
Gunningham, STP	Northwestern University	13 Mar - 19 Mar	United Kingdom	USA	M	25
Hausel, T	University of Oxford	14 Mar - 18 Mar		United Kingdom		-
Heinloth, J	Universiteit van Amsterdam	13 Mar - 19 Mar	Germany	Netherlands	M	38
Heller, S	Universität Tübingen	13 Mar - 19 Mar	Germany	Germany	M	30
Hernandez-Lamonedá, L	CIMAT (Centro de Investigación en Matemáticas), Mexico	13 Mar - 18 Mar	Mexico	Mexico	M	52
Hitchin, N	University of Oxford	14 Mar - 18 Mar		United Kingdom	M	-
Ho, NK	National Tsing Hua University	13 Mar - 19 Mar	Canada	Taiwan	F	36
Iozzi, A	ETH Zürich	14 Mar - 19 Mar	Italy	Switzerland	F	52
Klingler, B	Institut de mathématiques de Jussieu	13 Mar - 19 Mar	France	France	M	41
Labourie, F	Université Paris-Sud 11	13 Mar - 18 Mar				-
Lange, H	Universität Erlangen-Nürnberg	13 Mar - 19 Mar	Germany	Germany	M	68
Lawton, SD	University of Texas-Pan American	13 Mar - 19 Mar	USA	USA	M	35
Le, I	Northwestern University	13 Mar - 18 Mar	USA	USA	M	28
Lee, G-S	Seoul National University	13 Mar - 19 Mar	Korea, Republic Of	Korea, Republic Of	M	31
Logares, M	ICMAT	13 Mar - 19 Mar	Spain	Spain	F	35
Mandini, A	Universidade Técnica de Lisboa	13 Mar - 19 Mar	Italy	Portugal	F	32
Martens, J	Aarhus Universitet	13 Mar - 19 Mar	Belgium	Denmark	M	34
Mase, M	Tokyo Metropolitan University	14 Mar - 18 Mar	Japan	Japan	F	26
Meir Ben Efraim, E	Technion - Israel Institute of Technology	13 Mar - 19 Mar	Israel	Israel	M	26
Mozgovoy, S	University of Oxford	14 Mar - 18 Mar	Ukraine	United Kingdom	M	32
Mundet i Riera, I	Universitat de Barcelona	13 Mar - 19 Mar	Spain	Spain	M	38
Newstead, PE	University of Liverpool	13 Mar - 19 Mar	United Kingdom	United Kingdom	M	70
Ott, AMJ	IHES	13 Mar - 19 Mar	Germany	France	M	32
Pantev, T	University of Pennsylvania	13 Mar - 19 Mar	USA	USA	M	48
Peón Nieto, A	Consejo Superior de Investigaciones Científicas	13 Mar - 19 Mar	Spain	Spain	F	28
Rayan, S	University of Oxford	14 Mar - 18 Mar	Canada	United Kingdom	M	28
Roeser, MK	University of Oxford	14 Mar - 18 Mar	Germany	United Kingdom	M	27
Romao, N	Universitat de Barcelona	13 Mar - 18 Mar	Portugal	Spain	M	40
Rubio, R	University of Oxford	14 Mar - 18 Mar	Spain	United Kingdom	M	29
Schaffhauser, FMR	Universidad de los Andes	13 Mar - 19 Mar	France	Colombia	M	32
Schaposnik Massolo, LP	University of Oxford	14 Mar - 18 Mar	Argentina	United Kingdom	F	26
Serman, O	Université des Sciences et Technologies de Lille	13 Mar - 19 Mar	France	France	M	30
Sikander, S	Aarhus Universitet	13 Mar - 19 Mar	Pakistan	Denmark	M	25
Simpson, C	Université de Nice Sophia Antipolis	13 Mar - 19 Mar		France	M	-
Streater, R	King's College London	13 Mar - 19 Mar	United Kingdom	United Kingdom	M	75
Sutherland, TA	University of Oxford	14 Mar - 18 Mar	United Kingdom	United Kingdom	M	25
Szabo, S	Budapest University of Technology and Economics	15 Mar - 18 Mar	Hungary	Hungary	M	35
Szenes, A	Université de Genève	13 Mar - 19 Mar	Hungary	Switzerland	M	46
Tanaka, H	Northwestern University	13 Mar - 18 Mar	Japan	USA	M	25
Toledo, D	University of Utah	13 Mar - 19 Mar	USA	USA	M	66
Wentworth, R	University of Maryland	13 Mar - 18 Mar		USA		-
Wilkin, G	University of Colorado	13 Mar - 19 Mar	Australia	USA	M	36
Zamora Saiz, A	ICMAT-CSIC	13 Mar - 19 Mar	Spain	Spain	M	26