SHORT VISIT GRANT PROPOSAL

Luca Stefanini

Poisson groupoid actions and integrable systems

Poisson-Nijenhuis manifolds were introduced by Magri and Morosi in [3] and constitute a geometric facet of Gel'fand and Dorfman's algebraic approach to integrable systems [1]. There exist a huge number of bi-Hamiltonian systems arising from Poisson-Nijenhuis manifolds. The characterization of Poisson-Nijenhuis manifolds in terms of Lie bialgebroids given by Kosmann-Schwarzbach in [2] allows to borrow Lie theoretic techniques to study the complete integrability of the associated dynamical systems; in particular, the study modular classes of Poisson manifolds and Lie algebroids has recently led to a better understanding of the geometry of some integrable hierarchies, thanks to the work of various authors.

In my recent work I used Kosmann-Schwarzbach's description to obtain a reduction result for Poisson-Nijenhuis manifolds under compatible actions as general as those of Poisson groupoids. Other reduction procedures have been studied earlier by Vaisman [4] and Magri et alia and represent a powerful method to the study of complete integrability.

The aim of my visit to SISSA is to discuss with Prof. Dubrovin and the members of his research group in order to investigate the chance of applying the reduction under Poisson groupoid actions to infinite dimensional integrable systems; Prof. Pedroni is an expert on integrable systems associated with Poisson-Nijenhuis manifold, the aim of my visit to Dalmine is to discuss special examples arising in that contest.
I recently got interested to symplectic field theory; I also hope to learn more on this fascinating subject during my visit at SISSA.

Biographical: *Citizenship*: Italy
Born: 09/05/1978 in Bergamo (Italy)
Languages: Italian: native
English: fluent
German: intermediate
Spanish: beginner

Eucation: UNIVERSITY OF ZÜRICH; Zürich, Switzerland.
Position: Ph.D. student in Mathematics (since March 2003),
and teaching assistant (since March 2003),
Advisor: Prof. Alberto S. Cattaneo,
Ph.D. Thesis: Succesfully defended on 17. 03. 2008

UNIVERSITY OF PAVIA; Pavia, Italy.
Laurea in Theoretical Physics, September 2002.
Advisor: Chiar.mo Prof. Mauro Carfora,
Chair of committee: Prof.sa Annalisa Marzuoli,
Score: 110/110 cum laude (top score).

LICEO SCIENTIFICO
LORENZO MASCHERONI; Bergamo, Italy.
Maturita' Scientifica, July 1997.
Score: 60/60 cum laude (top score).

Research interests: My fields of interest include mathematical physics, Lie theory for Lie groupoids - Lie algebroids and double Lie structures, symplectic and Poisson geometry. I have recently gotten interested in integrable systems.

Research Papers: (inverse chronological)

Luca Stefanini,
Integration of quotient Poisson Bivectors;
In preparation;

Luca Stefanini,
Integrability and reduction of Poisson group actions;
Submitted for publication. Preprint: arXiv:0710.5753;

Luca Stefanini,
On the integration of $\mathcal{LA}$-groupoids and duality for Poisson groupoids;
Accepted for publication. Preprint: arXiv:math.DG/0701231;

Invited Talks:		
What is ... a Moment(um) Map?	Planned for May 06 2008	
ETH-Zentrum Zürich, Switzerland,		
Graduate colloquium;		
Integration of Quotient Poisson Bivectors	February 22 2008	
ETH-Hönggerberg Zürich, Switzerland,		
Winter meeting in mathematical physics;		
On the Integration of $\mathcal{LA}$-groupoids	May 16 2006	
University of Sheffield, U.K.;		
The Double of a Poisson Groupoid	February 22 2006	
Penn State University, U.S.A.,		
Mathematical Physics Seminar.		

Invited visits:		
Prof. Ping Xu,		
Penn State University, U.S.A.,	18-28 February 2006	
Prof. K. C. H. Mackenzie,		
University of Sheffield, U.K.,	14-21 May 2006	

Teaching: Universität Zürich   (Teaching assistant)
Geometry for high school teachers*, Mathematics for Chemistry I*-II*,
Linear Algebra I*-II*, Symplectic and Poisson Geometry I*,♯-II†,
Cohomological Methods in Symplectic and Poisson Geometry*.
* *Classes in German,* ♯ *Classes in English,* † *Seminar in English.*

Student tutoring: Universität Zürich
Since Spring 2008, master thesis of Tobias Borer

Organization of conferences: Tech support at *ICIAM 2007*
Webmaster for *Poisson 2008* (Since December 2007)

Conferences, workshops and schools attended:

Poisson Geometry, Deformation Quantisation and Group Representation
  Brussels, June 13 – 22, 2003
Groupoids and Stacks in Physics and Geometry
  Oberwolfach, June 29 – July 5, 2003
Poisson 2004
  University of Luxembourg, Luxembourg City, Grand-Duchy of Luxembourg,
  June 7 - 11, 2004
Groupoids and Stacks in Physics and Geometry
  CIRM-Luminy, France, June 28 - July 2, 2004
Non-commutative Geometry and Representation Theory in Mathematical Physics
  Karlstad University, Karlstad, Sweden; July 5 – 10, 2004
Au-Dela Des Algebroids De Lie
  Centre De Mathematiques Laurent Schwarz - Ecole Polytechnique,
  Palaiseu Cedex-Paris, France; November 2 - 4, 2004
Summer School and Conference on Poisson Geometry
  ICTP, Trieste, Italy; July 04 - 22 2005
Geometry & Physics III
Poisson sigma models, Lie algebroids and the BV master equation
  Dipartimento di Matematica e Informatica, Perugia Italy; July 25 - 29, 2005
Poisson 2006 – Poisson Geometry in Mathematics and Physics
  Tokyo, Japan, June 5 – 9, 2006
Higher Structures in Geometry and Physics
  Trimester at Henri Poincar Institute, Paris France; January 15 – 19, 2007
Weekendoid Geometrie de Poisson
  Toulouse, France, March 2 – 3, 2007
Geometry & Physics V
Interactions between symplectic geometry, Lie group theory and Riemannian geometry
  Dakar, Senegal, May 14-19, 2007
Lie algebroids and Lie groupoids in Differential Geometry
  Bakewell, U.K, October 25 - 27, 2007

References

[1] I. M. Gel′fand and I. J. Dorfman. Schouten bracket and Hamiltonian operators. *Funktsional. Anal. i Prilozhen.*, 14(3):71–74, 1980.

[2] Y. Kosmann-Schwarzbach. The Lie bialgebroid of a Poisson-Nijenhuis manifold. *Lett. Math. Phys.*, 38(4):421–428, 1996.

[3] F. Magri and C. Morosi. A geometric characterization of hamiltonian systems through the theory of Poisson-Nijenhuis manifolds. *Lett. Math. Phys.*, 38(4):421–428, 1996.

[4] I. Vaisman. Reduction of Poisson-Nijenhuis manifolds. *J. Geom. Phys.*, 19(1):90–98, 1996.

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