Intensive Research Period
May – July 2011

KNOTS & APPLICATIONS

Workshop
Entanglement and Linking
18-19 May, 2011

Mathematical Research Centre (CRM) "Ennio De Giorgi"
Scuola Normale Superiore – Pisa, Italy

URL: http://www.crm.sns.it/hpp/events/event.html?id=146

The Gauss integral formula for the linking number of two closed curves (1833) illustrates the fascinating intermingling of topology, geometry and physics rooted in knot theory from its very birth. Its "diffuse" version, namely helicity, measures the mutual wrapping and coiling of the field lines of a solenoidal field, providing, in particular, a lower bound to the energy it stores, thereby playing a fundamental role in fluid mechanics, magnetohydrodynamics and plasma physics. However, the linking number alone is not sufficient for assessing triviality of a link (such as for Whitehead link, Borromean rings, etc.), and higher order analogues thereof (due to Milnor and Massey) have been devised, together with companion diffuse versions, such as generalized helicities.

This workshop will be mainly devoted to differential geometric, topological and hydrodynamical aspects of ordinary and higher-order linkings, braiding and their asymptotic versions (helicity and higher order analogues); the following topics will be covered: integral formulae for higher order linking numbers and the quest for generalized "helicity bounds energy" results and generalizations of Whitehead products (Arnold's problem), link-homotopy invariants of links and the homotopy invariants of associated maps to configuration space (Koschorke's conjecture), with applications, among others, to magneto-hydrodynamics of plasmas, vortices, and relaxation of braided magnetic fields.

Invited Speakers
Peter Akhmetiev, Izmiran, Russia
Mitchell Berger, Exeter U., UK
Bertrand Duplantier, CEA-Saclay, France
Gunnar Hornig, Dundee U., UK
Chun-Chung Hsieh, Academia Sinica, Taiwan
Louis Kauffman, U. Illinois, Chicago, USA
Rafal Komendarczyk, Tulane U., USA
Marc Lefranc, Lille U., France
Jason Parsley, Wake Forest U., USA
Renzo Ricca, U. Milano-Bicocca, Italy

Short Talks
Alberto Benvegnù, U. Verona, Italy
Francesca Maggioni, U. Bergamo, Italy
Clayton Shonkwiler, Haverford College, USA

Participants willing to contribute with a talk are encouraged to submit title and abstract to Mauro Spera at mauro.spera@univr.it. The local expenses of speakers will be covered by the organization. Young participants can apply for financial support, even if they are not submitting a talk.

Registration: Required via the website above.

Financial support: Prospective participants should seek grant/university support towards travel expenses. Limited funding towards participant local expenses may be provided by CRM and INdAM upon application. Participants seeking support should send their CV and list of publications to mauro.spera@univr.it, before **13 March, 2011**.

Centro
di Ricerca
Matematica
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