

ESF-EMS-CRM-Pi
International Conference on

Knots and Links: From Form to Function

Centro di Ricerca Matematica (CRM) "Ennio De Giorgi"
Scuola Normale Superiore, Pisa, Italy

2-8 July, 2011

PROGRAMME

Lectures will be held in Lecture Room "Aula Dini"

SATURDAY, JULY 2

- 14:00 – Arrival and check-in
- 15:00 – 19:00 Registration at the ESF desk - Hotel Fossabanda
- 19:30 – 20:30 Dinner at SNS cafeteria

SUNDAY, JULY 3

- 9:00 – 10:00 Registration at the ESF desk – CRM, Collegio Puteano

Sunday morning (Chair: R. Ricca)

- 10:00 – 10:15 Coffee at "Aula Dini"

- 10:15 – 10:30 Opening address
- 10:30 – 11:05 **Keith Moffatt** (University of Cambridge)
Relaxation to topologically complex equilibria
- 11:10 – 11:45 **De Witt Sumners** (Florida State University)
DNA Topology: experiments and analysis
- 11:50 – 12:05 **Eugene Starostin** (University College London)
Elastic 2-braids, knots and links
- 12:10 – 12:25 **Eleni Panagiotou** (National Technical University of Athens)
A study of the linking number in systems with periodic boundary conditions

- 12:30 – 14:00 Lunch at SNS cafeteria

Sunday afternoon (Chair: E. Rawdon)

- 14:15 – 14:50 **Yuanan Diao** (University of North Carolina at Charlotte)
Random polygons and random links in a confined volume
- 14:55 – 15:30 **Nafaa Chbili** (UAEU at Abu Dhabi)
From symmetry of knots to symmetry of spatial graphs
- 15:35 – 15:50 **Matt Mastin** (University of Georgia)
Link symmetry and composite links
- 15:55 – 16:10 **Tobias Hermes** (Aachen University)
A gradient flow for Menger curvature
- 16:15 – 16:35 Coffee break
- 16:35 – 17:10 **Cristian Micheletti** (SISSA, Trieste)
Geometrical and topological entanglement in ring polymers under spherical confinement
- 17:15 – 17:50 **Tetsuo Deguchi** (Ochanomizu University)
Random knots and polymer physics
- 17:55 – 18:10 **Mauro Mauricio** (Imperial College)
An extension of the tangle model for composite knots
- 18:15 – 18:30 **Simon Candelaresi** (University Stockholm & NORDITA)
Decay of helical and non-helical magnetic links and knots
- 19:30 – 20:30 Dinner at SNS cafeteria

MONDAY, JULY 4**Monday morning (Chair: D. Ilyutko)**

- 9:00 – 9:35 **Colin Adams** (Williams College)
Indicatrices, stick index and superinvariants of knots
- 9:40 – 10:15 **Jun O'Hara** (Tokyo Metropolitan University)
Möbius invariant energies and average linking with circle
- 10:20 – 10:35 **Simon Blatt** (ETH Zuerich)
The gradient flow of O'Hara's knot energies
- 10:40 – 11:00 Coffee break
- 11:00 – 11:35 **Robert Kusner** (U. Pennsylvania & U. Massachusetts)
Knots and links as ropes, bands and branched coverings
- 11:40 – 12:15 **Eric Rawdon** (University of St. Thomas)
Knotted arcs
- 12:20 – 12:35 **Philipp Reiter** (University Freiburg)
Regularity theory for O'Hara's knot energy family E^α
- 12:40 – 14:00 Lunch at SNS cafeteria

Monday afternoon (Chair: T. Deguchi)

- 14:15 – 14:50 **Carlo Barenghi** (Newcastle University)
Vortex knots and vortex tangles in quantum fluids
- 14:55 – 15:30 **Enore Guadagnini** (University of Pisa)
Knots and quantum field theory
- 15:35 – 15:50 **Thomas Kephart** (Vanderbilt University)
The tight knot spectrum in QCD
- 15:55 – 16:10 **Jose Luis Trueba** (Rey Juan Carlos University)
Some new results on knotted electromagnetic fields in vacuum

- 16:15 – 16:35 Coffee break
- 16:35 – 17:10 **Mitchell Berger** (University of Exeter)
The writhe of open curves: theory and applications
- 17:15 – 17:50 **Xin Liu** (University of Sydney)
Knot polynomials in topological fluid mechanics
- 17:55 – 18:10 **Rafal Komendarczyk** (Tulane University)
Higher order helicities via link maps
- 18:15 – 18:30 **Manuel Arrayas** (Rey Juan Carlos University)
Persistence of entanglement and helicity integrals in reaction-diffusion systems
- 19:30 – 20:30 Dinner at SNS cafeteria

TUESDAY, JULY 5

Tuesday morning (Chair: E. Guadagnini)

- 9:00 – 9:35 **Bertrand Duplantier** (CEA at Saclay)
Random linking
- 9:40 – 10:15 **Renzo Ricca** (University of Milano-Bicocca)
On the groundstate energy spectrum of magnetic knots
- 10:20 – 10:35 **Satoshi Tanda** (Hokkaido University)
Discovery of topological knot and link crystals
- 10:40 – 11:00 Coffee break
- 11:00 – 11:10 Poster Presentation (5 mins presentation)
- 1.: **Marcin Modlinski** (Poznan University of Technology)
Symmetry of the average shape of the fluctuating trefoil knot
- 2.: **Piotr Pieranski** (Poznan University of Technology)
Conjectures concerning the curvature and torsion of the ideal trefoil knot
- 11:15 – 11:25 3.: **Sylwester Przybyl** (Poznan University of Technology)
Forces and momenta of forces within the most tight trefoil knot
- 4.: **Christopher Prior** (University of Oxford)
The Fourier transform of tubular densities
- 11:30 – 11:40 5.: **Candice Price** (University of Iowa)
A biological application of knot Floer homology
- 6.: **Eleni Panagiotou** (National Technical University of Athens)
A study of entanglement in polymer melts
- 11:45 – 11:55 6.: **Francesca Maggioni** (University of Bergamo)
Optimal kinematics of supercoiled filaments
- 8.: **Toru Matsuura** (Hokkaido University)
Surgery method for ring-shaped crystals
- 12:00 – 12:10 9.: **Lulia Elena Hirica** (University of Bucharest)
On generalized Riemann flow
- 10.: **Yohannes Sewiye** (Jimma University)
Structure dictates function, an universal principle that explains the link between human anatomy and physiology
- 12:20 – 12:30 Group Photo
- 12:30 – 14:00 Lunch at SNS cafeteria

Tuesday afternoon (Chair: Y. Diao)

- 14:15 – 14:50 **Carlo Petronio** (University of Pisa)
Exceptional Dehn surgeries on the minimally twisted 5-chain link
- 14:55 – 15:30 **Denis Ilyutko** (Moscow State University)
An equivalence between two theories of 'non-realizable' links
- 15:35 – 15:50 **Gyo Taek Jin** (Korea Advanced Institute of Science and Technology)
Prime knots whose arc index is smaller than the crossing number
- 15:55 – 16:10 **Takahiro Kitayama** (Kyoto University)
On the leading coefficient of the metabelian Alexander polynomial
- 16:15 – 16:35 Coffee break
- 16:35 – 17:10 **Sofia Lambropoulou** (National Technical University of Athens)
Framization of knot algebras
- 17:15 – 17:50 **Annalisa Calini** (College of Charleston)
Integrable evolution of closed vortex filaments: finite-gap solutions and their linear stability
- 19:00 – 20:00 **Poster Session** at Hotel Fossabanda: drinks served
- 20:00 – 22:00 **Conference Dinner** at Hotel Fossabanda

WEDNESDAY, JULY 6

Wednesday morning (Chair: R. Kusner)

- 9:00 – 9:35 **Kenneth Millett** (University of California at Santa Barbara)
Measures of polymer shape
- 9:40 – 10:15 **Jason Cantarella** (University of Georgia)
New computational approaches to exploring polygon and knot spaces
- 10:20 – 10:35 **Radmila Sazdanovic** (University of Pennsylvania)
Categorification in knot and graph theory
- 10:40 – 11:00 Coffee break
- 11:00 – 11:35 **John M. Sullivan** (Technical University of Berlin)
Ropelength criticality
- 11:40 – 12:15 **Pawel Strzelecki** (University of Warsaw)
Geometric curvature energies for curves: an overview of analytic and knot-theoretic properties
- 12:20 – 12:35 **Ioannis Diamantis** (National Technical University of Athens)
Toward the 3rd skein module of $L(p,q)$
- 12:40 – 14:00 Lunch at SNS cafeteria

Wednesday afternoon

- 14:00 – 19:00 **Social event:** visit to the village of San Miniato and wine tasting at the San Quintino farmhouse
- 19:30 – 20:30 Dinner at SNS cafeteria

THURSDAY, JULY 7

Thursday morning (Chair: J. Cantarella)

- 9:00 – 9:35 **Mark Dennis** (University of Bristol)
Fibred knots in laser beams
- 9:40 – 10:15 **Michael Monastyrskii** (ITEP, Moscow)
Topology of ensembles of links and knots and some applications to physics
- 10:20 – 10:35 **Maria Elena Vazquez** (San Francisco State University)
Modeling DNA unlinking
- 10:40 – 11:00 Coffee break
- 11:00 – 11:35 **Andrew Stasiak** (University of Lausanne)
Tightening of DNA knots by supercoiling facilitates their unknotting by type II DNA topoisomerases
- 11:40 – 12:15 **Isabel Darcy** (University of Iowa)
Tangle analysis of protein-DNA complexes
- 12:20 – 12:35 **Javier Arsuaga** (San Francisco State University)
The effects of minicircle density on the topological structure of the mitochondrial DNA from trypanosomes
- 12:40 – 14:00 Lunch at SNS cafeteria

Thursday afternoon (Chair: K. Millett)

- 14:15 – 14:50 **Robert Scharein** (Hypnagogic Software)
Investigating knots and tangles in physical systems
- 14:55 – 15:30 **Piotr Pieranski** (Poznan University of Technology)
High resolution picture of the ideal trefoil knot: new morphology details and new conjectures
- 15:35 – 15:50 **Igor Nikonov** (Moscow State University)
Parity functors on knot diagrams
- 15:55 – 16:10 **Marta Szumanska** (University of Warsaw)
Knots with finite integral Menger curvature energy
- 16:15 – 16:35 Coffee break
- 16:35 – 17:10 **Giovanni Dietler** (EPFL)
Interplay between topology and bubble formation in double-stranded DNA
- 17:15 – 17:50 **Dorothy Buck** (Imperial College London)
The classification of rational tangle adjacencies, with applications to complex nucleoprotein assemblies
- 19:30 – 20:30 Dinner at SNS cafeteria

Thursday evening (Chair: De W. Sumners)

- 20:45 – 21:00 Gathering at the Scuola Normale Superiore, Lecture room “Aula degli Stemmi” (top floor): SNS presentation
- 21:00 – 21:35 **Fernando Blasco** (Universidad Politécnica de Madrid)
Mathematical magic with knots
- 21:40 – 22:30 Forward Look Plenary Discussion
Panel: **K. Millett, K. Moffatt, C. Petronio, De W. Sumners**
Moderator: **R. Ricca**
Open problems and future challenges in knot theory and applications

FRIDAY, JULY 8

7:00 – 9:30

Breakfast at Hotel

9:30 –

Check-out and departure