Liebe KombinatorikerInnen,

herzlich willkommen zum Kolloquium über Kombinatorik, das in diesem Jahr zum 25. Mal stattfindet. Aus diesem Grunde haben wir uns entschlossen, das Jubiläumskolloquium auf drei Tage auszudehnen. Mit 9 Hauptvorträgen und etwa 80 Kurzvorträgen erwartet uns ein attraktives, aber auch dicht gedrängtes Programm. Es ist schon bemerkenswert, dass Format und Termin dieser Tagung seit 25 Jahren weitgehend unverändert geblieben sind, ohne dass die Tagung an Attraktivität verloren hat.

Das erste Kolloquium über Kombinatorik fand vor 25 Jahren in Bielefeld statt und wurde von Prof. Deuber organisiert. Deshalb ist KolKom bei den älteren Kollegen auch noch unter dem Namen "Deuberkolloquium" bekannt. "Eigentlich" wäre in diesem Jahr ja schon das 26. Kolloquium, aber im letzten Jahr haben wir bekanntlich auf die Ausrichtung von *KolKom* verzichtet, weil zeitnah zur *EuroComb* nach Berlin eingeladen wurde.

In diesem Jahr gibt es, abgesehen von der Ausdehnung auf drei Tage, eine kleine Änderung im Ablauf der Tagung. Sie werden im Programm erkennen, dass die Anfangszeiten der Vorträge manchmal recht ungewöhnlich "krumnme" Zahlen sind: Wir haben versucht, die recht vielen Vorträge ohne Kürzung der Mittags-, Abend- und Kaffeepausen so zu planen, dass wir den gewohnten Rhythmus "20 Minuten Vortrag plus 5 Minuten Diskussion" beibehalten können. Also haben wir die Zeiten zum Raumwechsel etwas eingeschränkt (2-3 Minuten), und so sind die ungewöhnlichen Anfangszeiten zustande gekommen.

Wir bedanken uns bei der Otto-von-Guericke-Universität für die finanzielle und organisatorische Unterstützung dieser Tagung. Wir bedanken uns auch beim Berliner Graduiertenkolleg *Methods for Discrete Structures*, das dieses Kolloquium ebenfalls finanziell unterstützt.

Stefan Felsner
Alexander Pott

Räume

Hauptvorträge	:	G03-315
Sektionsvorträge	:	G02-109, G02-111, G03-106, G03-214, G02-106 (nur Donnerstag), G03-315 (nur Samstag)
Tagungsbüro	:	G02-215
Bibliothek	:	Hauptbibliothek auf dem Campus
Kaffee/Tee/Erfrischungen	:	G02-215 und G02-210
Internet	:	G02-212

Das Tagungsbüro ist am Donnerstag und Freitag von 8:30 bis 17:30 Uhr geöffnet, am Samstag von 8:30 bis 17 Uhr. In dieser Zeit ist auch Zugang zum Internet in G02-212 möglich. Die Hauptbibliothek auf dem Campus ist am Donnerstag und Freitag von 9 bis 21 Uhr und am Samstag von 9 bis 15 Uhr geöffnet. Das gemeinsame Abendessen ist im *Ratskeller*, Alter Markt. Der Eingang ist direkt neben dem Roland-Standbild.

Donnerstag, 16.11.2006

9:00	**Christian Krattenthaler (Wien)** “Non-crossing partitions on an annulus”	(G03-315)
anschließend	*Kaffeepause*	
10:30	**Reinhard Diestel (Hamburg)** “Extremal infinite graph theory? A topological approach”	(G03-315)
11:40	**Anand Srivastav (Kiel)** “Low Discrepancy Colorings of Additive Structures ”	(G03-315)
anschließend	*Mittagspause*	
14:30 - 16:45	**Sektionsvorträge**	
16:45 - 17:15	*Kaffeepause*	
17:15	**Aart Blokhuis (Eindhoven)** “Do we know all 3 colourable distance regular graphs?”	(G03-315)

Freitag, 17.11.2006

9:00	**Peter Gritzmann (München)** “Geometric clustering ”	(G03-315)
anschließend	*Kaffeepause*	
10:30	**Veerle Fack (Ghent)** “Search algorithms for substructures in combinatorial objects”	(G03-315)
11:40	**Dorothea Wagner (Karlsruhe)** “Route Planning and Engineering Shortest Paths”	(G03-315)
anschließend	*Mittagspause*	
14:30 - 16:15	**Sektionsvorträge**	
16:15 - 16:45	*Kaffeepause*	
16:45 - 18:05	**Sektionsvorträge**	
19:15	*Gemeinsames Abendessen* im **Ratskeller** Alter Markt (Einlass ab 18:45).	

Samstag, 18.11.2006

9:00	**Rolf H. Möhring** **(Berlin)** (G03-315) “Routing in Graphs with Applications in Traffic and Logistics”
anschließend	*Kaffeepause*
10:20 - 12:10	**Sektionsvorträge**
anschließend	*Mittagspause*
14:00 - 15:20	**Sektionsvorträge**
anschließend	*Kaffeepause*
15:40	**Bojan Mohar** **(Vancouver)** (G03-315) “How large must the set of subset sums be?”

Kurzvorträge Donnerstag, 16.11.2006

Zeit	Sektion I G03-106	Sektion II G03-214	Sektion III G02-106	Sektion IV G02-111
14:30	**U. Brehm 1** Linking Structures	**A.-V. Kramer 2** The de Bruijn Graph $B(2, n)$	**J. Quistorff 3** Combinatorial Problems in the Enomoto-Katona Space	**M. Koch 4** Construction of generalized polyominoes
14:57	**M. Köppe 5** A primal Barvinok algorithm based on irrational decompositions	**S. M. Camacho 6** Colourings of graphs with prescribed cycle lengths	**S. Kurz 7** Integral point sets over $\mathbb{Z}_p^2$	**M. Sonntag 8** A characterization of hypercacti
15:25	**N. Düvelmeyer 9** Relative position of small point configurations	**M. Kochol 10** 3-coloring of graphs with restricted neighborhood	**T. Westerbäck 11** Maximal strictly partial Hamming packings of $\mathbb{Z}_2^n$	**E. Harzheim 12** Center-symmetric subsets of subsets of $\mathbb{N}$ which have infinite reciprocal sum
15:52	**V. Vígh 13** Approximating 3-dimensional convex bodies by polytopes with a restricted number of edges	**I. Schiermeyer 14** A new upper bound for the chromatic number of a graph	**W. Haas 15** On the failing cases of the Johnson bound for error-correcting codes	**H. Harborth 16** Magic and Latin Triangle and Hexagon Boards
16:20	**G. Averkov 17** Metric capacity of normed spaces	**M. Marangio 18** Färbungen von Distanzgraphen	**G. Kyureghyan 19** On monomial bent functions	**20**
16:45	*Kaffeepause*			
17:15	**Aart Blokhuis** Do we know all 3 colourable distance regular graphs?			

Kurzvorträge Freitag, 17.11.2006

Zeit	Sektion I G03-106	Sektion II G03-214	Sektion III G02-109	Sektion IV G02-111
14:30	**M. Andresen 21** An extension of the Triangle Lemma	**J. Lehmann 22** $[r, s, t]$-colorings of stars	**G. Gerlich 23** List Classes and Difference Lists	**M. Fouz 24** Hereditary Discrepancy in Different Numbers of Colors
14:57	**M. Kang 25** Random planar structures	**D. Gerbner 26** l-chain-profile vectors	**R. Laue 27** Large sets of t-designs from t-homogeneous groups	**N. Hebbinghaus 28** Discrepancy of d-dimensional Arithmetic Progressions with Common Difference
15:25	**T.G. Seierstad 29** Phase transitions in random graphs processes	**T. Friedrich 30** Deterministic Random Walks on the Infinite Grid	**M. Grüttmüller 31** Pan-orientable Block Designs	**F. Fodor 32** Line transversals to families of spheres
15:52	**L. K. Jørgensen 33** Extremal results for minors and rooted minors	**H.-M. Teichert 34** Competition structures of directed and undirected graphs	**M. Huber 35** Flag-transitive Combinatorial Designs	**W. Wenzel 36** Zariski-Topologien und Algebraische Kombinatorik
16:15	*Kaffeepause*			
16:45	**B. Doerr 37** Partial Colorings of Unimodular Hypergraphs	**F. Zickfeld 38** Counting Schnyder woods	**H. Gropp 39** News on configurations	**D. Van Dyck 40** NP-complete but easy: to be or not to be Yutsis
17:12	**A. O. Munagi 41** On Systems of Finite Complementing Subsets	**D. Johannsen 42** A Direct Decomposition of 3-Connected Planar Graphs	**A. Kohnert 43** Number of different degree sequences of a graph with no isolated vertices	**Ch. Klein 44** Matrix Rounding
17:40	**Ch. Bey 45** On shadows of intersecting set systems	**A. Kohl 46** Some bounds and open questions for L_P-list labellings	**M. Wappler 47** The Rotational Dimension of a Graph	**R. Hildenbrandt 48** Partitions-Requirements-Matrices (PRMs)

Kurzvorträge Samstag, 18.11.2006

Zeit	Sektion I G03-106	Sektion II G03-214	Sektion III G02-109	Sektion IV G02-111	Sektion V G03-315
10:20	**A. Paffenholz 53** Faces of the Birkhoff Polytope	**C. Dangelmayr 54** Chordal Graphs and Intersection Graphs of Pseudosegments	**O. Heden 55** Perfect codes of kernel dimension -3	**S. Schwarz 56** Optimal Line-Ups in Team Competitions with Non-linear Objective Functions	**J. Foniok 57** Graph Homomorphisms and Homomorphism Order
10:47	**B. Nill 58** Permutation polytopes	**A. Kemnitz 59** Circular Total Colorings of Graphs	**P. Ligeti 60** On reconstruction of words from its subwords	**C. Lange 61** Realisations of generalised associahedra	**K. Paramasivam 62** On Coloring Boolean Algebra and Boolean Semigroup
11:15	**S. Kappes 63** Orthogonal Surfaces - A Combinatorial Approach	**S. Brandt 64** On a Conjecture about Edge Irregular Total Labellings	**R. Waters 65** Network pricing, routing and congestion control	**G. Ambrus 66** On the number of mutually touching cylinders	**R. Gugisch 67** On the Generation of Isomorphism Classes of Mappings
11:42	**H. Han 68** Spanning bipartite subgraphs in dense graphs	**D. Kral 69** Non-rainbow colorings of plane graphs	**J. Lengler 70** The Burst Error Liar Game	**E. Gerbracht 71** Minimal Polynomials for the Coordinates of the Harborth Graph	**F. Pfender 72** On degree conditions for H-linked graphs
12:15	*Mittagspause*				
14:00	**D. Rautenbach 73** A Generalization of Dijkstra's Shortest Paths Algorithm with Applications to VLSI routing	**N.J. Rad 74** Total Domination critical graphs	**F. Göring 75** Equilibria for games played by players using simple learning rules	**D. Cieslik 76** Connecting Networks of Minimal Costs	
14:27	**Yu. Orlovich 77** On the complexity of the maximum dissociation set problem for line graphs	**J. Harant 78** A Generalization of Tutte's Theorem on Hamiltonian Cycles in Planar Graphs	**R. Steinberg 79** Combinatorial Auctions	**E. Eisenschmidt 80** Computation of atomic fibers of Z-linear maps	
14:55	**T. Laihonen 81** Codes for Locating Faulty Vertices in a Graph	**82**	**M. Kiermaier 83** Arcs in projective Hjelmslev geometries: A geometric construction of the expurgated Octacode	**M. Schacht 84** Generalizations of the removal lemma and property testing	
15:20	*Kaffeepause*				
15:40	**Bojan Mohar** How large must the set of subset sums be?				

Hauptvorträge

Aart Blokhuis (Eindhoven)	: Do we know all 3 colourable distance regular graphs?
Reinhard Diestel (Hamburg)	: Extremal infinite graph theory? A topological approach
Veerle Fack (Ghent)	: Search algorithms for substructures in combinatorial objects
Peter Gritzmann (München)	: Geometric clustering
Christian Krattenthaler (Wien)	: Non-crossing partitions on an annulus
Bojan Mohar (Vancouver)	: How large must the set of subset sums be?
Rolf H. Möhring (Berlin)	: Routing in Graphs with Applications in Traffic and Logistics
Anand Srivastav (Kiel)	: Low Discrepancy Colorings of Additive Structures
Dorothea Wagner (Karlsruhe)	: Route Planning and Engineering Shortest Paths

Kurzvorträge

Gergely Ambrus (Szeged)	: On the number of mutually touching cylinders
Michael Andresen (Magdeburg)	: An extension of the Triangle Lemma
Gennadiy Averkov (Magdeburg)	: Metric capacity of normed spaces
Christian Bey (Magdeburg)	: On shadows of intersecting set systems
Stephan Brandt (Ilmenau)	: On a Conjecture about Edge Irregular Total Labellings
Ulrich Brehm (Dresden)	: Linking Structures
Stephan Matos Camacho (Freiberg)	: Colourings of graphs with prescribed cycle lengths
Dietmar Cieslik (Greifswald)	: Connecting Networks of Minimal Costs
Cornelia Dangelmayr (Berlin)	: Chordal Graphs and Intersection Graphs of Pseudosegments
Benjamin Doerr (Saarbrücken)	: Partial Colorings of Unimodular Hypergraphs
Nico Düvelmeyer (Chemnitz)	: Relative position of small point configurations
Elke Eisenschmidt (Magdeburg)	: Computation of atomic fibers of Z-linear maps
Ferenc Fodor (Szeged)	: Line transversals to families of spheres
Jan Foniok (Praha)	: Graph Homomorphisms and Homomorphism Order
Mahmoud Fouz (Saarbrücken)	: Hereditary Discrepancy in Different Numbers of Colors
Tobias Friedrich (Saarbrücken)	: Deterministic Random Walks on the Infinite Grid
Dániel Gerbner (Budapest)	: l-chain-profile vectors
Eberhard H.-A. Gerbracht (Gifhorn)	: Minimal Polynomials for the Coordinates of the Harborth Graph
Gerhard Gerlich (Braunschweig)	: List Classes and Difference Lists
Frank Göring (Chemnitz)	: Equilibria for games played by players using simple learning rules
Harald Gropp (Heidelberg)	: News on configurations
Martin Grüttmüller (Rostock)	: Pan-orientable Block Designs
Ralf Gugisch (Bayreuth)	: On the Generation of Isomorphism Classes of Mappings
Wolfgang Haas (Freiburg)	: On the failing cases of the Johnson bound for error-correcting codes

Hiep Han (Berlin)	: Spanning bipartite subgraphs in dense graphs
Jochen Harant (Ilmenau)	: A Generalization of Tutte's Theorem on Hamiltonian Cycles in Planar Graphs
Heiko Harborth (Braunschweig)	: Magic and Latin Triangle and Hexagon Boards
Egbert Harzheim (Köln)	: Center-symmetric subsets of subsets of $\mathbb{N}$ which have infinite reciprocal sum
Nils Hebbinghaus (Saarbrücken)	: Discrepancy of d-dimensional Arithmetic Progressions with Common Difference
Olof Heden (Stockholm)	: Perfect codes of kernel dimension -3
Regina Hildenbrandt (Ilmenau)	: Partitions-Requirements-Matrices (PRMs)
Michael Huber (Tübingen)	: Flag-transitive Combinatorial Designs
Daniel Johannsen (Saarbrücken)	: A Direct Decomposition of 3-Connected Planar Graphs
Leif K. Jørgensen (Aalborg)	: Extremal results for minors and rooted minors
Mihyun Kang (Berlin)	: Random planar structures
Sarah Kappes (Berlin)	: Orthogonal Surfaces - A Combinatorial Approach
Arnfried Kemnitz (Braunschweig)	: Circular Total Colorings of Graphs
Michael Kiermaier (Bayreuth)	: Arcs in projective Hjelmslev geometries: A geometric construction of the expurgated Octacode
Christian Klein (Saarbrücken)	: Matrix Rounding
Matthias Koch (Bayreuth)	: Construction of generalized polyominoes
Martin Kochol (Bratislava)	: 3-coloring of graphs with restricted neighborhood
Anja Kohl (Freiberg)	: Some bounds and open questions for L_P-list labellings
Axel Kohnert (Bayreuth)	: Number of different degree sequences of a graph with no isolated vertices
Matthias Köppe (Magdeburg)	: A primal Barvinok algorithm based on irrational decompositions
Daniel Kral (Praha)	: Non-rainbow colorings of plane graphs
Alpar-Vajk Kramer (Milano)	: The de Bruijn Graph $B(2, n)$
Sascha Kurz (Bayreuth)	: Integral point sets over $\mathbb{Z}_p^2$
Gohar Kyureghyan (Magdeburg)	: On monomial bent functions
Tero Laihonen (Turku)	: Codes for Locating Faulty Vertices in a Graph
Carsten Lange (Berlin)	: Realisations of generalised associahedra
Reinhard Laue (Bayreuth)	: Large sets of t-designs from t-homogeneous groups
Juliane Lehmann (Braunschweig)	: $[r, s, t]$-colorings of stars
Johannes Lengler (Saarbrücken)	: The Burst Error Liar Game
Peter Ligeti (Budapest)	: On reconstruction of words from its subwords
Massimiliano Marangio (Salzgitter)	: Färbungen von Distanzgraphen
Augustine O. Munagi (Johannesburg)	: On Systems of Finite Complementing Subsets
Benjamin Nill (Berlin)	: Permutation polytopes
Yury Orlovich (Minsk)	: On the complexity of the maximum dissociation set problem for line graphs
Andreas Paffenholz (Berlin)	: Faces of the Birkhoff Polytope
Krishnan Paramasivam (Madras)	: On Coloring Boolean Algebra and Boolean Semigroup

Florian Pfender (Rostock)	: On degree conditions for H-linked graphs
Jörn Quistorff (Berlin)	: Combinatorial Problems in the Enomoto-Katona Space
Nader Jafari Rad (Babolsar)	: Total Domination critical graphs
Dieter Rautenbach (Ilmenau)	: A Generalization of Dijkstra's Shortest Paths Algorithm with Applications to VLSI routing
Mathias Schacht (Berlin)	: Generalizations of the removal lemma and property testing
Ingo Schiermeyer (Freiberg)	: A new upper bound for the chromatic number of a graph
Stefan Schwarz (Jena)	: Optimal Line-Ups in Team Competitions with Non-linear Objective Functions
Taral Guldahl Seierstad (Berlin)	: Phase transitions in random graphs processes
Martin Sonntag (Freiberg)	: A characterization of hypercacti
Richard Steinberg (Cambridge)	: Combinatorial Auctions
Hanns-Martin Teichert (Lübeck)	: Competition structures of directed and undirected graphs
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Robert Waters (Cambridge)	: Network pricing, routing and congestion control
Walter Wenzel (Chemnitz)	: Zariski-Topologien und Algebraische Kombinatorik
Thomas Westerbäck (Stockholm)	: Maximal strictly partial Hamming packings of $\mathbb{Z}_2^n$
Florian Zickfeld (Berlin)	: Counting Schnyder woods

Weitere TeilnehmerInnen

Jens-Peter Bode (Braunschweig), Thomas Böhme (Ilmenau), Heiodemarie Bräsel (Magdeburg), Holger Dell (Saarbrücken), Fernando M. de Oliveira Filho (Amsterdam), Klaus Dohmen (Mittweida), Stefan Felsner (Berlin), Dieter Gernert (München), Christian Haase (Berlin), Martin Henk (Magdeburg), Franz Hering (Dortmund), Christoph Hering (Tübingen), Thorsten Holm (Magdeburg), Christoph Josten (Frankfurt), Bernd Mehnert (Saarbrücken), Steffen Melang (Berlin), Johan Nilsson (Berlin), Alexander Pott (Magdeburg), Joachim Reichel (Dortmund), Jeroen Schillewaert (Ghent), Achill Schuermann (Magdeburg), Michael Stiebitz (Ilmenau), Nicolas van Cleemput (Ghent), Margit Voigt (Dresden), Wolfgang Willems (Magdeburg), Claudia Wunderlich (Jena).

Donnerstag, 16.11.2006 — Zeit: 9:00 — G03-315

Non-crossing partitions on an annulus

CHRISTIAN KRATTENTHALER (Wien)

Non-crossing partitions (which, more accurately, should be called "non-crossing partitions on a cycle" as they were by their inventor Germain Kreweras) are set partitions which, when the blocks are circularly presented on a cycle, have no crossings between the blocks. These combinatorial objects have many nice enumerative and structural properties, and, since their invention, turned out to be of great significance in many different environments.

Motivated by the recent introduction of non-crossing partitions for any finite reflection group (due to Bessis, and to Brady and Watt) and their generalization to m-divisible non-crossing partitions due to Armstrong, which, for the classical types can be realized as non-crossing partitions on a cycle, respectively on an annulus, subject to certain restrictions, we propose a systematic study of non-crossing partitions on an annulus (respectively on a cycle) which are rotationally symmetric and have block sizes all of which are divisible by m.

For a fixed annulus (cycle), a fixed rotation, and a fixed m, we find the total number of the corresponding non-crossing partitions, refined counts according to block sizes, Möbius function of the underlying poset, and, more generally, results on rank selected chain enumeration. Special cases of these results cover essentially all the previously known results on enumeration of non-crossing partitions due to Armstrong, Athanasiadis, Bessis, Brady, Edelman, Kreweras, Reiner, Watt. The results are obtained in a uniform way by an effective combination of generating function calculus and the Lagrange inversion formula.

Donnerstag, 16.11.2006 — Zeit: 10:30 — G03-315

Extremal infinite graph theory? A topological approach

REINHARD DIESTEL (Hamburg)

Extremal graph theory, broadly understood, studies the interaction of graph invariants such as average degree, connectivity, or chromatic number and their power to force certain desired substructures such as a given subgraph or minor. There is no comparable theory for infinite graphs. One reason is that a large minimum degree does not make an infinite graph “dense” (it can still be a tree), and hence cannot force any interesting substructures. Another, more subtle, reason has to do with paths and cycles: there are “not enough” of these in an infinite graph to play the structural roles they play in a finite graph. (For example, even a highly connected infinite graph need not contain an induced non-separating cycle, while in a finite graph these would generate its entire cycle space.)
This talk will suggest a possible approach to overcome these difficulties. The idea is to make an infinite (locally finite) graph “more finite” by compactifying it. By adding its ends we obtain a compact topological space, in which paths and cycles can be defined topologically, minimum degree conditions can be placed on the ends, and so on. These can then force substructures which minimum vertex degrees alone cannot force. The graph can even have a “Hamilton circle”: a topological circle containing all its vertices and ends. And indeed, it turns out that these topological paths and cycles seem to play the structural roles of ordinary cycles in finite graphs.
This is a very new area, with plenty of open questions.

Donnerstag, 16.11.2006 — Zeit: 11:40 — G03-315

Low Discrepancy Colorings of Additive Structures

ANAND SRIVASTAV (Kiel)

How uniformly can we distribute n points in the unit cube in dimension d? Can we color the first n integers with two colors such that any arithmetic progression in the first n integers is colored in an ”almost” balanced way ? What is the minimum cardinality of a subset of the first n integers which contains a non-trivial k term arithmetic progression ? Does the primes contain arbitraily long arithmetic progressions ?
The first two questions are core problems in geometric resp. combinatorial discrepancy theory, the answers to the third question are the celebrated theorems of Roth (1953), Szemeredi (1990) and Gowers (1998), and the fourth question has been a long standing open problem recently resolved by Green and Tao (2006). All these questions are not only of combinatorial nature leading to deep theorems, but their solutions share a typical methodological characteristics: the application of harmonic analysis to combinatorial problems, ,,the circle method” (Roth 1953).
In this talk we start with the explanation of the circle method for problem one and three and then show its impact to the computation of lower bounds for the c-color discrepancy of different kind of generalized arithmetic progressions, e.g. products of arithmetic progressions, sums of arithmetic progressions and Bohr neighborhoods.

Donnerstag, 16.11.2006 — Zeit: 17:15 — G03-315

Do we know all 3 colourable distance regular graphs?

AART BLOKHUIS (Eindhoven)

In the talk we will explain what a distance regular graph is, and why they form a very nice class of graphs. It is an NP-complete problem to decide whether a given graph has a given chromatic number $\chi \geq 3$. We will present some necessary eigenvalue conditions for being 3-chromatic. Then we will look at distance-regular graphs, determine for all known ones whether they are 3-chromatic, and make a start with the classification of all 3-chromatic distance-regular graphs.

This is joint work with Andries Brouwer and Willem Haemers.

Freitag, 17.11.2006 — Zeit: 9:00 — G03-315

Geometric clustering

PETER GRITZMANN (München)

In geometric clustering points of some finite point set in some Minkowski space have to be grouped together according to some balancing constraints so as to optimize some objective function. The prime example of a real-world clustering problem that motivates and guides our study is that of a lend-lease initiative for the consolidation of farmland. Of course, the underlying mathematical clustering problem is NP-hard even in the most simple cases.
We give and analyze a new norm maximization model for geometric clustering where in effect the centers of gravity of the clusters are pushed apart. On the theoretical side, we show that this model facilitates appropriate separation. On the algorithmic side we derive a polynomial-time approximation algorithm that can handle the underlying large size convex maximization problem efficiently, yet lending itself to a tight worst case analysis showing how favourably this model compares with other possible formulations of the task.

This is joint work with Andreas Brieden and, in part, with Christoph Metzger, Munich.

Freitag, 17.11.2006 — Zeit: 10:30 — G03-315

Search algorithms for substructures in combinatorial objects

VEERLE FACK (Ghent)

This talk will focus on search algorithms to investigate special substructures in combinatorial objects appearing in the area of finite projective geometry, coding theory and graph theory. We will present algorithms for two particular problem areas, i.e. (1) the search for maximal partial ovoids and minimal blocking sets in finite generalized quadrangles, and (2) a study of codewords of small weight in the codes arising from Desarguesian projective planes of prime order. In both cases, extensive computer searches have lead to new results, which could then be generalized by a mathematical proof, thus illustrating how a combination of theoretical and computer approaches can be fruitful.

Freitag, 17.11.2006 — Zeit: 11:40 — G03-315

Route Planning and Engineering Shortest Paths

DOROTHEA WAGNER (Karlsruhe)

Computing shortest paths is a base operation for many problems in traffic applications. The most prominent are certainly route planning systems for cars, bikes and hikers or timetable information systems for scheduled vehicles like trains and busses. If such a system is realized as a central server, it has to answer a huge number of customer queries asking for their best itineraries. Users of such a system continuously enter their requests for finding their "best" connections. Furthermore, similar queries appear as sub-problems in line planning, timetable generation, tour planning, logistics, and traffic simulations.
The algorithmic core problem that underlies the above scenario is a special case of the single-source shortest-path problem on a given directed graph with non-negative edge lengths. The particular graphs considered are huge, moreover, there is a potentially infinite number of queries to be processed within very short time. This motivates the use of speed-up techniques for shortest-path computations. The main focus is to reduce the response time for on-line queries. In this sense, a speed-up technique is considered as a technique to reduce the search space of Dijkstra's algorithm e.g. by using precomputed information or inherent information contained in the data.
In this talk, we provide an overview of the current state of research on speed-up techniques for Dijkstra's algorithm. Roughly speaking, two kinds of speed-up techniques are distinguished, approaches using node- or edge-labels and hierarchical methods. While existing tour planning systems often employ heuristic methods to reduce the search space and do not always guarantee optimal solutions, we restrict our attention to speed-up techniques that provably return a shortest path. Experimental studies with large real world data show that speed-up factors of more than 10.000 can be achieved resp. query times that are below the magnitude of a millisecond.

Samstag, 18.11.2006 — Zeit: 9:00 — G03-315

Routing in Graphs with Applications in Traffic and Logistics

ROLF H. MÖHRING (Berlin)

Traffic management and routing in logistic systems are optimization problem by nature. We want to utilize the available street or logistic network in such a way that the total network "load" is minimized or the "throughput" is maximized. This lecture deals with the mathematical aspects of these optimization problems from the viewpoint of network flow theory. It leads to flow models in which – in contrast to static flows – the aspects of "time" and "congestion" play a crucial role. Moreover, acceptance reasons may limit the choice of routes. We illustrate these aspects on three different applications: traffic guidance in rush hour traffic (cooperation with DaimlerChrysler), routing automated guided vehicles in container terminals (cooperation with HHLA), and timetabling in public transport (cooperation with Deutsche Bahn and Berliner Verkehrsbetriebe BVG).

Samstag, 18.11.2006 — Zeit: 15:40 — G03-315

How large must the set of subset sums be?

BOJAN MOHAR (Vancouver)

Let G be an abelian group, and let A, B be non-empty subsets of G. Let $A + B$ be the set of all sums $a+b$, where $a \in A$ and $b \in B$. The basic question in additive number theory is, how big the set $A+B$ must be. If G is the group of residues modulo a prime p, then the answer is given by the celebrated Cauchy-Davenport Theorem, $|A + B| \geq \min\{p, |A| + |B| - 1\}$. Kneser generalized this result to arbitrary abelian groups.
A result closely related to the Cauchy-Davenport Theorem is a theorem due to Erdös, Ginzburg, and Ziv. This theorem asserts that every sequence $a = (a_1, \ldots, a_{2n-1})$ of elements of an abelian group of order n contains a subsequence of length precisely n whose sum is 0. Today, many generalizations of the Erdös-Ginzburg-Ziv Theorem are known. They speak about the cardinality of the set of all sums obtained from a prescribed sequence, either by taking all subsequences or by taking only subsequences with the prescribed number of terms.
A common generalization of these results will be presented, and this will also be put into the realm of matroids, where a powerful generalization conjectured by Schrijver and Seymour waits to be resolved.

These results were obtained jointly with Matt DeVos and Luis Goddyn.

Donnerstag, 16.11.2006 — Zeit: 14:30

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1 — Sektion I — G03-106 — 13:30

Linking Structures

ULRICH BREHM (Dresden)

For $n \geq d+3$ (d odd) points in $\mathbb{R}^d$ in general position the *induced oriented linking structure* is defined as the function assigning to each pair of vertex-disjoint oriented $(d+1)/2$-simplices the linking number of their boundaries (with the induced orientation). We get an explicit complete classification of (the isomorphism classes of these) oriented linking structures on $d+3$ points and an explicit formula for the number of isomorphism classes.
This motivates the definition of (abstract) oriented linking structures for which we require a local realizability condition for any $d+3$ points and a consistency condition for any $d+4$ points.
There are very strong connections between the theory of oriented matroids and linking structures. In particular each uniform oriented matroid of rank $r = d-1$ (d odd) induces an oriented linking structure. When ignoring the orientation (linking numbers mod 2) one gets the concept of (non-oriented) linking structures.
Extensive software packages for working with oriented (and non-oriented) linking structures have been developed including the generation of linking structures from point sets in general position and from uniform oriented matroids. Also algorithms for computing different normal forms have been developed and implemented. We succeeded in giving a complete classification in all those cases where such a classification could be reasonably expected.

This is joint work with Maik Gerth (TU Dresden).

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2 — Sektion II — G03-214 — 13:30

The de Bruijn Graph $B(2,n)$

ALPAR-VAJK KRAMER (Milano)

The aim of this presentation is to give some combinatorial properties of the directed *de Bruijn Graph, B(m,n)*. A general definition will be given while the mentioned properties will refer to the particular case $B(2,n)$. The notion of fix vertex and the self-converse property will be also mentioned. A proof of the existence of a Hamiltonian cycle in $B(2,n)$ will be presented. The proof will be done by construction.

3 — Sektion III — G02-106 — 13:30

Combinatorial Problems in the Enomoto-Katona Space

JÖRN QUISTORFF (Berlin)

Let $n, k \in \mathbb{N}$ with $2k \leq n$ and X be an n-set. The Enomoto-Katona space

$$\mathcal{R} := \left\{ \{A, B\} \subseteq \binom{X}{k} \mid A \cap B = \emptyset \right\},$$

consisting of all unordered pairs of disjoint k-element subsets of X and equipped with

$$d^{\mathcal{R}}(\{A, B\}, \{S, T\}) := \min\{|A \setminus S| + |B \setminus T|, |A \setminus T| + |B \setminus S|\},$$

is considered. Upper bounds on the coding type problem, i.e. the determination of the maximum cardinality of a code consisting of unordered pairs of subsets far away from each other, are improved. The sphere packing problem, i.e. the determination of the maximum number of disjoint balls of a prescribed radius, is introduced and discussed. It is less closely connected to the first problem than it is in the most important spaces of coding theory.

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4 — Sektion IV — G02-111 — 13:30

Construction of generalized polyominoes

MATTHIAS KOCH (Bayreuth)

We define k-polyominoes as the union of edge-to-edge connected nonoverlapping regular k-gons and give an algorithm for an efficient enumeration. Using Grbner Basis we can perform an exact overlapping-test. The construction algorithm uses a variant of orderly generation to decrease the complexity of the overlapping-test. This strategy can also be applied to a wide range of other construction problems with strong auxiliary conditions.

Donnerstag, 16.11.2006 — Zeit: 14:57

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5 — Sektion I — G03-106 — 14:57

A primal Barvinok algorithm based on irrational decompositions

MATTHIAS KÖPPE (Magdeburg)

We introduce variants of Barvinok's algorithm for counting lattice points in polyhedra. The new algorithms are based on irrational signed decomposition in the primal space and the construction of rational generating functions for cones with low index. We give computational results that show that the new algorithms are faster than the existing algorithms by a large factor.

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6 — Sektion II — G03-214 — 14:57

Colourings of graphs with prescribed cycle lengths

STEPHAN MATOS CAMACHO (Freiberg)

In 1992 Gyárfás confirmed the well known conjecture of Erdös and Bollobás, that graphs with exactly k distinct odd cycle lengths are $2k+1$-colourable unless they are isomorphic to a K_{2k+2}. Schiermeyer and Mihók generalised this statement to graphs with k distinct odd and s distinct even cycle lengths in 2004. They proved that these graphs are colourable with at most $\min\{2k+2, 2s+3\}$ colours.
If we focus on graphs with exactly 2 distinct odd cycle lengths this estimation turns out to be not sharp if there is no triangle in the graph. This problem will be discussed in the talk.
Starting with the already known statements on graphs with k distinct odd cycle lengths, we will discuss the case $k = 2$ more precisely. Most attention we will pay on graphs having two consecutive odd cycle lengths. We will show that such graphs are 4-colourable if the odd cycles have length greater than 3.

7 — Sektion III — G02-106 — 14:57

Integral point sets over $\mathbb{Z}_p^2$

SASCHA KURZ (Bayreuth)

An integral point set $\mathcal{P}$ over $\mathbb{Z}_p^2$ is a set of n points in $\mathbb{Z}_p^2$ with pairwise integral distances. A pair (x_1, y_1), $(x_2, y_2) \in \mathbb{Z}_p^2$ is at integral distance if there exists an element $d \in \mathbb{Z}_p$ with $(x_1 - x_2)^2 + (y_1 - y_2)^2 = d^2$. By $\mathcal{I}(p, 2)$ we denote the maximum cardinality of an integral point set in $\mathbb{Z}_p^2$. We conjecture $\mathcal{I}(p, 2)$ for $p \neq 2$ and classify the extremal examples for $p \leq 223$. By $\overline{\mathcal{I}}(p, 2)$ we denote the maximum cardinality of an integral point set over $\mathbb{Z}_p^2$ where no three points are collinear. Again we give a conjecture. Similar to integral point sets over $\mathbb{R}^2$ the extremal examples seem to consist of point sets on a circle. Forbidding four points on a circle leads to the numbers $\dot{\mathcal{I}}(p, 2)$. The discovery of big examples i.e. leading to the lower bound $\dot{\mathcal{I}}(71, 2) \geq 11$ were a motivation to search with a bit more effort for seven points in the plane ($\mathbb{R}^2$) no three on a line, no four on a circle …

8 — Sektion IV — G02-111 — 14:57

A characterization of hypercacti

MARTIN SONNTAG (Freiberg)

Let $\mathcal{H} = (V, \mathcal{E})$ be a hypergraph, $\mathcal{C}(\mathcal{H})$ the set of all cycles and $\mathcal{W}(\mathcal{H})$ the set of all paths in $\mathcal{H}$.

Definition. $\mathcal{H} = (V, \mathcal{E})$ is a *hypercactus* iff H is a simple, finite and connected hypergraph with the property

$$\forall c, c' \in \mathcal{C}(\mathcal{H})\ \exists\, v_{c,c'} \in V\ \exists\, e_{c,c'} \in \mathcal{E}\ \forall w \in \mathcal{W}(\mathcal{H}) :$$
$$c \neq c' \ \wedge\ w \text{ is a } (c, c')\text{–path} \Longrightarrow v_{c,c'} \in V(w)\ \vee\ e_{c,c'} \in \mathcal{E}(w)\ .$$

We present some elementary properties and give a characterization of hypercacti.

Donnerstag, 16.11.2006 — Zeit: 15:25

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9 — Sektion I — G03-106 — 15:25

Relative position of small point configurations

NICO DÜVELMEYER (Chemnitz)

To determine all embeddings of a metric space into a suitable Minkowski space, we can try all possible relative positions of the embedded points and investigate one after another all corresponding embeddings. For this purpose, the relative position of points contains more information then the oriented matroid of the affine point configuration. In the planar case the concept of allowable sequences describes exactly the relative position in the required sense.
We will look at the algorithmical generation of a complete list of relative positions.

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10 — Sektion II — G03-214 — 15:25

3-coloring of graphs with restricted neighborhood

MARTIN KOCHOL (Bratislava)

The 3-colorability problem is known to be NP-complete in the class of graphs. We study this problem for classes of graphs where neighborhood of each vertex satisfies certain property. Primarily we present a linear time algorithm for 3-coloring of this graphs. We also study classes of graphs with degree at most four with restrictions on neighborhoods of vertices of degree exactly four. We show that the 3-coloring problem is either NP-complete or can be solved in linear time. In particular, we generalize classical Brooks' Theorem in case of 3-colorability to a larger class by showing that every connected graph in that class is 3-colorable, unless it is a complete graph on four vertices.

11 — Sektion III — G02-106 — 15:25

Maximal strictly partial Hamming packings of $\mathbb{Z}_2^n$

THOMAS WESTERBÄCK (Stockholm)

A maximal partial Hamming packing of $\mathbb{Z}_2^n$ is a family $\mathcal{S}$ of mutually disjoint cosets of Hamming codes of length n, such that any coset of any Hamming code of length n intersects at least one of the cosets in $\mathcal{S}$. The number of cosets in $\mathcal{S}$ is the packing number p, and a partial Hamming packing is strictly partial if the family $\mathcal{S}$ does not constitute a partition of $\mathbb{Z}_2^n$.

We show that $m+1 \leq p \leq n-1$ for any maximal strictly partial Hamming packing of $\mathbb{Z}_2^n$ where $n = 2^m - 1$. By a computer search we found all possible packing numbers when $n = 7$ and 15. In the case $n = 7$ the packing number is 5, and in the case $n = 15$ the possible packing numbers are $5, 6, 7, \ldots, 13$ and 14. We also show that for any $n = 2^m - 1$, where $m \geq 4$, there exist maximal strictly partial Hamming packings of $\mathbb{Z}_2^n$ with packing numbers $n-10, n-9, n-8, \ldots, n-1$.

12 — Sektion IV — G02-111 — 15:25

Center-symmetric subsets of subsets of $\mathbb{N}$ which have infinite reciprocal sum

EGBERT HARZHEIM (Köln)

A subset of the set $\mathbb{N}$ of natural number is said to be center-symmetric relative to a center $z \in \mathbb{N}$, if S has an even number $2n$ of elements and if the following holds: With each element a of the n greatest elements of S also that element a' is in S for which $a - z = z - a'$. There holds: If $S \subseteq \mathbb{N}$ satisfies $\sum\{\frac{1}{n} | n \in S\} = \infty$, then S has for every $k \in \mathbb{N}$ a center-symmetric subset of $2k$ elements.
By the way: Two years ago I talked on the following theorem, using the continuum hypothesis: There exists a subset S of the set $\mathbb{R}$ of real numbers which has an order type less than that of $\mathbb{R}$, and which has a similarity decomposition, that means: It is decomposable into $|\mathbb{R}|$ disjoint subsets each of which is order-isomorphic to S. This can now also be proved without the use of the continuum hypothesis. (This theorem gives a positive answer to a question of S. Ginsburg (Trans.Amer.Math.Soc. **74**, 514-535 (1953)).

Donnerstag, 16.11.2003 — Zeit: 15:52

13 — Sektion I — G03-106 — 15:52

Approximating 3-dimensional convex bodies by polytopes with a restricted number of edges

VIKTOR VÍGH (Szeged)

We give an asymptotic formula for the Hausdorff-distance of a sufficiently smooth convex body $K \subset \mathbf{R}^3$ and its best approximating (inscribed or circumscribed) polytope, where the number of edges (1-dimensional faces) of the polytope is restricted. Similar results exist only for the cases when the number of vertices or facets of the approximating polytope are prescribed.

This is joint work with K. Böröczky Jr. (MTA Rényi Institute, Budapest, Hungary) and F. Fodor (University of Szeged, Szeged, Hungary).

14 — Sektion II — G03-214 — 15:52

A new upper bound for the chromatic number of a graph

INGO SCHIERMEYER (Freiberg)

For a connected graph G of order n, the clique number $\omega(G)$, the chromatic number $\chi(G)$ and the independence number $\alpha(G)$ satisfy $\omega(G) \leq \chi(G) \leq n - \alpha(G) + 1$. We will show that the arithmetic mean of the previous lower and upper bound provides a new upper bound for the chromatic number of a graph.

Theorem
Let G be a connected graph of order n with clique number $\omega(G)$ and independence number $\alpha(G)$. Then

$$\chi(G) \leq \frac{n + \omega + 1 - \alpha}{2}.$$

Moreover, $\chi(G) = \frac{n+\omega+1-\alpha}{2}$, if either $\omega + \alpha = n + 1$ (then G is a split graph) or $\alpha + \omega = n - 1$ and G contains a $K_{\omega+3} - C_5$.

15 — Sektion III — G02-106 — 15:52

On the failing cases of the Johnson bound for error-correcting codes

WOLFGANG HAAS (Freiburg)

A central problem in coding theory is to determine $A(n, 2e + 1)$, the maximal cardinality of a binary code of length n correcting up to e errors. When n and e are comparatively small, the best upper bound on $A(n, 2e + 1)$ usually is the Linear Programming Bound from Delsarte (1973). When e is fixed however, Delsartes bound is not tractable for large n. In this case the best bound is the well-known Johnson bound from 1962. This however simply reduces to the sphere packing bound if a Steiner system $S(e + 1, 2e + 1, n)$ exists. Despite the fact that no such system is known whenever $e \geq 5$, they possibly exist for a set of values for n with positive density. Therefore in these cases no non-trivial numerical upper bounds on $A(n, 2e + 1)$ are known.
In this talk, the author presents a third method for upper-bounding $A(n, 2e + 1)$, which closes this gap in coding theory. The method is founded on lower bounds for $K(n, R)$, the minimal cardinality of a binary code of length n and covering radius R. The author uses the system of linear inequalities satisfied by the number of elements of a covering code lying in k-dimensional subspaces of the Hamming Space and extends earlier work in the case of covering radius one to arbitrary covering radius. The method suffices to give the first proof, that the difference between the sphere packing bound and $A(n, 2e + 1)$ approaches infinity with increasing n whenever $e \geq 2$ is fixed. The same result also holds for codes over arbitrary alphabet size. Interesting enough, the complete proof requires a classical Theorem of Siegel on Diophantine approximation.

16 — Sektion IV — G02-111 — 15:52

Magic and Latin Triangle and Hexagon Boards

HEIKO HARBORTH (Braunschweig)

Triangle and hexagon boards $B(n)$ are parts of the triangle and hexagon tessellation of the plane, similar to chessboards as parts of the square tessellation of the plane. One cell is $B(1)$, all cells around a vertexpoint is $B(2)$, and then $B(n)$ consists of $B(n - 2)$ together with all surrounding cells having at least one point in common with $B(n-2)$. Magic and latin boards are wellknown for squares. Here corresponding problems are discussed for triangle and hexagon boards.

This is joint work with Stefan Krause.

Donnerstag, 16.11.2006 — Zeit: 16:20

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17 — Sektion I — G03-106 — 16:20

Metric capacity of normed spaces

GENNADIY AVERKOV (Magdeburg)

Let $\mathcal{M}^d$ be an arbitrary real normed space of finite dimension $d \geq 2$. We define the metric capacity of $\mathcal{M}^d$ as the maximal $m \in \mathcal{N}$ such that every m-point metric space is isometric to some subset of $\mathcal{M}^d$ (with metric induced by $\mathcal{M}^d$). We obtain that the metric capacity of $\mathcal{M}^d$ lies in the range from 3 to $\left\lfloor \frac{3}{2}d \right\rfloor + 1$, where the lower bound is sharp for all d, and the upper bound is shown to be sharp for $d \in \{2, 3\}$. Thus, the unknown sharp upper bound is asymptotically linear, since it lies in the range from $d + 2$ to $\left\lfloor \frac{3}{2}d \right\rfloor + 1$.

The presentation is based on the joint results with Nico Düvelmeyer (TU Chemnitz).

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18 — Sektion II — G03-214 — 16:20

Färbungen von Distanzgraphen

MASSIMILIANO MARANGIO (Salzgitter)

Ein Distanzgraph $G(S, D)$ mit $S \subseteq \mathbb{R}^n$ und $D \subseteq \mathbb{R}^+$ ist ein Graph mit Knotenmenge S und Kanten zwischen allen Knoten u und v, für die der euklidische Abstand $\|u - v\|_2 \in D$ ist.
Im Vortrag werden u. a. Ergebnisse über die chromatische Zahl $\chi(G)$, die kantenchromatische Zahl $\chi'(G)$ und die totalchromatische Zahl $\chi''(G)$ von Distanzgraphen $G = G(S, D)$ zusammengefasst.

19 — Sektion III — G02-106 — 16:20

On monomial bent functions

GOHAR KYUREGHYAN (Magdeburg)

A bent function is a Boolean function $f : \mathbb{Z}_{2^n} \to \mathbb{Z}_2$ with n even, which has the maximal possible Hamming distance from the set of affine Boolean functions. Our talk is devoted to the monomial bent functions given by $f(x) = Tr_{n/1}(\lambda x^d)$. We will list the known exponents d and coefficients $\lambda \in \mathbb{Z}_{2^n}$, which define a monomial bent function. We will consider the recently found exponents $2^{2r} + 2^r + 1$ and $2^{2r} + 2^{r+1} + 1$ in more detail.

This talk is based on joint papers with A. Canteaut and P. Charpin.

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20 — Sektion IV — G02-111 — 16:20

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Freitag, 17.11.2006 — Zeit: 14:30

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21 — Sektion I — G03-106 — 14:30

An extension of the Triangle Lemma

MICHAEL ANDRESEN (Magdeburg)

The Triangle Lemma by GOLUMBIC is a well-known tool for analyzing implication classes in comparability graphs. For any tricolored triangle in a transitive orientation of a graph G (all three arcs belong to different implication classes) the vertices of every arc in G having one of these colors, are adjacent to some vertex of the triangle by arcs having the other two colors.
This famous theorem is stated in terms of implication classes which are based on the notion of a so-called Γ-relation. We introduce some substructure of these implication classes which are based on a new relation derived from the Γ-relation by respecting some sort of *forbidden edges*. We show that parts of the statement remain true for these new Γ-components making the ideas of the Triangle Lemma applicable to a new area of constellations for the triangle under consideration. For instance, it may be perfectly possible to apply this extended Triangle Lemma to a singlecolored triangle.
This extension of the Triangle Lemma has been used to solve a problem arising in the analysis of irreducible sequences for the open-shop scheduling problem.

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22 — Sektion II — G03-214 — 14:30

$[r, s, t]$-colorings of stars

JULIANE LEHMANN (Braunschweig)

For nonnegative integers r, s and t, an $[r, s, t]$-coloring of a graph G is a mapping $c : V(G) \cup E(G) \to \{0, 1, \ldots, k-1\}$ such that $|c(v) - c(v')| \geq r$ for any adjacent vertices v, v', $|c(e) - c(e')| \geq s$ for any adjacent edges e, e', and $|c(v) - c(e)| \geq t$ for any vertex v incident to edge e hold. The minimal k such that an $[r, s, t]$-coloring of G exists is called the $[r, s, t]$-chromatic number $\chi_{r,s,t}(G)$ of G.
The $[r, s, t]$-chromatic number of stars $K_{1,n}$ with an arbitrary number n of leaves will be determined. $K_{1,\Delta(G)}$ is a subgraph of G, if G has maximum degree $\Delta(G)$. Thus $\chi_{r,s,t}(K_{1,\Delta(G)})$ is a lower bound for $\chi_{r,s,t}(G)$.

23 — Sektion III — G02-109 — 14:30

List Classes and Difference Lists

GERHARD GERLICH (Braunschweig)

Let G be an abelian group of order v. A difference list $L = \sum_{g \in G} l_g g$ is an element of the group algebra $\mathbf{Q}G$ that satisfies $LL^{(-1)} = n1_G + \lambda G$ where the coefficients l_g are non-negative integers. L is a difference set if $l_g \in \{0,1\}$. We introduce an equivalence relation on $\mathbf{Q}G$. A part of the resulting equivalence classes form a group which we call the *list class group* $\mathcal{C}$ of $\mathbf{Q}G$. List classes $[L]$ which contain difference lists form a subgroup of $\mathcal{C}$. We start with a characterisation of these classes. Then we concentrate on the elements of $\mathcal{C}$ of finite order. It comes out that each list class of finite order contains difference lists and that $ord\,[L] = 2$ if and only if the difference lists in $[L]$ admit -1 as a multiplier. So the property that a difference list belongs to a class of finite order appears as a generalisation of the property that -1 is a multiplier. We give a complete classification of all list classes of finite order. This enables us to determine the algebraic structure of the torsion subgroup $T(\mathcal{C})$ of the list class group. We also present difference sets in classes of finite order which do not admit the multiplier -1. Finally, we give generalisations of some theorems which are well known results for difference sets with multiplier -1.

24 — Sektion IV — G02-111 — 14:30

Hereditary Discrepancy in Different Numbers of Colors

MAHMOUD FOUZ (Saarbrücken)

The discrepancy of a hypergraph measures how balanced it can be colored in two colors. The generalization to arbitrary numbers of colors has lead to surprising results. Although a couple of classical results could be generalized to the multi-color case, it turned out that there is no general relationship between the discrepancies of a hypergraph in different numbers of colors.
This dichotomy could be solved by considering a stronger notion of discrepancies - the hereditary discrepancy.
In this talk, I will give a quick introduction into discrepancies of hypergraphs and show (just main proof idea) that the hereditary discrepancies for a hypergraph in different numbers of colors differ only by factors depending linearly on the respective numbers of colors, i.e., for any hypergraph $\mathcal{H}$ and arbitrary numbers $a, b \in \mathbb{N}_{\geq 2}$ of colors, we have

$$\text{herdisc}(\mathcal{H}, b) \leq O(a)\text{herdisc}(\mathcal{H}, a).$$

Freitag, 16.11.2004 — Zeit: 14:57

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25 — Sektion I — G03-106 — 14:57

Random planar structures

MIHYUN KANG (Berlin)

In this talk we will discuss the enumeration results, uniform sampling algorithms, and properties of planar graphs and its subclasses. For exact enumeration and uniform sampling we use the so-called recursive method based on decomposition of graphs along the connectivity. For asymptotic enumeration we use the singularity analysis of generating functions, and for typical properties we use the probabilistic method.

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26 — Sektion II — G03-214 — 14:57

l-chain-profile vectors

DÁNIEL GERBNER (Budapest)

The l-chain profile vector of a set system $\mathcal{F}$ on a base set X of size n is defined to be the vector of length $\binom{n+1}{l}$ in which the αth component ($\alpha = (\alpha_1, \alpha_2, ..., \alpha_l) \quad 0 \leq \alpha_1 < \alpha_2 < ... < \alpha_l \leq n$) is the number of l-chains in $\mathcal{F}$ with the smallest set having size α_1, the second smallest α_2, and so on. We modify the method of P.L. Erdős, P. Frankl and G.O.H. Katona to determine the l-chain profile polytope of some sets of families including k-Sperner families.

This is joint work with Balázs Patkós

27 — Sektion III — G02-109 — 14:57

Large sets of t-designs from t-homogeneous groups

REINHARD LAUE (Bayreuth)

Large set recursion allows to construct series of t-designs for arbitrarily large t. But only rather restricted parameter sets are admissible for such a construction. It is an open question which of these are realizable. A recursion starts from directly constructed N t-(v, k, λ) designs with the same parameters partitioning the set of all k-element subsets of a set of size v. These form a large set LS$[N](t, k, v)$. We obtain many new large sets by combining orbits of a t-homogeneous group of different sizes. In particular, LS$[10](3, 15, 60)$, LS$[714](3, 15, 60)$, and LS$[518157892](3, 15, 60)$ are obtained out of 518157630 orbits of size $60 * 59 * 29$, 775 orbits of size $20 * 59 * 29$, 18 orbits of size $12 * 59 * 29$, and 1 orbit of size $4 * 59 * 29$ of $PSL(2, 59)$. By recursion we show that, in particular, all admissible parameter sets of LS$[3](3, k, v)$ are realizable for $k \leq 80$.

This is joint work with A. Wassermann, B. Tayfeh and R. Omidi.

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28 — Sektion IV — G02-111 — 14:57

Discrepancy of d-dimensional Arithmetic Progressions with Common Difference

NILS HEBBINGHAUS (Saarbrücken)

Estimating the discrepancy of the hypergraph of all arithmetic progressions in the set $[N]$ of the first N natural numbers was one of the classical problems in discrepancy theory. The lower bound of order $O(N^{1/4})$ was proven by Roth in the year 1964. Spencer and Matoušek 32 years later showed that this bound is asymptotically tight. Doerr, Srivastav, and Wehr generalized the hypergraph of arithmetic progressions to higher dimensions. For the hypergraph of direct products of d arithmetic progressions in $[N]^d$ they proved a discrepancy of order $\Theta_d(N^{d/4})$. We investigate the discrepancy of the following subhypergraph. The hyperedges are only those direct products of d arithmetic progressions in $[N]^d$ such that all arithmetic progressions have the same difference between two consecutive elements. For the discrepancy of this hypergraph we prove a lower bound of order $\Omega_d(N^{d/(2d+2)})$. Furthermore, we show that this bound is nearly sharp by giving an upper bound of order $O_d(N^{d/(2d+2)} \log^{\frac{3}{2}d+2} N)$.

Freitag, 17.11.2006 — Zeit: 15:25

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29 — Sektion I — G03-106 — 15:25

Phase transitions in random graphs processes

TARAL GULDAHL SEIERSTAD (Berlin)

It is well known that the random graph $G(n,p)$ undergoes a so-called *phase transition* when $p = \frac{1}{n}$: if $p = \frac{c}{n}$ with $c < 1$, $G(n,p)$ consists with high probability of many small components, while if $c > 1$, then there is with high probability a unique component with a linear number of vertices, called the *giant component*. We consider other random graph models – random graphs with a given degree sequence, and the minimum-degree graph process – and show that these also undergo such a phase transition, and we also consider the critical phase of these graph models, which is the period in which the giant component is formed.

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30 — Sektion II — G03-214 — 15:25

Deterministic Random Walks on the Infinite Grid

TOBIAS FRIEDRICH (Saarbrücken)

Jim Propp's rotor router model is a deterministic analogue of a random walk on a graph. Instead of distributing chips randomly, each vertex serves its neighbors in a fixed order. We analyze the difference between Propp machine and random walk on the infinite two-dimensional grid. It is known that, independent of the starting configuration, at each time, the number of chips on each vertex deviates from the expected number of chips in the random walk model by at most a constant. We show that this constant is approximately 7.8, if all vertices serve their neighbors in clockwise or counterclockwise order and 7.3 otherwise. This result in particular shows that the order in which the neighbors are served makes a difference. Our analysis also reveals a number of unexpected properties of these Propp machines.

31 — Sektion III — G02-109 — 15:25

Pan-orientable Block Designs

MARTIN GRÜTTMÜLLER (Rostock)

A *balanced incomplete block design* BIBD(v, k, λ) is a pair $(V, \mathcal{B})$ where V is a v-set and $\mathcal{B}$ is a collection of k-subsets of V (blocks) such that each pair of elements of V occurs in exactly λ blocks. A *k-tournament* is a directed graph on k vertices in which there is exactly one arc between any two vertices.
Given a k-tournament T, we call a BIBD($v, k, 2$) *T-orientable* if it is possible to replace each block $\mathcal{B}$ by a copy of T on the set B such that every ordered pair of distinct points appears in exactly one of the tournaments. Clearly, this provides a decomposition of the arcs of the complete directed graph into subgraphs each isomorphic to T. In the other direction, by replacing each subgraph in such a decomposition by a block containing all the vertices of the subgraph a BIBD($v, k, 2$) is obtained, the *underlying* design. We call a BIBD($v, k, 2$) *pan-orientable* if it is T-orientable for every possible k-tournament T.
There is an extensive literature on oriented triple systems. In this talk we investigate the case $k = 4$ and discuss the asymptotic existence of pan-orientable designs.

This is joint work with Sven Hartmann, Massey University (New Zealand).

32 — Sektion IV — G02-111 — 15:25

Line transversals to families of spheres

FERENC FODOR (Szeged)

We shall start by describing a recent joint result of T. Bisztriczky, F. Fodor and D. Oliveros regarding pairwise disjoint families of unit disks in the plane. The statement says that if every four-element subfamily has a line transversal then there is a line that meets all members of the family with the possible exception of one.
We shall continue with recent developments in similar problems in higher dimensions about families of unit balls.

Freitag, 17.11.2006 — Zeit: 15:52

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33 — Sektion I — G03-106 — 15:52

Extremal results for minors and rooted minors

LEIF K. JØRGENSEN (Aalborg)

For a fixed graph H we want to find extremal results for H minors, i.e., we want to find (bounds on) the largest number of edges in a (k-connected) graph with n vertices and with no H minor.
We prove that a graph with at least $5n-11$ edges has a $K_{4,5}$ minor. In the proof we use that for any set X of four vertices in a 4-connected graph with $5n-14$ edges there is a $K_{3,4}$ minor where the vertices of X are contracted onto the four vertices of one colour class of $K_{3,4}$.
We also prove that 3-connected graphs without a $K_{3,5}$ minor have at most $4n-8$ edges.

This is joint work with K. Kawarabayashi.

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34 — Sektion II — G03-214 — 15:52

Competition structures of directed and undirected graphs

HANNS-MARTIN TEICHERT (Lübeck)

If $D=(V,A)$ is a digraph, its *competition graph* has vertex set V and edge set
$E=\{\{u,w\}\mid u\neq w \wedge \exists\, v\in V:(u,v)\in A \wedge (w.v)\in A\}$. The *competition hypergraph* of D also has vertex set V and egde set $\mathcal{E}=\{e\subseteq V \mid |e|\ \geq 2\ \wedge\ \exists\, v\in V: e=N_D^-(v)\}$. For an undirected graph G its *competition graph* has the same vertices too and two vertices are adjacent if they have a common neighbor in G; in literature these graphs are known as 2-step graphs or neighborhood graphs.
In this talk we give a short summary of some old and new results for the competition structures mentioned above

35 — Sektion III — G02-109 — 15:52

Flag-transitive Combinatorial Designs

MICHAEL HUBER (Tübingen)

Among the properties of homogeneity of incidence structures flag-transitivity obviously is a particularly important and natural one. Consequently, in the last decades flag-transitive Steiner t-designs (i.e. flag-transitive t-$(v, k, 1)$ designs) have been investigated, whereas only by the use of the classification of the finite simple groups it has been possible in recent years to essentially characterize all flag-transitive Steiner 2-designs. However, despite the finite simple group classification, for Steiner t-designs with parameters $t > 2$ such characterizations have remained challenging open problems for about 40 years. The object of this talk is to present the complete classification of all flag-transitive Steiner t-designs with $t > 2$. The deep result relies on the classification of the finite doubly transitive permutation groups. The occurring examples and an outline of the proof shall be illustrated.

36 — Sektion IV — G02-111 — 15:52

Zariski-Topologien und Algebraische Kombinatorik

WALTER WENZEL (Chemnitz)

In den letzten Jahren hat sich das Gebiet der “Tropical Geometry” in rascher Entwicklung befunden. Grob gesprochen handelt es sich dabei um die Geometrie über dem Semiring der reellen Zahlen inlusive ∞, wobei aber die zugrundeliegende Addition die Minimum-Bildung und die Multiplikation die gewöhnliche Addition bedeutet. Diese algebraische Struktur ist insbesondere im Zusammenhang mit Phylogenetischen Bäumen von großem Interesse.
Es hat sich nun gezeigt, dass die klassische “Algebraische Geometrie” und die “Tropical Geometry” viele analoge Eigenschaften aufweisen. Insbesondere kann auch in der “tropical Geometry” eine Zariski-Topologie definiert werden.
Zum Zwecke eines einheitlichen Zugangs zu der klassischen Algebraischen Geometrie und der “Tropical Geometry” soll in dem Vortrag eine allgemeine Klasse von abstrakten Zariski-Topologien vorgestellt werden. Dabei wird eine einfache Algebraische Struktur zugrunde gelegt, die insbesondere auch interessante kombinatorische Anwendungen gestattet, so zum Beispiel in der Theorie der “Geordneten Mengen.”

Freitag, 17.11.2006 — Zeit: 16:45

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37 — Sektion I — G03-106 — 16:45

Partial Colorings of Unimodular Hypergraphs

BENJAMIN DOERR (Saarbrücken)

A *hypergraph* $\mathcal{H} = (V, \mathcal{E})$ consists of a (here) finite set V of vertices and a set $\mathcal{E} \subseteq 2^V$ of hyperedges. It is called *unimodular* if each induced subhypergraph has an almost balanced coloring, that is, if for each $V_0 \subseteq V$ there is a two-coloring $\chi : V_0 \to \{1, 2\}$ such that for all $E \in \mathcal{E}$, $\big||E \cap \chi^{-1}(1)| - |E \cap \chi^{-1}(2)|\big| \leq 1$. Hence these hypergraph can be colored as balanced as possible taking into account that an odd cardinality hyperedge cannot be colored perfectly balanced.
An interesting question is whether we can avoid such imbalances (caused by the 'odd' vertex) by not coloring all the vertices. In contrast to the above sketched nice behaviour of unimodular hypergraph, this is not possible for all unimodular hypergraphs. A simple counter-example is the hypergraph of all intervals of length 3 and 5 in $\{1, \ldots, 6\}$. On the other hand, k–uniform unimodular hypergraphs do have this property if $k \geq 2$.
In this talk, I present a simple characterization of when partial coloring is possible.

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38 — Sektion II — G03-214 — 16:45

Counting Schnyder woods

FLORIAN ZICKFELD (Berlin)

Schnyder woods on plane triangulations where first introduced by W. Schnyder in '89 as a tool for graph drawing and graph dimension theory. Since then extensive research has been done on Schnyder woods including a generalization to 3-connected planar maps. While infinite families of triangulations and other planar maps are known which have a unique Schnyder wood it remains an interesting open question to determine the maximum number of Schnyder woods that a planar map can have.
We show that there are infinitely many triangulations which have more than 2.27^n Schnyder woods and that no triangulation has more than 3.56^n Schnyder woods. For 3-connected planar maps the respective bounds are 3.2^n and 12.68^n. Besides classic and recent results about Schnyder woods the tools used to obtain these bounds include α-orientations, perfect matchings on bipartite graphs. The talk focuses on the connections that allow to use these tools for counting Schnyder woods.

This is joined work with Stefan Felsner.

39 — Sektion III — G02-109 — 16:45

News on configurations

HARALD GROPP (Heidelberg)

A *configuration* n_k is an incidence structure of n points and n lines such that (1) each line contains k points, (2) each point lies on k lines, and (3) two different points are connected by at most one line. Hence configurations are linear regular uniform hypergraphs, however defined already in 1876 (130 years ago). In 1881 (125 years ago) Reye posed the problem of configurations as follows.
Das Problem der Configurationen nun verlangt, daß alle verschiedenartigen, zu den Zahlen n und i gehörigen Configurationen n_i ermittelt und daß ihre wichtigsten Eigenschaften aufgesucht werden.
Now in 2006 a survey on new results since 2004 will be given including the existence of configurations 98_{10} by Funk et al. and 34_6 by Krčadinac, the nonexistence of configurations 33_6 and 112_{11} by Kaski and Östergård and recent results of the author for infinite series of nonisomorphic configurations n_5 and n_6.

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40 — Sektion IV — G02-111 — 16:45

NP-complete but easy: to be or not to be Yutsis

DRIES VAN DYCK (Hasselt)

Yutsis graphs or dual Hamiltonian cubic graphs are simple connected cubic graphs that can be partitioned into two vertex induced trees, which are necessarily of the same size.
Although deciding whether a given cubic graph is Yutsis is an NP-complete problem, the number of hard instances is surprisingly low. We present some structural properties leading to fast heuristics recognizing the overwhelming majority of both Yutsis and non Yutsis graphs.
The presented algorithms were used to determine the number of Yutsis and non Yutsis cubic graphs with upto 30 vertices and cubic polyhedra upto 40 vertices. We also confirmed Jaeger's conjecture that all cyclically 4-connected cubic graphs are Yutsis upto 30 vertices.

This is joint work with Robert E. L. Aldred, Gunnar Brinkmann, Veerle Fack and Brendan D. McKay.

Freitag, 17.11.2006 — Zeit: 17:12

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41 — Sektion I — G03-106 — 17:12

On Systems of Finite Complementing Subsets

AUGUSTINE O. MUNAGI (Johannesburg)

A collection $\{S_1, S_2, \ldots\}$ of nonempty sets is called a system of complementing subsets for a set X of nonnegative integers if every $x \in X$ can be represented uniquely as a sum $x = s_1 + s_2 + \cdots$ with $s_i \in S_i\, \forall i$. We give a complete characterization and enumeration of the set of all systems of complementing subsets for $N_n = \{0, 1, \ldots, n-1\}$. Our results generalize those of C. T. Long (Pacific J. Math. **23** (1967), 107-112) who solved the problem for complementing pairs of subsets of N_n.

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42 — Sektion II — G03-214 — 17:12

A Direct Decomposition of 3-Connected Planar Graphs

DANIEL JOHANNSEN (Saarbrücken)

Three-connected planar graphs are in a one-to-one relationship to the edge-graphs of convex polyhedra. The problem of enumerating these graphs as unlabeled objects dates back to Euler and is still unsolved.
In the talk a decomposition strategy for c-nets, i.e., rooted 3-connected planar graphs, is presented. This decomposition yields an algebraic equation for the generating function counting all c-nets on a given number of vertices and edges. By evaluation of the generating function the growth-constant of the number of c-nets and an efficient recursion formula (other than given by the decomposition) is obtained.

43 — Sektion III — G02-109 — 17:12

Number of different degree sequences of a graph with no isolated vertices

AXEL KOHNERT (Bayreuth)

We derive recursion formulas which allow us to compute the number of different degree sequences of graphs without isolated vertices. This is sequence number A095268 in the online Encyclopedia of Integer Sequences. Recently there has been some discussions about this sequence in the SeqFan mailing list. Our method allows to compute these numbers for up to > 30 vertices. This is much more than previously known. At the end of the talk I will mention some open problems concerning these numbers.

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44 — Sektion IV — G02-111 — 17:12

Matrix Rounding

CHRISTIAN KLEIN (Saarbrücken)

Rounding a real-valued matrix to an integer one such that the rounding errors in all rows and columns are less than one is a classical problem. It has been applied to hypergraph coloring, in scheduling and in statistics. In this talk we show how to solve a stronger version of this problem, where one additionally requires that the errors in all initial intervals of rows and columns are less than one.
It often is also desirable to round each entry randomly such that the probability of rounding it up equals its fractional part. This is known as unbiased rounding in statistics and as randomized rounding in computer science. We give a randomized algorithm that computes roundings having this additional property.

Freitag, 17.11.2006 — Zeit: 17:40

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45 — Sektion I — G03-106 — 17:40

On shadows of intersecting set systems

CHRISTIAN BEY (Magdeburg)

Let $I(n,k,t)$ denote the set of all k-uniform t-intersecting set systems on $[n]$, $n > 2k-t$. Given $\mathcal{A} \in I(n,k,t)$, let $\partial_\ell \mathcal{A}$ denote the shadow of $\mathcal{A}$ in level $k-\ell$, i.e., the system of all $(k-\ell)$-sets which are contained in a set of $\mathcal{A}$. Let $\mathcal{B}(r) = \{B \subseteq [n] : |B| = k, |B \cap [t+2r]| \geq t+r\}$, $r = 0,\ldots,k-t$. Two well-known results in extremal set theory are:
(i) Katona's shadow estimation $|\partial_\ell \mathcal{A}| \geq |\mathcal{A}|\,|\partial_\ell(\mathcal{B}(k-t))|/|\mathcal{B}(k-t)|$ for $\mathcal{A} \in I(n,k,t)$, $1 \leq \ell \leq t$,
(ii) the Ahlswede-Khachatrian theorem $\max\{|A| : A \in I(n,k,t)\} = \max\{|\mathcal{B}(r)| : 0 \leq r \leq k-t\}$.
Here we present shadow estimations for $\mathcal{A} \in I(n,k,t)$ which involve all $\mathcal{B}(r)$'s from (ii) and generalize (i).

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46 — Sektion II — G03-214 — 17:40

Some bounds and open questions for L_P-list labellings

ANJA KOHL (Freiberg)

Let $G = (V,E)$ be a simple graph and for all $v \in V$ let $L(v)$ be a set of labels assigned to v. $\mathcal{L} = \{L(v) \mid v \in V\}$ is called a list assignment of G. A $k-$assignment is a list assignment where all lists have the same cardinality k that is $|L(v)| = k$ for all $v \in V$.
For a given list assignment $\mathcal{L} = \{L(v) \mid v \in V\}$ and an $r-$tuple $P = (p_1,\ldots,p_r)$ consisting of nonnegative integers an L_P-*list labelling* of G is a function f that assigns a label $f(v) \in L(v)$ to every vertex $v \in V$, such that $|f(v) - f(w)| \geq p_i,$ if $dist(v,w) \leq i \leq r$.
$\chi_\ell^P(G)$ is the smallest integer k, such that every k-assignment admits an L_P- list labelling of G.

We present some general bounds for $\chi_l^P(G)$ and particular results for the cases $r = 1, 2$. Moreover, we discuss some open questions concerning different types of labellings with distance constraints, e.g. the connection between $\chi_l^{(1)}(G)$ and $\chi_l^{(d)}(G)$ as well as between $\chi_l^{(2,1)}(G)$ and its non-list version $\lambda_{2,1}(G)$.

47 — Sektion III — G02-109 — 17:40

The Rotational Dimension of a Graph

MARKUS WAPPLER (Chemnitz)

Suppose, one gives us the task to embed a graph with n vertices to n-space, such that the vertices are mapped as far apart as possible, measured by their variance, while adjacent vertices should have the distance of at most one. This problem may be interpreted as Lagrangian Dual to maximizing the algebraic connectivity of the graph over all nonnegative edge weightings whose total weight is one. If we look physically at the embedding problem, we obtain, that optimal configurations realize the mimimal potential energy of the image of the graph for a rotation around its barycenter with constant angular speed (vertices have mass one, edges are massless, dimension is high enough). The Rotational Dimension of the graph is the smallest dimension of a subspace, which contains an optimal configuration. We give an upper bound on the Rotational Dimension by the treewidth of the graph plus one. A small extension leads to a new minor monotone graph property. We will give the lists of forbidden minors for small dimensions, which lead to the conjecture of a close relation to the Colin de Verdière Number of a graph.

48 — Sektion IV — G02-111 — 17:40

Partitions-Requirements-Matrices (PRMs)

REGINA HILDENBRANDT (Ilmenau)

PRMs represent a new mathematical structure which was found in the last 10-15 years.
They have their origin in stochastic dynamic distance optimal partition problems (SDDP). They could lead to an expanded conception of monotone Markov chains and optimality monotone policies of Markov decision processes.
But PRMs themselves are combinatorial interesting: The definition of PRMs includes that PRMs are computed by means of a ”simple” enumeration, at first (a laborious method). And there is a main difficulty to deal with: No formulas are known for the most elements of PRMs.
The definition of PRMs is based on sets of restricted (unordered) partitions. Their elements p_{ij} are the numbers (probabilities respectively) of transitions from a partition i in another partition j for some “requirements”. More precisely, that are transitions to “feasible” partitions with least square sums of their coordinates.
Formulas for limits of P-R-Ms in the case of “sparse” partitions and “non-curtailed heavy” partitions have been found. “Kernel-equations” with P-R-Ms have been considered. A monotonicity of their solutions has been shown in certain cases. The solutions with regard to limits or P-R-Ms have a nice structure in contrast to the formulas of the limits of P-R-Ms.
In the case of discrete uniformly distributed requirements the elements of PRMs are sums of polynomials and exponential functions (in relation to a certain parameter). There the exponential functions follow from the limits of PRMs and the degrees and the leading terms of the polynomial have been computed.
Further on, a new rule for computation of PRMs has been given. It is based on the definition of perturbed partitions.
The lecture gives a summary about the results to P-R-Ms.

Samstag, 18.11.2006 — Zeit: 10:20

53 — Sektion I — G03-106 — 10:20

Faces of the Birkhoff Polytope

ANDREAS PAFFENHOLZ (Berlin)

The Birkhoff polytope B_n is the convex hull of all $n \times n$ permutation matrices. B_n is also known as the set of all doubly stochastic matrices, i.e. all $n \times n$ matrices with row and column sums equal to one. Its properties are of great interest in various fields of mathematics.
B_n is an $(n-1)^2$-dimensional $0/1$-polytope. Hence, also its faces are $0/1$-polytopes, but not all such polytopes do appear as faces. Brualdi and Gibson have provided several restrictions on the combinatorial types of d-faces, mainly depending on the number of vertices of the face. Later Billera and Sarangarajan proved that any combintorial type of d-face appears already in B_{2d}.
In my talk I review some of these results and present new combinatorial properties and restrictions of d-faces of B_n. In particular, we examine the connection between the combinatorial type of a d-face and the smallest dimension n of a Birkhoff polytope that has such a face.

This is joint work with Barbara Baumeister, Christian Haase, Benjamin Nill.

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54 — Sektion II — G03-214 — 10:20

Chordal Graphs and Intersection Graphs of Pseudosegments

CORNELIA DANGELMAYR (Berlin)

A graph is a PSI-graph if there is a one-to-one correspondance between the set of vertices and a set of pseudosegments such that two vertices are adjacent if and only if the corresponding pseudosegments intersect. The recognition problem of the class of PSI-graphs is NP-complete.
Interval graphs are defined similarly and can easily be transformed into PSI-representations. A superclass of interval graphs are chordal graphs. The subclass of VPT-graphs known as path graphs belongs to the class of PSI-graphs but there are families of chordal graphs that do not admit a PSI-representation.

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55 — Sektion III — G02-109 — 10:20

Perfect codes of kernel dimension -3

OLOF HEDEN (Stockholm)

The problem of the classification of all perfect codes is far from solved. The kernel of a perfect code C is the set of words p such that $p + c \in C$ for all words c of C. The kernel is a subspace of Z_2^n and the number of words of a 1-error correcting perfect binary code of length n equals $2^{n-\log(n+1)}$. We show that every 1-error correcting perfect binary code C of length n and with a kernel of dimension $n - \log(n+1) - 3$ is a Phelps code.

56 — Sektion IV — G02-111 — 10:20

Optimal Line-Ups in Team Competitions with Non-linear Objective Functions

STEFAN SCHWARZ (Jena)

We consider a team competition (as in chess or table tennis) where every member of team $A = \{a_1, \dots, a_n\}$ plays against exactly one member of team $B = \{b_1, \dots, b_n\}$, where $a_i > 0$ and $b_i > 0$ denote the playing strength of the i-th player of team A and B, respectively. We assume that a player with strength b_j playing against a player with strength a_i gets in average $\frac{b_j}{a_i+b_j}$ points. Further we assume that the sequence of team A is fixed whereas team B can order its players in an arbitrary permutation π.
If the aim of team B is to maximize the expected sum of points $\sum_{i=1}^{n} \frac{b_{\pi(i)}}{a_i+b_{\pi(i)}}$ we get the well known assignment problem with a linear objective function. But in many applications team B do not want to maximize the expected number of points, but e. g. the probability of having more points than A. This results in an assignment problem with a non-linear objective function. We show for a broad class of such non-linear assignment problems that the set of potentially optimal permutations is exactly the same as in the linear case. That means for every permutation π which is an unique optimal solution of a non-linear assignment problem, there is already a *linear* assignment problem such that π is the unique optimum.

This is joint work with Claudia Wunderlich (c_wunderlich@gmx.de)

57 — Sektion V — G03-315 — 10:20

Graph Homomorphisms and Homomorphism Order

JAN FONIOK (Praha)

A graph homomorphism is a mapping between the vertex sets of two graphs that preserves edges. Graphs and homomorphisms form a category with several interesting properties. We restrict our study to the partial order induced by the relation of *existence of homomorphism* between two graphs. I will be talking about the recent characterisation of finite maximal antichains in this partial order (my joint work with Nešetřil and Tardif), which has a surprising link to first-order definability of the *constraint satisfaction problem*, and I will mention some universality results for certain suborders of this partial order (due to Hubička and Nešetřil).

Samstag, 18.11.2006 — Zeit: 10:47

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58 — Sektion I — G03-106 — 10:47

Permutation polytopes

BENJAMIN NILL (Berlin)

A permutation polytope is the convex hull of a subgroup of permutation matrices, a well-known example is the Birkhoff polytope. Hence, permutation polytopes form a special class of 0/1-polytopes. In this talk I will present recent results on their combinatorial properties. In particular, we have a complete classification of the groups defining a permutation polytope of dimension less or equal to four. We also study which combinatorial types can appear as faces of permutation polytopes.

This is joint work with Barbara Baumeister, Christian Haase and Andreas Paffenholz.

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59 — Sektion II — G03-214 — 10:47

Circular Total Colorings of Graphs

ARNFRIED KEMNITZ (Braunschweig)

A (k, d)-total coloring (k, d positive integers, $k \geq 2d$) of a graph G is an assignment c of colors $\{0, 1, \ldots, k-1\}$ to the vertices and edges of G such that $d \leq |c(x_i) - c(x_j)| \leq k - d$ whenever x_i and x_j are two adjacent edges, two adjacent vertices or an edge incident to a vertex. The circular total chromatic number $\chi''_c(G)$ is defined by $\chi''_c(G) = \inf\{k/d : G$ has a (k, d)-total coloring$\}$. It holds $\chi''(G) - 1 < \chi''_c(G) \leq \chi''(G)$ with equality for all type-1 graphs where $\chi''(G)$ is the total chromatic number of G.
We determine exact values of $\chi''_c(G)$ for different classes of type-2 graphs. Moreover, we determine infinite classes of graphs G such that $\chi''_c(G) < \chi''(G)$.

60 — Sektion III — G02-109 — 10:47

On reconstruction of words from its subwords

PETER LIGETI (Budapest)

The reconstruction problem of words is the following: for every n determine the smallest k, such that every word of length n is uniquely determined by its subwords of length at most k. In the talk we consider some generalizations of this problem and its application to the determination of the automorphism group of word posets.

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61 — Sektion IV — G02-111 — 10:47

Realisations of generalised associahedra

CARSTEN LANGE (Berlin)

One procedure that yields a new polyhedron from a convex polytope is to discard some of the defining inequalities. A natural question whether it is possible to discard different sets of inequalities to end up with the same combinatorial type and to identify possible ways.
Starting with the classical permutahedron (associated to the Coxeter group of type A) we obtain the associahedron (or Stasheff polytope) by discarding inequalities associated to the orientations of a path with n edges. Moreover, the vertices of these realisations can be described explicitly by a procedure that generalises an algorithm of J.-L. Loday.
The method can be generalised to obtain generalised associahedra (as defined by Fomin and Zelevinsky) from a permutahedra associated to a finite Coxeter group: every orientation of the Coxeter graph yields a realisation.

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62 — Sektion V — G03-315 — 10:47

On Coloring Boolean Algebra and Boolean Semigroup

KRISHNAN PARAMASIVAM (Madras)

Beck (1988) introduced the concept of coloring a commutative ring and determined the chromatic number of commutative rings, which are finite colorable. A commutative ring R is associated with a simple graph G_R (called zero-divisor graph) with the vertex set R and two different elements x and y are adjacent if and only if x is a zero-divisor of y. He conjectured that for any commutative ring R, $\chi(G_R) = \omega(G_R)$. Anderson *et al.*(1993) gave a strong counter-example for the existence of non-perfect graph and have given the complete listing of R for which $\chi(G_R) \leq 4$. In this paper, we discuss the problem of coloring a commutative semi-ring. We compute the chromatic number of finite Boolean algebra, Boolean semigroup and certain classes of distributive lattices, which are commutative semi-rings. Moreover, we construct some new classes of distributive lattices using Z_n, the set of all integers modulo n and compute their chromatic number.

Samstag, 18.11.2006 — Zeit: 11:15

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63 — Sektion I — G03-106 — 11:15

Orthogonal Surfaces - A Combinatorial Approach

SARAH KAPPES (Berlin)

Orthogonal surfaces are related to partial orders, graphs and convex polytopes. In this talk, I will give a short overview on some results from my thesis, in particular concerning the connection of orthogonal surfaces and polytopes.

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64 — Sektion II — G03-214 — 11:15

On a Conjecture about Edge Irregular Total Labellings

STEPHAN BRANDT (Ilmenau)

An irregular assignment of a graph is a labelling of the edges such that for every pair of distinct vertices the sums of the edge labels incident with the respective vertex are different. The irregularity strength of G is the minimal label k, such that there is an irregular assignment with labels $\leq k$. Irregular assignments have attracted considerable attention.
A recent variant introduced by Bača, Jendrol', Miller and Ryan are edge irregular total labellings of a graph $G = (V, E)$. Here vertices and edges are labelled by a function $f : V \cup E \to \{1, 2, \ldots, k\}$ such that the weight $w(uv) := f(u) + f(uv) + f(v)$ is different for every pair of edges. The smallest k such that there is an edge irregular total labelling f is called the total edge irregularity strength $\mathrm{tes}(G)$. A conjecture of Ivančo and Jendrol' says that $\mathrm{tes}(G) = \max\{\lceil\frac{|E|+2}{3}\rceil, \lceil\frac{\Delta+1}{2}\rceil\}$ for every graph $G \neq K_5$. Both terms of the maximum are natural lower bounds for $\mathrm{tes}(G)$. The conjecture is known to hold for trees.
In contrast to the irregularity strength where in most cases only upper and lower bounds are known, for the edge variant we prove the exact bound of the Ivančo-Jendrol' conjecture for large classes graphs, including dense graphs and regular graphs of large order, and graphs where $\frac{\Delta+1}{2} \geq \frac{|E|+2}{3}$, mostly with the help of probabilistic arguments.

This is joint work with Jozef Miškuf and Dieter Rautenbach.

65 — Sektion III — G02-109 — 11:15

Network pricing, routing and congestion control

ROBERT WATERS (Cambridge)

In a 2006 paper, Anderson, Kelly and Steinberg proposed a method, called the *Contract and Balancing Mechanism*, for determining how much to charge users of a communication network when they share bandwidth, and as a way of managing congestion. We will outline their method and discuss recent attempts to extend their work, including the addition of routing flexibility.

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66 — Sektion IV — G02-111 — 11:15

On the number of mutually touching cylinders

GERGELY AMBRUS (Szeged)

In 1968, Littlewood posed the question "How many congruent infinite cylinders can be arranged in 3-space such that any two of them are touching? Is it 7?" The question is still open; for the upper bound, A. Bezdek proved that the number is at most 24. For the lower bound, several possible configurations of 6 cylinders are known. About 10 years ago, W. Kuperberg constructed an intricate possible arrangement of 8 cylinders; however, the validity of the construction could not be proved. In the talk we show that there are two cylinders among the 8 which are not touching, and therefore the construction is not suitable.

This is joint work with A. Bezdek.

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67 — Sektion V — G03-315 — 11:15

On the Generation of Isomorphism Classes of Mappings

RALF GUGISCH (Bayreuth)

Graphs, digraphs, hypergraphs, matroids and oriented matroids are all examples of discrete structures which can be represented as mappings from a set X to a set Y, where X is in some way defined over a set of n points (or vertices). Most time, one is interested not in the structures itself, but in the isomorphism- or relabelling classes which result by an induced operation of (a subgroup of) the symmetric group S_n on the set X, and hence on the set Y^X of the mappings in question.
We implemented a generator of isomorphism classes of such mappings, which provides capability to influence the set of generated structures via further restrictions. This way, we are able to generate all of the above mentioned discrete structures with the same engine in the background.
Though our implementations are based on a general data structure, the resulting programs are quite efficient. Comparisons are presented in the talk.

Samstag, 18.11.2006 — Zeit: 11:42

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68 — Sektion I — G03-106 — 11:42

Spanning bipartite subgraphs in dense graphs

HIEP HAN (Berlin)

The study of sufficient degree conditions on a given graph G which imply that G contains a particular spanning subgraph H is one of the central areas in modern graph theory. A well known classical example of such a result is Dirac's theorem which asserts that any graph G on n vertices with minimum degree at least $n/2$ contains a spanning, so called Hamiltonian, cycle. Generalizing several related results Bollobas and Komlos conjectured that an n-vertex graph G with minimum degree at least $((k-1)/k + o(1))n$ contains all k-chromatic n-vertex graphs H with bounded maximum degree and bandwidth $o(n)$ as spanning subgraphs. In this talk we consider $k = 2$, the bipartite case. Its proof relies on Szemeredi's regularity lemma and the so-called blow-up lemma.

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69 — Sektion II — G03-214 — 11:42

Non-rainbow colorings of plane graphs

DANIEL KRAL (Praha)

We study vertex-colorings of plane graphs that do not contain a rainbow face, i.e., a face with vertices of mutually distinct colors. For 3-connected cubic plane graphs G, we find a formula that relates the maximum size of a matching in the dual graph of G and the maximum number of colors that can be used in a non-rainbow coloring of G. We also show that the number of colors used in a non-rainbow coloring does not exceed $\left\lfloor \frac{7n-8}{9} \right\rfloor$ if G is a 3-connected n-vertex plane graph, $\left\lfloor \frac{5n-6}{8} \right\rfloor$, if G is 4-connected and $\left\lfloor \frac{43}{100}n - \frac{19}{25} \right\rfloor$, if G is 5-connected. The bounds for 3- and 4-connected plane graphs are the best possible as we exhibit constructions of graphs with colorings matching the bounds.

70 — Sektion III — G02-109 — 11:42

The Burst Error Liar Game

JOHANNES LENGLER (Saarbrücken)

Liar Games are games in which one player, Carole, chooses a number between 1 and n, and the other player, Paul, must find out this number by asking yes/no-questions; however, Carole is allowed to lie in some restricted way.
In the burst error setting, the lies must be contained in some interval of a given size. This setting is motivated by certain communication scenarios.
I will present a solution of this game. The methods that are used are applicable to a whole class of Liar Games.

71 — Sektion IV — G02-111 — 11:42

Minimal Polynomials for the Coordinates of the Harborth Graph

EBERHARD H.-A. GERBRACHT (Gifhorn)

The Harborth graph is the smallest known example of a 4-regular planar unit-distance graph. In this talk we will give an analytical description of the coordinates of its vertices for a particular embedding in the Euclidean plane. More precisely, we show, how to calculate the minimal polynomials of the coordinates of its vertices (with the help of a computer algebra system), and list those. Furthermore some algebraic properties of these polynomials, and consequences to the structure of the Harborth graph are determined.

72 — Sektion V — G03-315 — 11:42

On degree conditions for H-linked graphs

FLORIAN PFENDER (Rostock)

Let H be a multigraph. A simple graph G on $n \geq |V(H)|$ vertices is called H-linked if for every $\tau : V(H) \to V(G)$ we can find a set of undirected walks $\mathcal{P}$ in G with the following properties:

1. There is a bijection $f : E(H) \to \mathcal{P}$.
2. If u, v are the end vertices of $e \in E(H)$, then $\tau(u)$ and $\tau(v)$ are the end vertices of $f(e) \in \mathcal{P}$.
3. Two walks in $\mathcal{P}$ share at most their end vertices.

This notion generalizes the notions of k-connected, k-ordered and k-linked graphs, and was first introduced by Jung in 1970. Lately, a lot of work was spent to produce degree bounds which guarantee that a graph is H-linked. But these bounds are needed mostly to guarantee a certain connectivity of the graph. In this talk we show how these bounds can be substantially lowered if we explicitely ask for this connectivity.

Samstag, 18.11.2006 — Zeit: 14:00

73 — Sektion I — G03-106 — 14:00

A Generalization of Dijkstra's Shortest Paths Algorithm with Applications to VLSI routing

DIETER RAUTENBACH (Ilmenau)

We generalize Dijkstra's algorithm for finding shortest paths in directed graphs with non-negative edge lengths. Instead of labeling individual vertices we label subgraphs which partition the given graph and can achieve much better running times when the number of the involved subgraphs is small compared to the order of the original graph and when the shortest path problems restricted to these subgraphs is computationally easy.
As an application we consider the VLSI routing problem, where we need to find millions of shortest paths in partial grid graphs with billions of vertices. We illustrate considerable reductions of running time and memory consumption with experimental data.

This is joint work with Sven Peyer and Jens Vygen, Forschungsinstitut für Diskrete Mathematik, Universität Bonn

74 — Sektion II — G03-214 — 14:00

Total Domination critical graphs

NADER JAFARI RAD (Babolsar)

A graph G with no isolated vertex is total domination vertex critical if for any vertex v of G that is not adjacent to a vertex of degree one, the total domination number of $G - v$ is less than the total domination number of G. These graphs we call γ_t-critical. If such a graph G has total domination number k, we call it k-γ_t-critical. We verify an open problem of k-γ_t-critical graphs and obtain some results on the characterization of total domination critical graphs of order $n = \Delta(G)(\gamma_t(G) - 1) + 1$.

This is joint work with Doost Ali Mojdeh.

75 — Sektion III — G02-109 — 14:00

Equilibria for games played by players using simple learning rules

FRANK GÖRING (Chemnitz)

There is a huge amount of knowledge about equilibria of games for the case that all players have complete information, and thus are able to optimize their behaviour in a certain sense. But how about the other (practically more common) case, that the rules of the game are not known to the players and have to be learned by successive plays of the game?
In a first part of the talk we introduce a very small hierarchy of learning rules for winning games related to their ability to learn cooperation. We give a simple Idea, how to use such learning rules in games with general payoff-function.
The second and last part deals with the question, which payoffs such learning rules achieve if all players use learning rules of the same level of the introduced hierarchy. This implicates some equilibria for general multiplayer games, not all of them being discussed in literature.

This talk is based upon joint work with Thomas Böhme, Jens Schreyer (TU Ilmenau, both) , Herwig Unger (Uni Rostock) and Zsolt Tuza (MTA SZTAKI, Budapest).

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76 — Sektion IV — G02-111 — 14:00

Connecting Networks of Minimal Costs

DIETMAR CIESLIK (Greifswald)

Given a finite set N of points in a (finite-dimensional) normed space. Let α_1, α_2 be fixed nonnegative real numbers.
Find a connected graph $G = (V, E)$ such that $N \subseteq V$ and the cost

$$\mathcal{C}(G) = \alpha_1 \cdot |V \setminus N| + \alpha_2 \cdot \sum_{\underline{vv'} \in E} ||v - v'||$$

is minimal.
Such a graph must be a tree. We discuss the combinatorial structures of these trees and show how such trees can be constructed.

Samstag, 18.11.2006 — Zeit: 14:27

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77 — Sektion I — G03-106 — 14:27

On the complexity of the maximum dissociation set problem for line graphs

YURY ORLOVICH (Minsk)

We show that the maximum dissociation set problem is NP-hard for planar line graphs of planar bipartite graphs. A subset of vertices in a graph G is called a dissociation set if it induces a subgraph with vertex degree at most 1. The maximum dissociation set problem, i.e., the problem of finding in a given graph a dissociation set of maximum size was known to be NP-hard for bipartite graphs. We describe also several polynomially solvable cases for the problem under consideration. One of them deals with a subclass of so-called Chair-free graphs.

This work is partially supported by INTAS (Project 03-51-5501) and by BRFFR (Project F06MC-002).

This is joint work with G. Finke V. Gordon and F. Werner.

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78 — Sektion II — G03-214 — 14:27

A Generalization of Tutte's Theorem on Hamiltonian Cycles in Planar Graphs

JOCHEN HARANT (Ilmenau)

In 1956, W.T. Tutte proved that a 4-connected planar graph is hamiltonian. Moreover, in 1997, D.P. Sanders extended this to the result that a 4-connected planar graph contains a hamiltonian cycle through any two of its edges. We prove that a planar graph G has a cycle containing a given subset X of its vertex set and any two prescribed edges of the subgraph of G induced by X if $|X| \geq 3$ and if X is 4-connected in G. If $X = V(G)$ then Sander's result follows.

79 — Sektion III — G02-109 — 14:27

Combinatorial Auctions

RICHARD STEINBERG (Cambridge)

A Combinatorial Auction is an auction in which bidders can place bids on combinations of items, rather than just individual items. The "Winner Determination Problem" (WDP) is: *Given a set of bids in a combinatorial auction, find an allocation of items to bidders that maximizes the auctioneer's revenue.* The WDP is obviously NP-complete. This talk will present an iterative combinatorial auction procedure called PAUSE (Progressive Adaptive User Selection Environment), due to F. Kelly and R. Steinberg, that is computationally tractable for the auctioneer.

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80 — Sektion IV — G02-111 — 14:27

Computation of atomic fibers of Z-linear maps

ELKE EISENSCHMIDT (Magdeburg)

For given matrix $A \in \mathbb{Z}^{d\times n}$ the discrete set $P_b = \{z \in \mathbb{Z}_+^n \; : \; Az = b\}$ describes the fiber of $b \in \mathbb{Z}^d$ under the $\mathbb{Z}$-linear map induced by matrix A. A fiber is called atomic if a decomposition with respect to Minkowski sums, $P_b = P_{b_1} + P_{b_2}$, either implies $b = b_1$ or $b = b_2$. The set of atomic fibers constitutes an integral generating set of the family of fibers of the matrix A. Atomic fibers arise as subproblems in a variety of applications, e.g., in the construction of strong SAGBI bases, in the computation of minimal vanishing sums of roots of unity and in the capacitated design of networks under survivability constraints.
We will present the first algorithm to compute the family of atomic fibers and give preliminary computational results.

This is joint work with Raymond Hemmecke and Matthias Köppe.

Samstag, 18.11.2006 — Zeit: 14:55

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81 — Sektion I — G03-106 — 14:55

Codes for Locating Faulty Vertices in a Graph

TERO LAIHONEN (Turku)

A multiprocessor system is modelled by an undirected graph $G = (V, E)$ where processors correspond to vertices and an edge is a bidirectional communication link between two processors. Some of the processors may be malfunctioning and our task is to locate them using the so-called *identifying codes*. The concept of identifying codes were introduced by Karpovsky, Chakrabarty and Levitin in 1998, and these codes are closely related to locating-dominating sets.
A subset $C \subseteq V$, is called an r-*identifying code*, if the sets $B_r(v) \cap C$ are non-empty and distinct for all vertices $v \in V$, where $B_r(v)$ denotes the set of vertices within distance r from v.
We discuss various aspects of the recent topic, including the smallest possible cardinalities or densities of identifying codes in some natural graphs. Moreover, we consider the problem whether or not a graph admits an identifying code.

Acknowledgment. Research is supported by the Academy of Finland under grant 111940.

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82 — Sektion II — G03-214 — 14:55

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83 — Sektion III — G02-109 — 14:55

Arcs in projective Hjelmslev geometries: A geometric construction of the expurgated Octacode

MICHAEL KIERMAIER (Bayreuth)

In the nineties it was dicovered, that some good non-linear codes can be represented as linear codes over the ring $\mathbb{Z}_4$. That gave rise to the theory of linear codes over finite rings. In the beginning mostly the ring $\mathbb{Z}_4$ was considered, later the rings of the integers modulo a prime power, and eventually the class of the finite chain rings, that are finite associative rings with identity where the lattice of the ideals is a chain.
By means of the example of the expurgated Octacode it will be shown how linear codes over finite chain rings can be constructed from arcs in finite projective Hjelmslev geometries. Furthermore, the results of a computer search for arcs in general small projective Hjelmslev geometries will be represented.

84 — Sektion IV — G02-111 — 14:55

Generalizations of the removal lemma and property testing

MATHIAS SCHACHT (Berlin)

Ruzsa and Szemerédi established the *triangle removal lemma* by proving that: Every n-vertex graph with $o(n^3)$ triangles can be made triangle free by removing $o(n^2)$ edges. More general statements of that type regarding graphs were successively proved by several authors. In particular, Alon and Shapira obtained a generalization (which extends all the previous results of this type), where the triangle is replaced by a possibly infinite family of graphs and containment is induced.
We prove the corresponding result for k-uniform hypergraphs. As a consequence we obtain that every decidable, hereditary property of uniform hypergraphs is testable with one-sided error.
The proof is based iterated applications of the hypergraph generalizations of Szemerédi's regularity lemma.

This is joint work with Vojtěch Rödl from Emory University.

Teilnehmerinnen und Teilnehmer

Gergely Ambrus
Lengyel u. 9/A
6721 Szeged, **Hungary**

Michael Andresen
Otto-von-Guericke-Universität Magdeburg
Universitätsplatz 2
39016 Magdeburg

Gennadiy Averkov
Fakultät für Mathematik
Institut für Algebra und Geometrie
Otto-von-Guericke Universität Magdeburg
39106 Magdeburg

Christian Bey
Otto-von-Guericke-Universität Magdeburg
Universitätsplatz 2
39016 Magdeburg

Aart Blokhuis
Department of Mathematics and Computing Science
Eindhoven University of Technology
P.O. Box 513
5600 MB Eindhoven, **The Netherlands**

Jens-Peter Bode
Diskrete Mathematik
Technische Universität Braunschweig
38023 Braunschweig

Thomas Böhme
Technische Universität Ilmenau
Postfach 100565
98684 Ilmenau

Heidemarie Bräsel
Otto-von-Guericke-Universität Magdeburg
Universitätsplatz 2
39016 Magdeburg

Stephan Brandt
Technische Universität Ilmenau
Postfach 100565
98684 Ilmenau

Ulrich Brehm
Institut für Geometrie
Technische Universität Dresden
01062 Dresden

Stephan Matos Camacho
Institut für Diskrete Mathematik und Algebra
TU Bergakademie Freiberg
Prüferstraße 9 DG4
09596 Freiberg

Dietmar Cieslik
Institut für Mathematik und Informatik
Jahnstraße 15a
17487 Greifswald

Cornelia Dangelmayr
2. Mathematisches Institut
Fachbereich Mathematik und Informatik
FU Berlin
Arnimallee 3
14195 Berlin

Holger Dell
Universität des Saarlandes
Informatik
Postfach 151150
66041 Saarbrcken

Veerle Fack
Research Group on Combinatorial Algorithms and Algorithmic Graph Theory
Department of Applied Mathematics and Computer Science
Ghent University
Krijgslaan 281-S9
B-9000 Ghent, **Belgium**

Fernando M. de Oliveira Filho
Centrum voor Wiskunde en Informatica
Kruislaan 413
1098 SJ Amsterdam, **The Netherlands**

Reinhard Diestel
Mathematisches Seminar der Universität Hamburg
Bundesstr. 55
20146 Hamburg

Benjamin Doerr
Max-Planck-Institut für Informatik
Stuhlsatzenhausweg 85
66123 Saarbrücken

Klaus Dohmen
Hochschule Mittweida
Fachgruppe Mathematik
Technikumplatz 17
09648 Mittweida

Nico Düvelmeyer
Fakultät für Mathematik
Technische Universität Chemnitz
09107 Chemnitz

Elke Eisenschmidt
Otto-von-Guericke-Universität Magdeburg
Universitätsplatz 2
39016 Magdeburg

Stefan Felsner
TU Berlin
Institut für Mathematik, MA 6-2
Straße des 17. Juni 136
10623 Berlin

Ferenc Fodor
Bolyai Institute
University of Szeged
1 Aradi vártanúk tere
H-6720 Szeged, **Hungary**

Jan Foniok
Charles University
Institute of Theoretical Computer Science (ITI)
Malostranske nam. 25
118 00 Praha 1, **Czech Republic**

Mahmoud Fouz
Max-Planck-Institut für Informatik
Stuhlsatzenhausweg 85
66123 Saarbrücken

Tobias Friedrich
Max-Planck-Institut für Informatik
Stuhlsatzenhausweg 85
66123 Saarbrücken

Dániel Gerbner
Reviczky ezr. u. 6
1031 Budapest, **Hungary**

Eberhard H.-A. Gerbracht
Bismarckstraße 20
38518 Gifhorn

Gerhard Gerlich
Institut für Geometrie, Algebra und diskrete Mathematik
Technisch Universität Braunschweig
Pockelsstrae 14
38106 Braunschweig

Dieter Gernert
Hardenbergstraße 24
80992 München

Frank Göring
TU Chemnitz
Fakultät für Mathematik
Reichenhainer Strae 39
09126 Chemnitz

Peter Gritzmann
Kombinatorische Geometrie
Zentrum Mathematik
Technische Universität München
Boltzmannstr. 3
85747 Garching bei München

Harald Gropp
Muehlingstr. 19
69121 Heidelberg

Martin Grüttmüller
Universität Rostock
Institut für Mathematik
18051 Rostock

Ralf Gugisch
Lehrstuhl Mathematik II
Universität Bayreuth
95440 Bayreuth
ralf.gugisch@uni-bayreuth.de

Wolfgang Haas
Dreikönigstraße 45
79102 Freiburg

Christian Haase
Fachbereich Mathematik und Informatik
FU Berlin
Arnimallee 3
14195 Berlin

Hiep Han
Humboldt-Universität zu Berlin
Institut für Informatik
Lehrstuhl für Algorithmen und Komplexität
10099 Berlin

Jochen Harant
Technische Universität Ilmenau
Postfach 100565
98684 Ilmenau

Heiko Harborth
Diskrete Mathematik
Technische Universität Braunschweig
38023 Braunschweig

Egbert Harzheim
Pallenbergstrasse 23
50737 Kln

Nils Hebbinghaus
Max-Planck-Institut für Informatik
Stuhlsatzenhausweg 85
66123 Saarbrücken

Olof Heden
Department of Mathematics, KTH
S-10044 Stockholm, **Sweden**

Martin Henk
Otto-von-Guericke-Universität Magdeburg
Universitätsplatz 2
39016 Magdeburg

Franz Hering
Kuhlenbankweg 36
44227 Dortmund

Christoph Hering
Mathematisches Institut
Universität Tübingen
Auf der Mergenstelle 10
72076 Tübingen

Regina Hildenbrandt
Technische Universitẗ Ilmenau
Institut für Mathematik
Postfach 100565
98684 Ilmenau

Thorsten Holm
Otto-von-Guericke-Universität Magdeburg
Universitätsplatz 2
39016 Magdeburg

Michael Huber
Mathematisches Institut
Universität Tübingen
Auf der Mergenstelle 10
72076 Tübingen

Daniel Johannsen
Max-Planck-Institut für Informatik
Stuhlsatzenhausweg 85
66123 Saarbrücken

Leif K. Jørgensen
Department of Mathematical Sciences
Aalborg University
Fr. Bajers Vej 7G
9220 Aalborg, **Denmark**

Christoph Josten
Langobardenweg 24
65929 Frankfurt

Mihyun Kang
Humboldt-Universität zu Berlin
Institut für Informatik
Unter den Linden 6
10099 Berlin

Sarah Kappes
Technische Universität Berlin
Institut für Mathematik
Sekretariat MA 6-1
Strasse des 17. Juni 136, 10623 Berlin

Arnfried Kemnitz
Computational Mathematics
Technical University Braunschweig
Pockelsstraße 14
38106 Braunschweig

Michael Kiermaier
Lehrstuhl Mathematik II
Universität Bayreuth
95440 Bayreuth

Christian Klein
Max-Planck-Institut für Informatik
Stuhlsatzenhausweg 85
66123 Saarbrücken

Matthias Koch
Oberkeil 10
95512 Neudrossenfeld

Martin Kochol
MÚ SAV, Štefánikova 49
814 73 Bratislava 1, **Slovakia**

Anja Kohl
Institut für Diskrete Mathematik und Algebra
TU Bergakademie Freiberg
09596 Freiberg

Axel Kohnert
Lehrstuhl Mathematik II
The University of Bayreuth
95440 Bayreuth

Matthias Köppe
Otto-von-Guericke-Universität Magdeburg
Universitätsplatz 2
39016 Magdeburg

Daniel Kral
Charles University
Institute of Theoretical Computer Science (ITI)
Malostranske nam. 25
118 00 Praha 1, **Czech Republic**

Alpar-Vajk Kramer
Polytecnico di Milano
Via Bonardi 9
20133 Milano, **Italy**

Christian Krattenthaler
Fakultät für Mathematik
Universität Wien
Nordbergstrae 15
A-1090 Vienna, **Austria**

Sascha Kurz
University of Bayreuth
Department of Mathematics
95440 Bayreuth

Gohar Kyureghyan
Otto-von-Guericke-Universität Magdeburg
Universitätsplatz 2
39016 Magdeburg

Tero Laihonen
Department of Mathematics
University of Turku
20014 Turku, **Finland**

Carsten Lange
Freie Universität Berlin
FB Mathematik und Informatik
Arnimallee 3
14195 Berlin

Reinhard Laue
Universität Bayreuth
Lehrstuhl II für Mathematik
95440 Bayreuth

Juliane Lehmann
Institut Computational Mathematics
Technical University Braunschweig
Pockelsstr. 14
38106 Braunschweig

Johannes Lengler
Universität des Saarlandes
Fachbereich 6.1-Mathematik

Peter Ligeti
Alfréd Rényi Institute of Mathematics
Hungarian Academy of Sciences
Reáltanoda utca 13-15
H-1053 Budapest, **Hungary**

Massimiliano Marangio
Breite Strae 50
38259 Salzgitter

Bernd Mehnert
Waldhausweg 7
66123 Saarbrcken

Steffen Melang
Technische Universität Berlin
MA 442
Straße des 17. Juni 136
10623 Berlin

Bojan Mohar
Department of Mathematics
Simon Fraser University
Burnaby, British Columbia V5A 1S6, **Canada**

Rolf H. Möhring
Institut für Mathematik
Sekretariat MA 6-1
Technische Universität Berlin
Straße des 17. Juni 136
10623 Berlin

Augustine O. Munagi
The John Knopfmacher Centre for Applicable Analysis and Number Theory
School of Mathematics
University of the Witwatersrand
Johannesburg 2050, **South Africa**

Benjamin Nill
FU Berlin
Arnimallee 3
14195 Berlin

Johan Nilsson
Technische Universität Berlin
Institut für Mathematik
Sekretariat MA 6-1
Straße des 17. Juni 136
D-10623 Berlin

Yury Orlovich
Department of Discrete Mathematics and Algorithmics
Faculty of Applied Mathematics and Computer Science
Belarus State University
4 Nezavisimostsi ave
220030 Minsk, **Belarus**

Andreas Paffenholz
Freie Universität Berlin
Institut für Mathematik II
Arnimallee 3
14195 Berlin

Krishnan Paramasivam
Research Scholar
Department of mathematics
Indian Institute of Technology Madras
Chennai 600036, **India**

Florian Pfender
Universität Rostock
Institut für Mathematik
Universitätsplatz 1
18051 Rostock

Alexander Pott
Otto-von-Guericke-Universität Magdeburg
Universitätsplatz 2
39016 Magdeburg
alexander.pott@mathematik.uni-magdeburg.de

Jörn Quistorff
Fachbereich 4 der FHTW Berlin
10313 Berlin

Nader Jafari Rad
Department of Mathematics
University of Mazandaran
Babolsar, **Iran**

Dieter Rautenbach
Institut fr Mathematik
TU Ilmenau
Postfach 100565
D-98684 Ilmenau

Joachim Reichel

Mathias Schacht
Institut für Informatik
Humboldt-Universität zu Berlin

Ingo Schiermeyer
Institut für Diskrete Mathematik und Algebra
Technische Universität Bergakademie Freiberg
09596 Freiberg

Jerden Schillewaert
Krijgslaan 281-S22
B9000 Ghent, **Belgium**

Achill Schuermann
Otto-von-Guericke-Universität Magdeburg
Universitätsplatz 2
39016 Magdeburg

Stefan Schwarz
Institute of Applied Mathematics
Friedrich-Schiller University
07737 Jena

Taral Guldahl Seierstad
Institut für Informatik
Humboldt-Universität zu Berlin
Unter den Linden 6
10099 Berlin

Martin Sonntag
Fakultät für Mathematik und Informatik
Technische Universität Bergakademie Freiberg
Prüferstraße 1
09596 Freiberg

Anand Srivastav
Institut für Informatik
Christian-Albrechts-Universität zu Kiel
Christan-Albrechts-Platz 4
24118 Kiel

Richard Steinberg
University of Cambridge
Judge Business School
Trumpington Street
Cambridge CB2 1AG, **England**

Michael Stiebitz
Technische Universität Ilmenau
Postfach 100565
98684 Ilmenau

Hanns-Martin Teichert
Universität zu Lübeck
Institut für Mathematik
Wallstraße 40
23560 Lübeck

Nicolas Van Cleemput
Applied Mathematics and Computer Science
Ghent University
Krijgslaan 281 S9
B 9000 Gent, **Belgium**
Nicolas.VanCleemput@UGent.be

Dries van Dyck
Department WNI
Theoretical Computer Science Group
Hasselt University
Agoralaan, Building D
3590 Diepenbeek, **Belgium**

Viktor Vígh
Bolyai Institute
University of Szeged
1 Aradi vártanúk tere
H-6720 Szeged, **Hungary**

Margit Voigt
Hochschule für Technik und Wirtschaft
Postfach 120701
01008 Dresden

Universität Karlsruhe
Fakultät für Informatik
Postfach 6980
76128 Karlsruhe

Markus Wappler
TU Chemnitz
Fakultät für Mathematik
Reichenhainer Straße 41
09126 Chemnitz

Robert Waters
Judge Business School
University of Cambridge
Cambridge CB2 1AG **United Kingdom**

Walter Wenzel
Fakultät für Mathematik
09107 Chemnitz

Thomas Westerbäck
Department of Mathematics, KTH
S-10044 Stockholm, **Sweden**

Wolfgang Willems
Otto-von-Guericke-Universität Magdeburg
Universitätsplatz 2
39016 Magdeburg

Claudia Wunderlich
Institute of Applied Mathematics
Friedrich-Schiller University
07737 Jena

Florian Zickfeld
Technische Universität Berlin
Institut für Mathematik
Sekretariat MA 6-1
Strasse des 17. Juni 136
D-10623 Berlin

Vortragende

Donnerstag, 16.11.2006, Sektion I, G03-106

Chair:

Zeit		
14:30	**Ulrich Brehm** Linking Structures	**1**
14:57	**Matthias Köppe** A primal Barvinok algorithm based on irrational decompositions	**5**
15:25	**Nico Düvelmeyer** Relative position of small point configurations	**9**
15:52	**Viktor Vígh** Approximating 3-dimensional convex bodies by polytopes with a restricted number of edges	**13**
16:20	**Gennadiy Averkov** Metric capacity of normed spaces	**17**

Donnerstag, 16.11.2006, Sektion II, G03-214

Chair:

Zeit		
14:30	**Alpar-Vajk Kramer** The de Bruijn Graph $B(2, n)$	**2**
14:57	**Stephan Matos Camacho** Colourings of graphs with prescribed cycle lengths	**6**
15:25	**Martin Kochol** 3-coloring of graphs with restricted neighborhood	**10**
15:52	**Ingo Schiermeyer** A new upper bound for the chromatic number of a graph	**14**
16:20	**Massimiliano Marangio** Färbungen von Distanzgraphen	**18**

Donnerstag, 16.11.2006, Sektion III, G02-106

Chair:

Donnerstag, 16.11.2006, Sektion IV, G02-111

Chair:

Zeit		
14:30	**Matthias Koch** Construction of generalized polyominoes	**4**
14:57	**Martin Sonntag** A characterization of hypercacti	**8**
15:25	**Egbert Harzheim** Center-symmetric subsets of subsets of $\mathbb{N}$ which have infinite reciprocal sum	**12**
15:52	**Heiko Harborth** Magic and Latin Triangle and Hexagon Boards	**16**
16:20		**20**

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Chair:

Zeit		
14:30	**Michael Andresen** An extension of the Triangle Lemma	**21**
14:57	**Mihyun Kang** Random planar structures	**25**
15:25	**Taral Guldahl Seierstad** Phase transitions in random graphs processes	**29**
15:52	**Leif K. Jørgensen** Extremal results for minors and rooted minors	**33**

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Chair:

Zeit		
14:30	**Juliane Lehmann** $[r, s, t]$-colorings of stars	**22**
14:57	**Dániel Gerbner** l-chain-profile vectors	**26**
15:25	**Tobias Friedrich** Deterministic Random Walks on the Infinite Grid	**30**
15:52	**Hanns-Martin Teichert** Competition structures of directed and undirected graphs	**34**

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Chair:

Zeit		
14:30	**Gerhard Gerlich** List Classes and Difference Lists	**23**
14:57	**Reinhard Laue** Large sets of t-designs from t-homogeneous groups	**27**
15:25	**Martin Grüttmüller** Pan-orientable Block Designs	**31**
15:52	**Michael Huber** Flag-transitive Combinatorial Designs	**35**

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Chair:

Zeit		
14:30	**Mahmoud Fouz** Hereditary Discrepancy in Different Numbers of Colors	**24**
14:57	**Nils Hebbinghaus** Discrepancy of d-dimensional Arithmetic Progressions with Common Difference	**28**
15:25	**Ferenc Fodor** Line transversals to families of spheres	**32**
15:52	**Walter Wenzel** Zariski-Topologien und Algebraische Kombinatorik	**36**

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Chair:

Zeit		
16:45	**Benjamin Doerr** Partial Colorings of Unimodular Hypergraphs	**37**
17:12	**Augustine O. Munagi** On Systems of Finite Complementing Subsets	**41**
17:40	**Christian Bey** On shadows of intersecting set systems	**45**

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Chair:

Zeit		
16:45	**Florian Zickfeld** Counting Schnyder woods	**38**
17:12	**Daniel Johannsen** A Direct Decomposition of 3-Connected Planar Graphs	**42**
17:40	**Anja Kohl** Some bounds and open questions for L_P-list labellings	**46**

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Chair:

Zeit		
16:45	**Harald Gropp** News on configurations	**39**
17:12	**Axel Kohnert** Number of different degree sequences of a graph with no isolated vertices	**43**
17:40	**Markus Wappler** The Rotational Dimension of a Graph	**47**

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Chair:

Zeit		
16:45	**Dries Van Dyck** NP-complete but easy: to be or not to be Yutsis	**40**
17:12	**Christian Klein** Matrix Rounding	**44**
17:40	**Regina Hildenbrandt** Partitions-Requirements-Matrices (PRMs)	**48**

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Chair:

Zeit		
10:20	**Andreas Paffenholz** Faces of the Birkhoff Polytope	**53**
10:47	**Benjamin Nill** Permutation polytopes	**58**
11:15	**Sarah Kappes** Orthogonal Surfaces - A Combinatorial Approach	**63**
11:42	**Hiep Han** Spanning bipartite subgraphs in dense graphs	**68**

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Chair:

Zeit		
10:20	**Cornelia Dangelmayr** Chordal Graphs and Intersection Graphs of Pseudosegments	**54**
10:47	**Arnfried Kemnitz** Circular Total Colorings of Graphs	**59**
11:15	**Stephan Brandt** On a Conjecture about Edge Irregular Total Labellings	**64**
11:42	**Daniel Kral** Non-rainbow colorings of plane graphs	**69**

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Chair:

Zeit		
10:20	**Olof Heden** Perfect codes of kernel dimension -3	**55**
10:47	**Peter Ligeti** On reconstruction of words from its subwords	**60**
11:15	**Robert Waters** Network pricing, routing and congestion control	**65**
11:42	**Johannes Lengler** The Burst Error Liar Game	**70**

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Chair:

Zeit		
10:20	**Stefan Schwarz** Optimal Line-Ups in Team Competitions with Non-linear Objective Functions	**56**
10:47	**Carsten Lange** Realisations of generalised associahedra	**61**
11:15	**Gergely Ambrus** On the number of mutually touching cylinders	**66**
11:42	**Eberhard H.-A. Gerbracht** Minimal Polynomials for the Coordinates of the Harborth Graph	**71**

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Chair:

Zeit		
10:20	**Jan Foniok** Graph Homomorphisms and Homomorphism Order	**57**
10:47	**Krishnan Paramasivam** On Coloring Boolean Algebra and Boolean Semigroup	**62**
11:15	**Ralf Gugisch** On the Generation of Isomorphism Classes of Mappings	**67**
11:42	**Florian Pfender** On degree conditions for H-linked graphs	**72**

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Chair:

Zeit		
14:00	**Dieter Rautenbach** A Generalization of Dijkstra's Shortest Paths Algorithm with Applications to VLSI routing	**73**
14:27	**Yury Orlovich** On the complexity of the maximum dissociation set problem for line graphs	**77**
14:55	**Tero Laihonen** Codes for Locating Faulty Vertices in a Graph	**81**

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Chair:

Zeit		
14:00	**Nader Jafari Rad** Total Domination critical graphs	**74**
14:27	**Jochen Harant** A Generalization of Tutte's Theorem on Hamiltonian Cycles in Planar Graphs	**78**
14:55		**82**

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Chair:

Zeit		
14:00	**Frank Göring** Equilibria for games played by players using simple learning rules	**75**
14:27	**Richard Steinberg** Combinatorial Auctions	**79**
14:55	**Michael Kiermaier** Arcs in projective Hjelmslev geometries: A geometric construction of the expurgated Octacode	**83**

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Chair:

Zeit		
14:00	**Dietmar Cieslik** Connecting Networks of Minimal Costs	**76**
14:27	**Elke Eisenschmidt** Computation of atomic fibers of Z-linear maps	**80**
14:55	**Mathias Schacht** Generalizations of the removal lemma and property testing	**84**