Liebe Kombinatorikerinnen und Kombinatoriker,

herzlich willkommen zum 28. Kolloquium über Kombinatorik, das zum siebten Mal in Magdeburg stattfindet.

Auch in diesem Jahr wird an zwei Tagen wieder eine Mischung unterschiedlicher Aspekte der Diskreten Mathematik präsentiert. Dazu gehören 64 Kurzvorträge, die von vier Hauptvorträgen umrahmt werden. Für das wissenschaftliche Programm des Kolloquiums 2009 sind, wie in den letzten Jahren, die beiden Unterzeichner verantwortlich. Die lokale Organisation liegt in den Händen der Magdeburger Diskreten Mathematik am Institut für Algebra und Geometrie. Wir hoffen, Sie fühlen sich bei uns in Magdeburg wohl und der Besuch des Kolloquiums über Kombinatorik ist für Sie erfolgreich.

Allen Teilnehmerinnen und Teilnehmern, die durch ihre Vorträge und ihr Kommen zum Gelingen der Tagung beitragen, sei an dieser Stelle ganz herzlich gedankt. Wie immer bedanken wir uns auch bei der Otto-von-Guericke-Universität Magdeburg für die finanzielle und organisatorische Unterstützung.

Über die Zukunft des Kolloquiums und die Frage "Was kommt nach Magdeburg?" wurde in letzter Zeit schon gelegentlich spekuliert. Wir haben einen Plan für den Übergang in die Nach-Magdeburg-Zeit entwickelt. Dafür schlagen wir vor, den Austragungsmodus zu ändern und Austragungsorte und Veranstalter etwas schneller zu rotieren. Für 2010 hat sich Benjamin Doerr aus Saarbrücken bereit erklärt, das Kolloquium auszurichten. Wir danken ihm und freuen uns auf den neuen Rahmen. Für 2011 wollen wir Sie dann noch einmal nach Magdeburg einladen.

Die positiven Aspekte der Kontinuität (die Tagungsteilnehmer kennen schon die Hotels und Wege, die Organisatoren werden effizienter und professioneller) wollen wir nicht ganz aufgeben. Daher schlagen wir vor, die Tagung künftig im Wechsel zwischen zwei Orten auszutragen. Das könnte heissen, dass Saarbrücken 2010, 2012, 2014, 2016 "dran" ist. Für 2013, 2015, ... findet sich sicherlich ein attraktiver Standort, Bewerbungen sind willkommen und sollten von allen Teilnehmern diskutiert werden.

Wir freuen uns auf viele weitere anregende und nette Kolloquien über Kombinatorik.

Stefan Felsner
Alexander Pott

Räume

Hauptvorträge	:	G03-315
Sektionsvorträge	:	G02-109, G02-111, G03-106, G03-214
Tagungsbüro	:	G02-215
Bibliothek	:	Hauptbibliothek auf dem Campus
Kaffee/Tee/Erfrischungen	:	G02-215 und G02-210
Internet	:	G02-112

Das Tagungsbüro ist am Freitag von 9 bis 17 Uhr geöffnet, am Samstag von 8:30 bis 17:00 Uhr. Die Hauptbibliothek auf dem Campus ist am Freitag von 9 bis 21 Uhr und am Samstag von 9 bis 15 Uhr geöffnet.

Das gemeinsame Abendessen ist im *Ratskeller*, Alter Markt. Einlass ab 18:30, Beginn des Buffets um 19:00.

Unsere Universität bietet einen drahtlosen Internetzugang an. Eine begrenzte Anzahl Gastzugänge sowie CD's mit der benötigten Software sind im Tagungsbüro erhältlich.

Freitag, 13.11.2009

9:30	**Matthias Kriesell (Odense)**	(G03-315)
	"Orientations of graphs with prescribed outdegrees mod 3"	
anschließend	*Kaffeepause*	
10:45	**Martin Skutella (Berlin)**	(G03-315)
	"Recent results on unsplittable and k-splittable flows in single-source networks"	
anschließend	*Mittagspause*	
13:00 - 14:30	**Sektionsvorträge**	
14:30 - 15:00	*Kaffeepause*	
15:00 - 16:30	**Sektionsvorträge**	
16:30 - 16:45	*kurze Kaffeepause*	
16:45 - 18:15	**Sektionsvorträge**	
19:00	*Gemeinsames Abendessen* im **Ratskeller**, Alter Markt (Einlass ab 18:30).	

Samstag, 14.11.2009

08:45	**Jonathan Jedwab (Vancouver)**	(G03-315)
	"A Survey of Golay Complementary Sequences"	
anschließend	*Kaffeepause*	
10:00 - 12:00	**Sektionsvorträge**	
anschließend	*Mittagspause*	
13:30 - 15:00	**Sektionsvorträge**	
15:00 - 15:15	*kurze Kaffeepause*	
15:15	**Jaroslav Nešetřil (Prag)**	(G03-315)
	"Existence vs Counting"	

Kurzvorträge Freitag, 13.11.2009

Zeit	Sektion I G02-111	Sektion II G02-109	Sektion III G03-106	Sektion IV G03-214
13:00	**V. Mkrtchyan 1** Disjoint matchings in cubic graphs	**H. Harborth 2** Maximum Rectilinear Crossing Number of the Petersen Graph	**P. Östergard 3** Two optimal one-error-correcting codes of length 13	**M. Trinks 4** A new representation of "A most general edge elimination polynomial"
13:30	**I. Schiermeyer 5** Rainbow connection in graphs with minimum degree three	**C. Reiher 6** A proof that every prime number has property B	**M. Kiermaier 7** A new series of 2-arcs in projective Hjelmslev planes	**P. Schweitzer 8** Connected hitting sets of planar graphs
14:00	**E. Harzheim 9** Graphs satisfying a richness condition and a condition concerning forbidden subgraphs	**F. Effenberger 10** Combinatorial conditions for the tightness of triangulated manifolds	**I. Landjev 11** The Dual Construction For Arcs in Projective Hjelmslev Spaces	**R. Čada 12** Antimagicness through factorizations
14:30	*Kaffeepause*			
15:00	**M. Martens 13** 2-InterConnected Facility Location	**C. Lange 14** Associahedra as Minkowski sums and differences of simplices	**J. Zwanzger 15** Heuristic Construction of Linear Codes over Finite Chain Rings	**A. Schwarz 16** Extensions of Bondy's Theorem for Hamiltonian-connected Graphs
15:30	**J. Goedgebeur 17** Speeding up shortest path calculations	**V. Vigh 18** Disc-polygonal approximation of planar spindle convex sets	**U. Tamm 19** Lattice Path Enumeration for Codes and the Tennis Ball Problem	**A. Mestre 20** On the combinatorics of biconnected and 2-edge connected graphs
16:00	**I. Nasrabadi 21** Continuous-time Dynamic Shortest Path Problem	**R. Sotak 22** Generalized fractional and circular total coloring of graphs	**K.-U. Schmidt 23** Symmetric Bilinear Forms Over Finite Fields of Even Characteristic	**E. Linke 24** Minimal zonotopes containing the crosspolytope
16:30	*Kaffeepause*			
16:45	**P. Bonsma 25** Efficiently finding fullerene patches with a given boundary code	**M. Sonntag 26** Iterated neighborhood graphs	**B. Benedetti 27** Locally constructible manifolds	**F. Fodor 28** The Separation Problem For Polytopes
17:15	**J. Matuschke 29** Lattices and maximum flow algorithms in planar graphs	**F. Simon 30** Counting Connected Set Partitions of Graphs	**F. Özbudak 31** Artin-Schreier Type Curves and Quadratic Forms	**Ch. Wagner 32** Three-Dimensional Maximal Lattice-Free Polytopes with Integer Vertices
17:45	**A. Bley 33** The 4-hop constrained edge-disjoint paths problem is APX-complete	**T. Ueckerdt 34** α-Orientations and Shortest Paths	**G. Kyureghyan 35** An additive construction of permutations on finite fields	**E. Steffen 36** The oddness of regular graphs: Measure of edge-uncolorability and applications on r-graphs

Kurzvorträge Samstag, 14.11.2009

Zeit	Sektion I G02-111	Sektion II G02-109	Sektion III G03-106	Sektion IV G03-214
10:00	**F. Pfender 37** Total Edge Irregular Weightings of Graphs	**C. Dangelmayr 38** Pseudosegment and Cocomparability Graphs	**D. Frettloeh 39** Algebraic Stringology: Selfdual substitutions for words	**R.R. Lapus 40** Enumerating the Number of Admissible Stack Polygons: An Approach Using a Finite State Automaton
10:30	**M. Kochol 41** Approximation of 3-Edge-Coloring of Cubic Graphs	**A. Paffenholz 42** Lattice Polytopes in polymake	**M. Grüttmüller 43** On Near-Minimal Completely Separating Systems	**T. Friedrich 44** Quasirandom Rumor Spreading on Expanders
11:00	**M. Marangio 45** $[1, 1, 2]$-colorings of complete graphs	**S. Herrmann 46** Splitting Polytopes	**N. Van Cleemput 47** Nanocones: A classification result in chemistry	**A. Huber 48** Robustness of Randomized Rumor Spreading Protocols
11:30	**S. Jendrol 49** Facial Parity Edge Colouring of Plane Graphs	**F. Lutz 50** Equivelar and d-covered triangulations of surfaces	**M. Kovse 51** Covering and identifying codes in Sierpiński graphs	**S. Kurz 52** Enumeration of complete simple games and weighted voting games
12:00	*Mittagspause*			
13:30	**N. Megow 53** Cardinality Constrained Graph Partitioning into Cliques with Submodular Costs	**T. Kalinowski 54** Maximal antichains of 2- and 4-sets	**J. Bierbrauer 55** Commutative semifields in arbitrary odd characteristic	**M. Henze 56** Ehrhart polynomials and successive minima
14:00	**D. Dressler 57** Confluent Flows and a Solvable Case	**M. Böhm 58** k-regular antichains on $[m]$ with $k \leq m$	**T. Feulner 59** The Automorphism Groups of Linear Codes and Canonical Representatives of Their Semilinear Isometry Classes	**J. Spreer 60** Normal surfaces as combinatorial slicings
14:30	**M. Huq 61** Development of an Approximation Method for Multiple-Objective Optimization Problem	**M. Massow 62** On the linear extension diameter of distributive lattices	**Ch. Hering 63** Latin Squares, Homologies and Euler's Conjecture	**E. S. Gómez 64** How to differenciate quermassintegrals. Solving a problem by Hadwiger

Hauptvorträge

Martin Skutella (Berlin) : Recent results on unsplittable and k-splittable flows in single-source networks

Jonathan Jedwab (Vancouver) : A Survey of Golay Complementary Sequences

Matthias Kriesell (Odense) : Orientations of graphs with prescribed outdegrees mod 3

Jaroslav Nešetřil (Prag) : Existence vs Counting

Kurzvorträge

Bruno Benedetti (Berlin) : Locally constructible manifolds

Jürgen Bierbrauer (Houghton) : Commutative semifields in arbitrary odd characteristic

Andreas Bley (Berlin) : The 4-hop constrained edge-disjoint paths problem is APX-complete

Matthias Böhm (Rostock) : k-regular antichains on $[m]$ with $k \leq m$

Paul Bonsma (Berlin) : Efficiently finding fullerene patches with a given boundary code

Roman Čada (Pilsen) : Antimagicness through factorizations

Cornelia Dangelmayr (Berlin) : Pseudosegment and Cocomparability Graphs

Daniel Dressler (Berlin) : Confluent Flows and a Solvable Case

Felix Effenberger (Stuttgart) : Combinatorial conditions for the tightness of triangulated manifolds

Thomas Feulner (Bayreuth) : The Automorphism Groups of Linear Codes and Canonical Representatives of Their Semilinear Isometry Classes

Ferenc Fodor (Szeged) : The Separation Problem For Polytopes

Dirk Frettloeh (Bielefeld) : Algebraic Stringology: Selfdual substitutions for words

Tobias Friedrich (Saarbrücken) : Quasirandom Rumor Spreading on Expanders

Jan Goedgebeur (Ghent) : Speeding up shortest path calculations

Eugenía Saorín Gómez (Magdeburg) : How to differenciate quermassintegrals. Solving a problem by Hadwiger

Martin Grüttmüller (Leipzig) : On Near-Minimal Completely Separating Systems

Heiko Harborth (Braunschweig) : Maximum Rectilinear Crossing Number of the Petersen Graph

Egbert Harzheim (Köln) : Graphs satisfying a richness condition and a condition concerning forbidden subgraphs

Matthias Henze (Magdeburg) : Ehrhart polynomials and successive minima

Christoph Hering (Tübingen) : Latin Squares, Homologies and Euler's Conjecture

Sven Herrmann (Darmstadt) : Splitting Polytopes

Anna Huber (Saarbrücken) : Robustness of Randomized Rumor Spreading Protocols

Mahmudul Huq (Halle) : Development of an Approximation Method for Multiple-Objective Optimization Problem

Stanislav Jendrol (Kosice) : Facial Parity Edge Colouring of Plane Graphs

Thomas Kalinowski (Rostock) : Maximal antichains of 2- and 4-sets

Michael Kiermaier (Bayreuth) : A new series of 2-arcs in projective Hjelmslev planes

Martin Kochol (Bratislava) : Approximation of 3-Edge-Coloring of Cubic Graphs

Matjaz Kovse (Bordeaux) : Covering and identifying codes in Sierpiński graphs

Sascha Kurz (Bayreuth) : Enumeration of complete simple games and weighted voting games

Gohar Kyureghyan (Magdeburg) : An additive construction of permutations on finite fields

Ivan Landjev (Sofia) : The Dual Construction For Arcs in Projective Hjelmslev Spaces

Carsten Lange (Berlin) : Associahedra as Minkowski sums and differences of simplices

Raymond R. Lapus (Mittweida) : Enumerating the Number of Admissible Stack Polygons: An Approach Using a Finite State Automaton

Eva Linke (Magdeburg) : Minimal zonotopes containing the crosspolytope

Frank Lutz (Berlin) : Equivelar and d-covered triangulations of surfaces

Massimiliano Marangio (Braunschweig) : $[1, 1, 2]$-colorings of complete graphs

Maren Martens (Berlin) : 2-InterConnected Facility Location

Mareike Massow (Berlin) : On the linear extension diameter of distributive lattices

Jannik Matuschke (Berlin) : Lattices and maximum flow algorithms in planar graphs

Nicole Megow (Saarbrücken) : Cardinality Constrained Graph Partitioning into Cliques with Submodular Costs

Angela Mestre (Paris) : On the combinatorics of biconnected and 2-edge connected graphs

Vahan Mkrtchyan (Paderborn) : Disjoint matchings in cubic graphs

Ibrahim Nasrabadi (Berlin) : Continuous-time Dynamic Shortest Path Problem: Extreme Point Characterization and Strong Duality

Patric R. J. Östergård (Helsinki) : Two optimal one-error-correcting codes of length 13 that are not doubly shortened perfect codes

Ferruh Özbudak (Ankara) : Artin-Schreier Type Curves and Quadratic Forms

Andreas Paffenholz (Berlin) : Lattice Polytopes in polymake

Florian Pfender (Rostock) : Total Edge Irregular Weightings of Graphs

Christian Reiher (Rostock) : A proof that every prime number has property B

Ingo Schiermeyer (Freiberg) : Rainbow connection in graphs with minimum degree three

Kai-Uwe Schmidt (Vancouver) : Symmetric Bilinear Forms Over Finite Fields of Even Characteristic

Anika Schwarz (Hildesheim) : Extensions of Bondy's Theorem for Hamiltonian-connected Graphs

Pascal Schweitzer (Saarbrücken) : Connected hitting sets of planar graphs

Frank Simon (Mittweida) : Counting Connected Set Partitions of Graphs

Martin Sonntag (Freiberg) : Iterated neighborhood graphs

Roman Sotak (Kosice) : Generalized fractional and circular total coloring of graphs

Jonathan Spreer (Stuttgart) : Normal surfaces as combinatorial slicings

Eckhard Steffen (Paderborn) : The oddness of regular graphs: Measure of edge-uncolorability and applications on r-graphs

Ulrich Tamm (Istanbul) : Lattice Path Enumeration for Codes and the Tennis Ball Problem

Martin Trinks (Mittweida) : A new representation of "A most general edge elimination polynomial"

Torsten Ueckerdt (Berlin) : α-Orientations and Shortest Paths

Nico Van Cleemput (Ghent) : Nanocones: A classification result in chemistry

Viktor Vigh (Szeged) : Disc-polygonal approximation of planar spindle convex sets

Christian Wagner (Magdeburg) : Three-Dimensional Maximal Lattice-Free Polytopes with Integer Vertices

Johannes Zwanzger (Bayreuth) : Heuristic Construction of Linear Codes over Finite Chain Rings with High Minimum (Homogenous) Weight

Weitere TeilnehmerInnen

Mais Alkahateeb (Freiberg), Jens-P. Bode (Braunschweig), Klaus Dohmen (Mittweida), Stefan Felsner (Berlin), Faruk Göloğlu (Dublin), Gerrit Grenzebach (Bremen), Hans-Dietrich Gronau (Rostock), Daniel Heldt (Berlin), Martin Henk (Magdeburg), Franz Hering (Dortmund), Katrin Herr (Darmstadt), Daniel Johannsen (Saarbrücken), Christoph Josten (Frankfurt), Arnfried Kemnitz (Braunschweig), Maria Koch (Freiberg), Matthias Koch (Bayreuth), Anja Kohl (Freiberg), Axel Kohnert (Bayreuth), Silke Möser (Darmstadt), Alexander Pott (Magdeburg), Ulrike Püschmann (Dresden), Moritz Schmitt (Berlin), Daria Schymura (Berlin), Hanns-Martin Teichert (Lübeck), Peter Tittmann (Mittweida), Yue Zhou (Magdeburg).

Freitag, 13.11.2009 — Zeit: 09:30 — G03-315

Orientations of graphs with prescribed outdegrees mod 3

MATTHIAS KRIESELL (Odense)

A graph G is Tutte orientable if for every function $f : V(G) \to \mathbb{Z}$ with $\sum_{x \in V(G)} f(x) \equiv |E(G)| \mod 3$ there exists an orientation D of G such that $d_D^+(x) \equiv f(x) \mod 3$ for all $x \in V(G)$, where $d_D^+(x)$ denotes the number of edges starting at x in D. The talk surveys recent results on this concept, supporting Tutte's 3-flow Conjecture, Jaeger's Weak 3-flow Conjecture, the conjecture of Thomassen and Barát on claw decompositions, and other open questions. Moreover, we will see how Ryjáček's closure concept, a tool from hamiltonian graph theory, can be applied to flow theory and orientation problems.

Freitag, 13.11.2009 — Zeit: 10:45 — G03-315

Recent results on unsplittable and k-splittable flows in single-source networks

MARTIN SKUTELLA (Berlin)

Given a network with a single source and several sinks with associated demands, we study flow problems with restrictions on the flow-carrying paths. In the unsplittable flow problem, the demand of each sink has to be satisfied along a single source-sink path. The k-splittable flow problem allows to split each demand into at most k packets such that each packet is sent along a single source-sink path. We discuss recent results and algorithms for turning an arbitrary flow into an unsplittable or k-splittable flow with bounded increase of flow values along arcs.

Samstag, 14.11.2009 — Zeit: 9:00 — G03-315

A Survey of Golay Complementary Sequences

JONATHAN JEDWAB (Vancouver)

Golay complementary sequences have been used since the 1950s in digital information processing applications such as multislit spectrometry, optical time domain reflectometry, multicarrier wireless transmission, and medical ultrasound. It is of theoretical and practical importance to determine all lengths for which Golay sequences exist over a specified alphabet, and to enumerate all examples of a given length.
We'll begin by placing the study of Golay sequences in historical context, by reference to practical applications. Next, we'll describe some constructions of Golay sequences that were published over a period of nearly forty years. We'll then examine the recent idea of viewing a Golay sequence as the projection of a multi-dimensional Golay array, which accounts for all known Golay sequences of length $2m$ over a $2h$-phase alphabet. Finally, we'll examine some new constructions for Golay sequences whose length and alphabet take other forms.

This is joint work with Frank Fiedler, Richard Gibson, Matthew Parker, and Amy Wiebe

Samstag, 14.11.2009 — Zeit: 15:15 — G03-315

Existence vs Counting

JAROSLAV NEŠETŘIL (Prag)

We introduce the dichotomy between classes of graphs (and more generally of structures): Nowhere Dense and Somewhere Dense classes. We show how this dichotomy naturally arises and show its several characterizations. Particularly, we show how these classes can be defined by the limit frequencies of its subgraphs (which are integral and an be interpreted as degrees of freedom).

This is a joint work with Patrice Ossona de Mendez (EHESS Paris).

Freitag, 13.11.2009 — Zeit: 13:00

---

1 — Sektion I — G02-111 — 13:00

Disjoint matchings in cubic graphs

VAHAN MKRTCHYAN (Paderborn)

For $i = 1, 2, 3$ and a cubic graph G let $\nu_i(G)$ denote the maximum number of edges that can be covered by i matchings. We show that $\nu_2(G) \geq \frac{4}{5}|V(G)|$, $\nu_3(G) \geq \frac{7}{6}|V(G)|$ and $\nu_2(G) + \nu_3(G) \geq 2|V(G)|$, which implies that there is no a single graph attaining the last two bounds. Our methodology allows us to prove that $\nu_2(G) \leq \frac{\nu_1(G)+\nu_3(G)}{2}$ provided that G contains a perfect matching.

This is a joint work with Samvel Petrosyan and Gagik Vardanyan.

---

2 — Sektion II — G02-109 — 13:00

Maximum Rectilinear Crossing Number of the Petersen Graph

HEIKO HARBORTH (Braunschweig)

The maximum rectilinear crossing number of the Petersen graph is proved to be 49.

3 — Sektion III — G03-106 — 13:00

Two optimal one-error-correcting codes of length 13 that are not doubly shortened perfect codes

PATRIC R. J. ÖSTERGÅRD (Helsinki)

The doubly shortened perfect codes of length 13 are classified utilizing the classification of perfect codes in [P.R.J. Östergård and O. Pottonen, The perfect binary one-error-correcting codes of length 15: Part I—Classification, *IEEE Trans. Inform. Theory*, to appear]; there are 117821 such (13,512,3) codes. By applying a switching operation to those codes, two more (13,512,3) codes are obtained, which are then not doubly shortened perfect codes.

This is joint work with Olli Pottonen.

---

4 — Sektion IV — G03-214 — 13:00

A new representation of "A most general edge elimination polynomial"

MARTIN TRINKS (Mittweida)

We define the so called covered components polynomial $G(C) = G(G, x, y, z)$ for a (multi)graph G. The coefficient of $x^i y^j z^k$ in $C(G)$ is the number of subgraphs of G with exactly i components, j edges and k covered components, where covered components are the components with at least one edge. We show that these polynomial has a recursive relation using edge elimination operations (deletion, contraction and extraction of an edge) and that this polynomial is also a most general polynomial for this operations, such as the edge elimination polynomial $\xi(G)$ (defined by Averbouch, Godlin and Makowsky in "A most general edge elimination polynomial") is. The covered components polynomial $C(G)$ exhibits an easier edge subset sum representation than the original ξ-polynomial. We figure out some invariants of G coded in $C(G)$, some classes of C-unique graphs and explicit formulas for special graphs.

Freitag, 13.11.2009 — Zeit: 13:30

---

5 — Sektion I — G02-111 — 13:30

Rainbow connection in graphs with minimum degree three

INGO SCHIERMEYER (Freiberg)

An edge-coloured graph G is *rainbow connected* if any two vertices are connected by a path whose edges have distinct colours. This concept of rainbow connection in graphs was recently introduced by Chartrand et al.. The *rainbow connection number* of a connected graph G, denoted $rc(G)$, is the smallest number of colours that are needed in order to make G rainbow connected. The computation of $rc(G)$ is an NP-hard problem.
In this talk we will show that $rc(G) < \frac{3n}{4}$ for graphs with minimum degree three, which was conjectured by Caro et al.. We will also report about the status of this problem for graphs with minimum degree at least four.

---

6 — Sektion II — G02-109 — 13:30

A proof that every prime number has property B

CHRISTIAN REIHER (Rostock)

Let p denote a prime number and work in your favourite abelian p–group, i.e. F_p^2. It is known that any sequence consisting of $2p-1$ terms from that group has a nonempty subsequence the sum of whose elements equals zero. Also, some straightforward examples show that the number $2p-1$ occurring here cannot be replaced by $2p-2$, but is seems to be less easy to describe all counterexamples. There is, however, a conjectured classification of these sequences the recent proof of which we will discuss.

7 — Sektion III — G03-106 — 13:30

A new series of 2-arcs in projective Hjelmslev planes

MICHAEL KIERMAIER (Bayreuth)

We investigate the maximal 2-arc problem in projective Hjelmslev planes over finite chain rings R of composition length 2. The problem is only solved partially: If R is a Galois ring of even characteristic, there exist hyperovals. For non-Galois chain rings R, a new construction of large 2-arcs is given. If the characteristic of R ist odd, the size meets the known upper bound, thus solving the maximal 2-arc problem for this instance.

This is joint work with Thomas Honold.

---

8 — Sektion IV — G03-214 — 13:30

Connected hitting sets of planar graphs

PASCAL SCHWEITZER (Saarbrücken)

In my talk I will be concerned with relationships among hitting sets in connected planar graphs, i.e., with face hitting sets, feedback vertex sets and their connected variants. In connected planar graphs of minimum degree 3, the smallest sizes of these hitting sets are bounded by each other by multiplicative factor. I will give tight bounds for such a relationship.

This is joint work with Patrick Schweitzer.

Freitag, 13.11.2009 — Zeit: 14:00

9 — Sektion I — G02-111 — 14:00

Graphs satisfying a richness condition and a condition concerning forbidden subgraphs

EGBERT HARZHEIM (Köln)

We present some R-F-theorems. That means we characterize classes of finite graphs G which satisfy a condition (R) of richness and a condition (F)concerning forbidden subgraphs. In particular we consider (R): Each two vertices of G have a common neighbor. And (F): G has no 5-circle (resp. no 6-circle). It turns out that in both cases of (F) the graphs G which satisfy (R) and (F) have a vertex which is joined with all other vertices of G. And we give a complete description of the corresponding graph classes. Another theorem deals with conditions concerning the existence or non-existence of certain circles in the graphs G.

10 — Sektion II — G02-109 — 14:00

Combinatorial conditions for the tightness of triangulated manifolds

FELIX EFFENBERGER (Stuttgart)

Tightness of a triangulated manifold is a topological condition, roughly meaning that any simplexwise linear embedding of the triangulation into euclidean space is “as convex as possible”. It can thus be understood as a generalization of the notion of convexity. In even dimensions, super-neighborliness is known to be a purely combinatorial condition which implies the tightness of a triangulation. In this talk other sufficient and purely combinatorial conditions which can be applied to the odd-dimensional case as well are presented. One of the conditions is that all vertex links are stacked spheres, which implies that the triangulation is in Walkup’s class $\mathcal{K}(d)$.

11 — Sektion III — G03-106 — 14:00

The Dual Construction For Arcs in Projective Hjelmslev Spaces

IVAN LANDJEV (Sofia)

Duality constructions for arcs without multiple points in projective geometries over finite fields have been known for a long time. It turns out that they can be generalized for multiarcs in projective Hjelmslev geometries over finite chain rings. However, the situation here is more complicated. A major difference from the classical case is that dual constructions yield arcs in the dual geometry,

which in the case of non-commutative chain rings may not be isomorphic to the original geometry. The more complex structure of the projective Hjelmslev geometries results also in more complicated formulas for the parameters of the dual arcs. In this talk, we generalize the duality construction for multiarcs to projective Hjelmslev geometries over finite chain rings of length (nilpotency index) 2 and derive formulas for the parameters and the spectrum of the resulting dual arcs. It is possible (in principle) to prove analogous results for projective Hjelmslev geometries over finite chain rings of arbitrary nilpotency index, but the formulas obtained are expected to be rather complicated. The main result is contained in the following theorem. **Theorem.** Let $\mathfrak{K}$ be a (n, w)-arc in $\mathrm{PHG}(R_R^k)$, where R is a chain ring with $|R| = q^2$, $R/\operatorname{Rad} R \cong \mathbb{F}_q$. Let $\alpha, \beta, \gamma \in \mathbb{Q}$ be such that $\alpha + \beta a_1 + \gamma a_2 \in \mathbb{N}_0$ for all $\boldsymbol{a} = (a_0, a_1, a_2) \in W$. For any hyperplane H of type $\boldsymbol{a} = (a_0, a_1, a_2)$, let

$$\tau(H) = \tau(\boldsymbol{a}(H)) = \alpha + \beta a_1 + \gamma a_2.$$

Then the type of an arbitrary hyperplane $x^* = \boldsymbol{x}R \in \mathcal{P}$ in the dual geometry is $\boldsymbol{b} = (b_0, b_1, b_2)$, where

$$\begin{aligned}
b_0 &= \alpha q^{2k-2} + \beta n q^{2k-4}(q-1) + \gamma n q^{2k-4} \\
&\quad -\Big(\beta q^{2k-4}(q-1) + \gamma q^{2k-4}\Big)\mathfrak{K}([x]), \\
b_1 &= \alpha q^{k-2}(q^{k-1}-1) + \beta n q^{k-3}(q^{k-2}-1)(q-1) + \gamma n q^{k-3}(q^{k-2}-1) \\
&\quad +\Big(\beta q^{k-3}(q^k - 2q^{k-1} + q^{k-2} - 1) + \gamma q^{k-3}(q^{k-1} - q^{k-2} + 1)\Big)\mathfrak{K}([x]) \\
&\quad -(\gamma-\beta)q^{2k-4}\mathfrak{K}(x), \\
b_2 &= \alpha q^{k-2} \cdot \frac{q^{k-1}-1}{q-1} + \beta n q^{k-3}(q^{k-2}-1) + \gamma n q^{k-3} \cdot \frac{q^{k-2}-1}{q-1} \\
&\quad +\Big(\beta q^{k-3}(q^{k-1} - q^{k-2} + 1) + \gamma q^{k-3}(q^{k-2}-1)\Big)\mathfrak{K}([x]) \\
&\quad +(\gamma-\beta)q^{2k-4}\mathfrak{K}(x).
\end{aligned}$$

This is joint work with Thomas Honold

---

12 — Sektion IV — G03-214 — 14:00

Antimagicness through factorizations

ROMAN ČADA (Pilsen)

Given an edge labeling of a graph the sum of labels of all edges incident with a vertex v is called a vertex sum of v. A graph with m edges is called antimagic if there is an edge labeling using labels $1, 2, \ldots, m$ (each only once) such that the corresponding vertex sums are pairwise distinct. A long standing conjecture due to Hartsfield and Ringel (1990) says that all graphs (except K_2) are antimagic. One of the strongest results in this field stating that all dense graphs are antimagic is due to Alon, Kaplan, Lev, Roditty and Yuster (2004) .

In the talk we will investigate the role of graph factors for antimagic property.

Freitag, 13.11.2009 — Zeit: 15:00

---

13 — Sektion I — G02-111 — 15:00

2-InterConnected Facility Location

MAREN MARTENS (Berlin)

Connected facility location problems combine cost-efficient facility placement (and cheap client-to-facility-connection) with the requirement to connect the facilities among each other. Such network design problems arise, e.g., in telecommunications where networks consist of a central router (or facility) network and local clients, which are connected to the routers. Reliability of the facility network then is a central issue, and we may hence require it to be 2-interconnected, i.e., there are two disjoint paths within the facility network between every pair of facilities. We establish the problem class of 2-interConnected Facility Location, categorize its central variants, and prove that they are hard to approximate. However, cut-based ILP formulations, which are also presented, allow us to effectively solve such problems to optimality for hundreds of nodes. We establish simple exhaustive characterizations for problem instances admitting feasible solutions. These characterizations are constructive and can be used for algorithmic feasibility checks and preprocessing steps.

This is joint work with Markus Chimani and Maria Kandyba.

---

14 — Sektion II — G02-109 — 15:00

Associahedra as Minkowski sums and differences of simplices

CARSTEN LANGE (Berlin)

The n-dimensional associahedron is a polytope with the following combinatorics: a k-dimensional face corresponds to a triangulation of a convex $(n+3)$-gon with k missing diagonals and a k-face is contained in a $(k+1)$-face if and only if the corresponding triangulation with $k+1$ missing diagonals is obtained from the one with k missing diagonals by removing one diagonal.

A beautiful realization was explicitly described by Loday: remove certain facets of the permutahedron. Generalizing this construction, Hohlweg & Lange described more realizations of the associahedron of this flavour by removing combinatorially different face patterns.

It is known how to describe Loday's associahedra as a Minkowski sum of simplices. The aim of this talk is to present a simple way to express the larger class of Hohlweg & Lange as Minkowski sums and differences of simplices.

15 — Sektion III — G03-106 — 15:00

Heuristic Construction of Linear Codes over Finite Chain Rings with High Minimum (Homogenous) Weight

JOHANNES ZWANZGER (Bayreuth)

In the eighties and nineties, it was discovered that several nonlinear binary codes with excellent minimum distance can be represented as linear codes over $\mathbb{Z}_4$. $\mathbb{Z}_4$ is a finite chain ring, i. e. a finite ring R whose left ideals $I_0, \ldots, I_m$ form a chain $R = I_0 \supset I_1 \cdots \supset I_m = \{0\}$. m is called the *chain length* of R and the factor ring R/I_1 is isomorphic to some finite field $\mathbb{F}_q$. A linear code C over R of length n is an R-left submodule of ${}_RR^n$. For every such C, there exists $k \in \mathbb{N}$ and a tupel $\lambda = (\lambda_0, \lambda_1, \ldots, \lambda_{k-1}) \in \{1, \ldots, m\}^k$ such that $C \cong \bigoplus_{i=0}^{k-1} R/I_{\lambda_i}$. We now prescribe values for λ and n as well as a weight function w from which we derive the corresponding metric d_w on R^n. Like in the classical case over finite fields we want to construct linear codes with minimum distance $d_w(C)$ as high as possible. A very interesting aspect is that if w is chosen as the so-called *homogenous weight*, C corresponds to a (generally nonlinear) code over $\mathbb{F}_q$ of length $n \cdot q^{m-1}$ and minimum hamming distance $d_w(C) \cdot q^{m-2}$. In our talk we present a heuristic method to construct such codes using a greedy algorithm based on probabilistic calculations. It was applied to the finite chain rings up to order 27 for all $n \leq 100$ and more than 200 different shapes in total, giving a lot of provable optimal codes. Our results will also be accessible through an online database.

---

16 — Sektion IV — G03-214 — 15:00

Extensions of Bondy's Theorem for Hamiltonian-connected Graphs

ANIKA SCHWARZ (Hildesheim)

In 1980 Bondy proved a sufficient condition for hamiltonicity that generalizes the classical sufficient conditions of Dirac and Ore. An analogous result holds for hamiltonian-connected graphs:

> Let G be a k-connected graph of order n. If the degree sum of every $k+1$ pairwise nonadjacent vertices is at least $\frac{1}{2}((k+1)n+1)$ then G is hamiltonian-connected.

It is possible to weaken the assumption of this theorem by allowing some independent sets with $k+1$ vertices that do not satisfy the given degree condition but still implying hamiltonian-connectedness. A bound for the maximum number of such possible 'bad $(k+1)$-sets' depending on the minimum degree or on the connectivity of the graph will be presented.

Freitag, 13.11.2009 — Zeit: 15:30

---

17 — Sektion I — G02-111 — 15:30

Speeding up shortest path calculations

JAN GOEDGEBEUR (Ghent)

Dijkstra's algorithm is the best known algorithm for solving single-source shortest path problems (i.e. to determine the shortest path between two vertices in a weighted graph). We present new goal-directed heuristics that are up to 5 times faster than Dijkstra's algorithm while the paths obtained by these heuristics are on average less than 1% longer than the shortest paths

---

18 — Sektion II — G02-109 — 15:30

Disc-polygonal approximation of planar spindle convex sets

VIKTOR VIGH (Szeged)

A set $H \subset E^d$ of circumradius not greater than one is spindle convex if for any pair of its points, it contains every short circular arc of radius at least one, connecting them. It is useful to think of compact, spindle convex sets as the intersection of closed unit balls. The intersection of finitely many unit balls is called a ball-polyhedra. It is natural to ask that how well can we approximate a spindle convex set with ball-polyhedras. In this talk we give asymptotic formulas for the distance of a sufficiently smooth, planar spindle convex body and its best approximating disc-polygon, where the number of the vertexes of the polygon is restricted.

This is joint work with F. Fodor (University of Szeged).

19 — Sektion III — G03-106 — 15:30

Lattice Path Enumeration for Codes and the Tennis Ball Problem

ULRICH TAMM (Istanbul)

We shall discuss the six sequences of numbers around the 0's in the array

$$\beta(n,k) = 3 \cdot \binom{n+k}{k} - 2 \cdot \binom{n+k}{k-1} = \frac{3(n+1)-2k}{n+k+1}\binom{n+k+1}{k}.$$

Four of these sequences play a role in the construction of burst-error detecting codes due to Berlekamp. The other two sequences and their generalizations are of recent interest in combinatorial theory, since they occur as solution to the so–called tennis ball problem.

---

20 — Sektion IV — G03-214 — 15:30

On the combinatorics of biconnected and 2-edge connected graphs

ANGELA MESTRE (Paris)

We give a simple formula to recursively generate all (vertex) biconnected graphs with rational coefficients. The essential property is that the sum of the coefficients of all graphs in the same equivalence class is given by the inverse of the order of their group of automorphisms. Furthermore, we define a graph transformation to produce a 2-edge connected graph with say, μ, biconnected components from one with $\mu - 1$ biconnected components. We use such map and the aforesaid result to recursively generate all 2-edge connected graphs (up to isomorphism) with the exact coefficients.

Freitag, 13.11.2009 — Zeit: 16:00

---

21 — Sektion I — G02-111 — 16:00

Continuous-time Dynamic Shortest Path Problem: Extreme Point Characterization and Strong Duality

IBRAHIM NASRABADI (Berlin)

The dynamic shortest path problem is an extension of the shortest path problem to networks with time-dependent arc costs. Moreover, each arc has a fixed transit time and waiting at the nodes is allowed but causes a time-dependent cost. We study a very general class of these shortest path problems for which time is modeled as a continuum and transit times can be negative. The problem is formulated as a linear programming (LP) problem in spaces of measures. We characterize extreme point solutions of the LP formulation and derive a one-to-one correspondence between extreme points and dynamic paths. We also define a dual problem and establish a strong duality result in the case of piecewise analytic cost functions.

---

22 — Sektion II — G02-109 — 16:00

Generalized fractional and circular total coloring of graphs

ROMAN SOTAK (Kosice)

An additive hereditary property of graphs is a class of simple graphs which is closed under unions, subgraphs and isomorphism. Let $\mathcal{P}$ and $\mathcal{Q}$ be additive hereditary properties of graphs. For non-negativ integers r and s a $(\mathcal{P}, \mathcal{Q})$-*total fractional/circular* (r, s)-*coloring* of a simple graph G is a coloring of the vertices $V(G)$ and edges $E(G)$ of G by arbitrary/consecutive s-element subsets of $\mathbb{Z}_n$ such that for each color i the vertices colored by sets containing i induce a subgraph of property $\mathcal{P}$, the edges colored by sets containing i induce a subgraph of property $\mathcal{Q}$ and incident vertices and edges obtain disjoint sets. We present general basic results on $(\mathcal{P}, \mathcal{Q})$-total fractional/circular (r, s)-colorings. For specific properties we determine the $(\mathcal{P}, \mathcal{Q})$-total fractional and circular chromatic numbers of complete graphs.

23 — Sektion III — G03-106 — 16:00

Symmetric Bilinear Forms Over Finite Fields of Even Characteristic

KAI-UWE SCHMIDT (Vancouver)

Let S_m be the set of symmetric bilinear forms on an m-dimensional vector space over GF(2^k). A subset Y of S_m is called an (m, d)-*set* if the difference between any two distinct elements in Y has rank at least d. In the 1970s, Delsarte and Goethals studied (m, d)-sets that are restricted to contain only alternating bilinear forms. This eventually led to the discovery of the Delsarte–Goethals codes, which are codes over GF(2^k). It turns out that (m, d)-sets, in general, underlie related families of codes over GR$(4, k)$, the Galois ring of characteristic 4 and size 4^k. This connection motivates to study fundamental combinatorial aspects of (m, d)-sets. In particular, we would like to answer the following. What is the maximum size of an (m, d)-set? What can be said about the rank distance distribution of (m, d)-sets? How can we construct (m, d)-sets of large (preferably maximum) size? I will give answers to these questions in my talk.

---

24 — Sektion IV — G03-214 — 16:00

Minimal zonotopes containing the crosspolytope

EVA LINKE (Magdeburg)

Motivated by the problem to improve Minkowski's lower bound on the successive minima for the class of zonotopes we determine the minimal volume of a zonotope containing the standard crosspolytope. It turns out that this volume can be expressed via the maximal determinant of a ± 1-matrix. Based on that link we present a characterisation of all zonotopes attaining the minimal volume in dimension 3 and present related results in higher dimensions.

Freitag, 13.11.2009 — Zeit: 16:45

25 — Sektion I — G02-111 — 16:45

Efficiently finding fullerene patches with a given boundary code

PAUL BONSMA (Berlin)

Fullerene molecules can be modelled by 3-regular plane graphs with only 5- and 6-faces. For their enumeration, the following subgraphs are important: a *fullerene patch* is a 2-connected plane graph in which inner faces have length 5 or 6, internal vertices have degree 3, and boundary vertices have degree 2 or 3. Its *boundary code* is the degree sequence along the outer face.
We consider the following well-studied problem: given a sequence of twos and threes of length n, does there exist a fullerene patch with this boundary code? We give the first polynomial time algorithm for this problem, for boundary codes corresponding to patches with $k \leq 5$ 5-faces.
The complexity of the algorithm is improved to $O(n^{2k+3})$, by considering straight walks in fullerene patches. A *straight walk* is a walk that alternatingly turns left and right at its internal vertices, which all have degree 3. We study a partial order defined by how such paths may cross.
The talk will end with many open questions on the complexity of (variants of) the problem.

This is joint work with Felix Breuer.

26 — Sektion II — G02-109 — 16:45

Iterated neighborhood graphs

MARTIN SONNTAG (Freiberg)

Let $G = (V, E)$ be a simple undirected graph. $N(G) = (V, E_N)$ is the *neighborhood graph* of the graph G, if and only if

$$E_N = \{\{a, b\} \mid a \neq b \wedge \exists\, x \in V : \{x, a\} \in E \wedge \{x, b\} \in E\}.$$

It is well-known that the neighborhood graph $N(G)$ is connected if and only if the graph G is connected and non-bipartite. We present some results concerning the *k-iterated neighborhood graph* $N^k(G) := N(N(\ldots N(G)))$ of the graph G. So we discuss the question which types of graphs occur as k-iterated neighborhood graphs $N^k(G)$ for large k and investigate under which conditions $N^k(G)$ becomes a complete graph.

This is joint work with Hanns-Martin Teichert (Universität zu Lübeck).

27 — Sektion III — G03-106 — 16:45

Locally constructible manifolds

BRUNO BENEDETTI (Berlin)

Locally constructible (LC) simplicial 3-manifolds are the manifolds obtained from a 'tree of tetrahedra' by repeatedly identifying two adjacent boundary triangles. This notion was introduced in 1995 by two physicists, who conjectured that all 3-spheres are LC. We characterize the LC property using classical notions in combinatorial topology. We also solve the conjecture negatively, by showing the existence of non-LC d-spheres for each $d > 2$.

This is joint work with Gnter M. Ziegler.

---

28 — Sektion IV — G03-214 — 16:45

The Separation Problem For Polytopes

FERENC FODOR (Szeged)

We shall discuss the separation problem for d-polytopes. The separation problem for polytopes asks for the minimum number of hyperplanes that can separate an internal point of a d-polytope from its facets. The conjecture states that this number is at most 2^d. The separation conjecture is very closely related to the Gohberg-Markus-Hadwider covering conjecture which asks for the minimum number of smaller homothets of a convex body that can cover the original convex body. We will describe classes of polytopes for which the separation problem is solved.

This talk contains results that are joint with T. Bisztriczky (Calgary) and D. Oliveros (Mexico City).

Freitag, 13.11.2009 — Zeit: 17:15

---

29 — Sektion I — G02-111 — 17:15

Lattices and maximum flow algorithms in planar graphs

JANNIK MATUSCHKE (Berlin)

Packing and covering problems are a very general class of combinatorial optimization problems that can be solved by a two-phase greedy algorithm if they are defined on so-called "consecutive and submodular lattices". In this talk we shall see that the set of paths in an s-t-planar network yields such a consecutive lattice and hence the uppermost path algorithm of Ford and Fulkerson for maximum flow is a special case of this greedy algorithm.
We will also present an extension of the above result to a lattice in a general planar graph, which is based on a left/right relation on the paths introduced by Klein. However, the important property of consecutivity is not preserved by this generalization. In fact, we will show that submodularity and consecutivity cannot be achieved simultaneously by any partial order if the graph is not s-t-planar, yielding a characterization of this class of planar graphs.

---

30 — Sektion II — G02-109 — 17:15

Counting Connected Set Partitions of Graphs

FRANK SIMON (Mittweida)

Let $G = (V, E)$ be a simple, undirected graph with n vertices then a set partition $\pi = \{V_1, \ldots, V_k\}$ of the vertex set V of G is a connected set partition if the subgraphs $G[V_j]$ induced by the blocks V_j of π are connected for $1 \leq j \leq k$. Define $q_i(G)$ as the number of connected set partitions in G with i blocks. The partition polynomial is then defined by $Q(G, x) = \sum_{i=0}^{n} q_i(G)x^i$. The author presents a splitting approach to the partition polynomial on a vertex separating set X in G and discusses some properties of the underlying lattice of connected set partitions.

31 — Sektion III — G03-106 — 17:15

Artin-Schreier Type Curves and Quadratic Forms

FERRUH ÖZBUDAK (Ankara)

Let q be a power of an odd prime. Let m and n be positive integers with $n \mid m$. Let $\mathbb{F}_{q^n}$ and $\mathbb{F}_{q^m}$ denote finite fields with q^n and q^m elements. Let $\mathrm{Tr}_{\mathbb{F}_{q^m}/\mathbb{F}_{q^n}}$ denote the relative trace map from $\mathbb{F}_{q^m}$ onto $\mathbb{F}_{q^n}$.
Let h be a nonnegative integer. Let $\gamma \in \mathbb{F}_{q^m} \setminus \{0\}$ and $\alpha \in \mathbb{F}_{q^m}$. Let $N(m,n)$ denote the cardinality given by

$$N(m,n) = \left| \left\{ x \in \mathbb{F}_{q^m} : \mathrm{Tr}_{\mathbb{F}_{q^m}/\mathbb{F}_{q^n}} \left(\gamma x^{q^h+1} - \alpha \right) = 0 \right\} \right|.$$

We determine $N(m,n)$ exactly and explicitly in all cases.
Let χ be the smooth, geometrically irreducible projective curve defined over $\mathbb{F}_{q^m}$ which is given by the plane affine equation

$$y^{q^n} - y = \gamma x^{q^h+1} - \alpha.$$

As a direct consequence of our result on $N(m,n)$, we also determine the number of $\mathbb{F}_{q^m}$-rational points of χ exactly in all cases.

This is joint work with E. Kurtaran Özbudak and Z. Saygı.

---

32 — Sektion IV — G03-214 — 17:15

Three-Dimensional Maximal Lattice-Free Polytopes with Integer Vertices

CHRISTIAN WAGNER (Magdeburg)

A convex set with nonempty interior is maximal lattice-free if it is inclusion-maximal with respect to the property of not containing integer points in its interior. Bounded maximal lattice-free convex sets are known to be rational full-dimensional polytopes. Lately, it has been shown that – up to unimodular transformation – the number of three-dimensional maximal lattice-free polytopes with integer vertices is finite. Motivated by recent research on cutting plane theory in mixed-integer linear optimization an explicit list of those objects is needed. In this talk, we present such a complete list and sketch out the proof strategy.

The results are based on joint work with Kent Andersen, Gennadiy Averkov and Robert Weismantel.

Freitag, 13.11.2009 — Zeit: 17:45

---

33 — Sektion I — G02-111 — 17:45

The 4-hop constrained edge-disjoint paths problem is APX-complete

ANDREAS BLEY (Berlin)

We consider the problem of finding a maximum number of edge-disjoint (s, t)-paths of length at most 4 in a given (directed or undirected) graph $G = (V, E)$ with designated nodes s and t. This problem arises for example in the planning of fault-tolerant communication networks. We show that this problem is APX-hard and we present a simple factor 2 approximation algorithm. This also answers the question whether this problem is NP-hard or not, which has been open until now.

---

34 — Sektion II — G02-109 — 17:45

α-Orientations and Shortest Paths

TORSTEN UECKERDT (Berlin)

Given an undirected graph G, we are interested in orientations of its edges such that, the outdegree at every vertex v meets a predescribed value $\alpha(v)$. Such orientations are called α-*orientations* of G. Depending on the map $\alpha : V \to \mathbf{N}$ the graph G may have none, exactly one, or many α-orientations. If G is planar the set of its α-orientations is highly structured. In this talk we restrict G to be planar. Whence the task of computing an α-orientation (or deciding that none exists) can be handed over to the dual graph G^* of G. Somehow surprisingly, in G^* this may be rephrased as a *shortest-path-problem*.
The fastest known algorithm goes this way. But the main open problem, whether there is a *linear-time-algorithm* for computing an α-orientation of a planar graph, remains open.

35 — Sektion III — G03-106 — 17:45

An additive construction of permutations on finite fields

GOHAR KYUREGHYAN (Magdeburg)

Let $\mathbb{F}_q$ be the finite field with q elements. Any mapping from a finite field into itself is given by a polynomial. A polynomial over $\mathbb{F}_q$ is called a *permutation polynomial* of $\mathbb{F}_q$ if it induces a permutation on $\mathbb{F}_q$. The explicit constructions of "nice" permutation polynomials are of a special interest for various theoretical and practical applications of finite fields. Majority of the known examples of permutation polynomials are obtained by exploiting the multiplicative structure of the finite fields and therefore are not well suited for applications of additive nature. In this talk, an additive construction of permutation polynomials will be introduced and several applications in Cryptology and Finite Geometry will be presented.

---

36 — Sektion IV — G03-214 — 17:45

The oddness of regular graphs: Measure of edge-uncolorability and applications on r-graphs

ECKHARD STEFFEN (Paderborn)

We generalize the notion of the oddness of cubic graphs to r-regular (multi-)graphs. This invariant measures how far is a r-regular graph from having an r-edge-coloring. We study this invariant and its relation to the size of a maximum r-edge-colorable subgraph. We then concentrate on r-graphs and prove for some r-graphs that they have an $r+1$-edge-coloring.

This is joint work with Vahan V. Mkrtchyan.

Samstag, 14.11.2009 — Zeit: 10:00

---

37 — Sektion I — G02-111 — 10:00

Total Edge Irregular Weightings of Graphs

FLORIAN PFENDER (Rostock)

Let $m := ||G||$ sufficiently large and $s := \lceil \frac{m-1}{3} \rceil$. We show that unless the maximum degree $d_1 > 2s$, there is a weighting $\hat{w} : E \cup V \to \{0, 1, \ldots, s\}$ so that $\hat{w}(uv)+\hat{w}(u)+\hat{w}(v) \neq \hat{w}(u'v')+\hat{w}(u')+\hat{w}(v')$ whenever $uv \neq u'v'$ (such a weighting is called *total edge irregular*). This shows a conjecture by Ivančo and Jendrol' for large graphs, extending a result by Brandt, Miškuf and Rautenbach.

---

38 — Sektion II — G02-109 — 10:00

Pseudosegment and Cocomparability Graphs

CORNELIA DANGELMAYR (Berlin)

Pseudosegment graphs are intersection graphs of pseudosegments that is Jordan arcs in the plane where two arcs are either disjoint or intersect in a single crossing point. Trapezoid graphs are intersection graphs of trapezoids spanned between two parallel lines, and are also known as the cocomparability graphs of posets of interval dimension two. Examples of trapezoid graphs are interval graphs and PI*-graph, that is intersection graphs of triangles spanned between two parallel lines.
First we show that PI*-graphs are pseudosegment graphs. The latter result motivates the definition of a further subclass of trapezoid graphs, the class of II_1-graphs, that then, directly, belongs to the class of pseudosegment graphs. To justify the definition of the latter class we then show that the class of II_1-graphs is not contained in the class of PI*-graph, and vice versa.

39 — Sektion III — G03-106 — 10:00

Algebraic Stringology: Selfdual substitutions for words

DIRK FRETTLOEH (Bielefeld)

Sturmian words are infinite words over the alphabet a, b, which contain exactly n+1 different words of length n. There are several equivalent characterisations known for a word to be Sturmian, some of them will be presented here. One is that they are generated by an automorphism of F_2 (the free group with two generators a, b). We determine all such automorphisms, which are self-dual. That is, the inverse automorphism generates the same words (up to renaming letters).

This is joint work with V. Berthe.

---

40 — Sektion IV — G03-214 — 10:00

Enumerating the Number of Admissible Stack Polygons: An Approach Using a Finite State Automaton

RAYMOND R. LAPUS (Mittweida)

Let $R(H, W)$ be a rectangle with positively integral valued height H and width W. We consider the classes of stack polygons that can be formed inside $R(H, W)$ in such a way that the point of origin and the base of these polygons respectively coincides with the southwest corner and the bottom portion of $R(H, W)$. In this paper, we construct an automaton to enumerate the number of stack polygons that satisfies the above restrictions. Moreover we derive the generating function from this automaton.

Samstag, 14.11.2009 — Zeit: 10:30

41 — Sektion I — G02-111 — 10:30

Approximation of 3-Edge-Coloring of Cubic Graphs

MARTIN KOCHOL (Bratislava)

The problem to find a 4-edge-coloring of a 3-regular graph is solvable in polynomial time but an analogous problem for 3-edge-coloring is NP-hard. We study complexity of approximation algorithms for invariants measuring how far is a 3-regular graph from having a 3-edge-coloring. We show that it is an NP-hard problem to approximate such invariants with an error $O(n^{1-\epsilon})$, where n denotes the order of the graph and $0 < \epsilon < 1$ is a constant.

This is a joint work with N. Krivoáková, S. Smejová, and K. Šranková.

---

42 — Sektion II — G02-109 — 10:30

Lattice Polytopes in polymake

ANDREAS PAFFENHOLZ (Berlin)

The `polymake` software system by Gawrilow and Joswig deals with convex polytopes and related objects from geometric combinatorics. The new `polymake` release contains an application that deals with specific properties of lattice polytopes. The main focus of the provided methods is on applications in toric geometry. `polymake` includes a unified interface to some existing software packages in this field (e.g. `normaliz`, `barvinok`). This is joint work with Benjamin Lorenz.
After a short introduction to the `polymake` system and the new lattice polytope application I will demonstrate the new methods with the recent construction of a counter-example to a conjecture of Batyrev and Selivanova. They asked whether non-singular toric Fano manifolds with a Kähler-Einstein metric are necessarily symmetric. This fails in dimensions ≥ 7.

43 — Sektion III — G03-106 — 10:30

On Near-Minimal Completely Separating Systems

MARTIN GRÜTTMÜLLER (Leipzig)

An (n)-completely separating system $\mathcal{C}$ or (n)-CSS is a collection of subsets of $[n]$, called blocks, such that for each $a, b \in [n]$ there are blocks $A, B \in \mathcal{C}$ with $a \in A \setminus B$ and $b \in B \setminus A$. $R(n)$ denotes the minimum possible number of blocks of an (n)-CSS. Such an (n)-CSS with exactly $R(n)$ blocks is called a minimal completely separating system or (n)-MCSS. (Non-)Existence proofs involve investigations of substructures of the MCSSs. These substructures on $[m] \subset [n]$ points are CSS itself but contain usually more than $R(m)$ blocks. So, an $(n; s)$-near minimal completely separating system $(n; s)$-NMCSS is an (n)-CSS with exactly $R(n) + s$ blocks. In this talk methods for constructing catalogues of non-isomorphic $(n; s)$-NMCSS will be discussed. This is joint work with Ian T. Roberts, Kevin Gilbert, Sue D'Arcy and Leanne J. Rylands.

---

44 — Sektion IV — G03-214 — 10:30

Quasirandom Rumor Spreading on Expanders

TOBIAS FRIEDRICH (Saarbrücken)

Randomized rumor spreading is an efficient way to distribute information in networks. Recently, a quasirandom version of this protocol has been proposed. It was proven that it works equally well or even better in many settings. In this work, we exhibit a natural expansion property for networks, which ensures that quasirandom rumor spreading informs all nodes of the network in logarithmic time with high probability. This expansion property is satisfied, among others, by many expander graphs, random regular graphs, and Erdős-Rényi random graphs.

This is joint work with Benjamin Doerr and Thomas Sauerwald.

Samstag, 14.11.2009 — Zeit: 11:00

---

45 — Sektion I — G02-111 — 11:00

$[1, 1, 2]$-colorings of complete graphs

MASSIMILIANO MARANGIO (Braunschweig)

Given non-negative integers r, s, and t, an $[r, s, t]$-*coloring* of a graph $G = (V(G), E(G))$ is a mapping c from $V(G) \cup E(G)$ to the color set $\{0, 1, \ldots, k-1\}$ such that $|c(v_i) - c(v_j)| \geq r$ for every two adjacent vertices v_i, v_j, $|c(e_i) - c(e_j)| \geq s$ for every two adjacent edges e_i, e_j, and $|c(v_i) - c(e_j)| \geq t$ for all pairs of incident vertices and edges, respectively. The $[r, s, t]$-*chromatic number* $\chi_{r,s,t}(G)$ of G is defined to be the minimum k such that G admits an $[r, s, t]$-coloring. In this talk we determine $\chi_{1,1,2}(K_p)$ for complete graphs K_p.

This is joint work with Arnfried Kemnitz and Juliane Lehmann.

---

46 — Sektion II — G02-109 — 11:00

Splitting Polytopes

SVEN HERRMANN (Darmstadt)

A split of a polytope P is a (regular) subdivision with exactly two maximal cells. Generalizing a result of Bandelt and Dress on the decomposition of finite metric spaces, we show that each weight function on the vertices of P admits a unique decomposition in splits with a split prime remainder. Introducing the concept of compatibility of splits gives rise to a finite simplicial complex associated with P, the split complex of P. In the case of a special polytope, this complex is used in an application to tropical geometry. Furthermore, it will be explained how the concept of splits (and possible generalisations of it) can be used to obtain a better understanding of polytopes and their subdivisions in general,

This is joint work with Michael Joswig.

47 — Sektion III — G03-106 — 11:00

Nanocones: A classification result in chemistry

NICO VAN CLEEMPUT (Ghent)

Nanocones are carbon networks conceptually situated in between graphite and one-side infinite fullerene nanotubes. It is an infinite structure and next to hexagons it has between 1 and 5 pentagons, so that neither the flat shape of graphite nor the constant diameter tube of the nanotubes can be formed. Recently the attention of the chemical world in nanocones has strongly increased.
The structure of graphite is uniquely determined, but for nanotubes and nanocones an infinite variety of possibilities exist. There already exist fast algorithms to generate fullerene nanotubes that are e.g. used to detect energetically possible nanotubes. In this talk we describe a classification result and a generator for nanocones.

---

48 — Sektion IV — G03-214 — 11:00

Robustness of Randomized Rumor Spreading Protocols

ANNA HUBER (Saarbrücken)

Randomized rumor spreading is a classical protocol to disseminate information in a network. At SODA 2008, a quasirandom version of this protocol was proposed and competitive bounds for its runtime were proven. This prompts the question: to what extent does the quasirandom protocol inherit the second principal advantage of randomized rumor spreading, namely robustness against transmission failures?
For the complete graph on n nodes, we show that after $(1+\epsilon)(\log_{1+p} n + \frac{1}{p}\ln n)$ rounds, the quasirandom protocol with transmission success probability p has informed all vertices with probability $1 - n^{-\frac{p\epsilon}{40}}$.
We also provide a corresponding lower bound for the classical model. This demonstrates that the quasirandom model is at least as robust as the fully random model despite the greatly reduced degree of independent randomness.

This is joint work with Benjamin Doerr and Ariel Levavi.

Samstag, 14.11.2009 — Zeit: 11:30

---

49 — Sektion I — G02-111 — 11:30

Facial Parity Edge Colouring of Plane Graphs

STANISLAV JENDROL (Kosice)

Let G be a connected bridgeless plane graph; loops and multiple edges are allowed. An edge colouring of G is a *facial parity edge colouring* of G if for each face α and each color c, no edge or an odd number of edges incident with α are coloured with c. Clearly each graph has such an edge colouring. The minimum number of colours used in a such colouring of G is denoted by $\chi_p(G)$ and it is called the *facial parity chromatic index* of G. In our talk we will show that

$$\chi_p(G) \leq 92.$$

We believe that the upper bound 92 can be improved substantially. We will present several families of plane graphs for which this is so.

This is joint work with J. Czap and F. Kardoš

---

50 — Sektion II — G02-109 — 11:30

Equivelar and d-covered triangulations of surfaces

FRANK LUTZ (Berlin)

A triangulated surface is *q-equivelar* if every vertex of the triangulation has degree q; it is *d-covered* if every edge contains at least one vertex of degree d. Clearly, every q-equivelar triangulation is a q-covered triangulation. By subdividing q-equivelar triangulations appropriately, it is even possible to obtain $2q$-covered triangulations.

Negami and Nakamoto stated that $d \leq 2\left\lfloor \frac{1}{2}(5 + \sqrt{49 - 24\chi(M)}) \right\rfloor$. We correct their proof of this bound and provide examples for which the bound is tight. Moreover, we present a generation scheme for infinite series of cyclic triangulations as well as for infinite series of cyclic tesselations of surfaces with p-gons, $p \geq 4$.

51 — Sektion III — G03-106 — 11:30

Covering and identifying codes in Sierpiński graphs

MATJAZ KOVSE (Bordeaux)

Different types of codes ((a, b)-codes, identifying codes, locating-domianting codes, and total-dominating codes) in Sierpiński graphs will be presented.

This is a joint work together with Laurent Beaudou, Sylvain Gravier, Sandi Klavžar, Michel Mollard and Julien Moncel.

---

52 — Sektion IV — G03-214 — 11:30

Enumeration of complete simple games and weighted voting games

SASCHA KURZ (Bayreuth)

In a weighted voting game each voter has a non-negative weight. A proposal is accepted if the sum of the weights of the yea voters is at least as large as a given quota. By introducing an equivalence relation for weighted voting games one can show that for each fixed number of voters there is only a finite list of non-isomorphic weighted voting games. The topic of this talk is the enumeration of weighted voting games and complete simple games, which is a super class. E.g. we exhaustively enumerate all 989913344 weighted voting games for 9 voters and we show up a relation between the number of complete simple games with two types of voters and the Fibonacci numbers.

Samstag, 14.11.2009 — Zeit: 13:30

---

53 — Sektion I — G02-111 — 13:30

Cardinality Constrained Graph Partitioning into Cliques with Submodular Costs

NICOLE MEGOW (Saarbrücken)

We consider the problem of partitioning a graph into cliques of bounded cardinality. The goal is to find a partition that minimizes the sum of clique costs, where the cost of a clique is given by a set function on nodes. We present a general algorithmic solution based on solving the problem variant without the cardinality constraint. We yield constant factor approximations depending on the solvability of this relaxation for a large class of submodular cost functions. We give optimal algorithms for special graph classes.

This is joint work with Jose R. Correa, Rajiv Raman, and Karol Suchan.

---

54 — Sektion II — G02-109 — 13:30

Maximal antichains of 2- and 4-sets

THOMAS KALINOWSKI (Rostock)

Let $\mathcal{B}_n$ be the set of all subsets of the set $[n] = \{1, \ldots, n\}$, ordered by inclusion. We consider the set $\mathcal{M}$ of all antichains $\mathcal{A} \subseteq \mathcal{B}_n$ containing only 2- and 4-element sets, and we are interested in the smallest size $|\mathcal{A}|$ of such an antichain $\mathcal{A} \in \mathcal{M}$, subject to the condition that $\mathcal{A}$ is not contained in any other element of $\mathcal{M}$. In the talk we present a new asymptotic lower bound for this size.

---

55 — Sektion III — G03-106 — 13:30

Commutative semifields in arbitrary odd characteristic

JÜRGEN BIERBRAUER (Houghton)

Semifields, also called **division algebras,** are algebraic structures closely related to fields. Commutative semifields satisfy all the axioms of a field with the exception of associativity. The classical constructions of finite commutative semifields are due to Dickson (1906) [6] and Albert (1952) [1]. I want to review the known constructions for commutative finite semifields in arbitrary odd characteristic. Not many are known. Aside of the classical examples they are due to Zha-Kyureghyan-Wang [8], Budaghyan-Helleseth [5] and myself [3, 4].
The odd characteristic case is special as those semifields can be described by **quadratic planar functions.** The relation between a quadratic planar function and a semifield multiplication is identical

to that of a quadratic form and the corresponding bilinear form (its polarisation) in classical geometric algebra.
There are links to other parts of mathematics. The geometric representation of semifields are a class of projective planes. The characteristic 2 counterpart of planar functions are APN functions: S-boxes for secret key cryptology.
The main new contribution is an elementary general projection method [2]. One application yields a family of commutative semifields of order q^{2m} with middle nucleus of order at least q^2 for every odd prime-power q and every odd integer $m > 1$. This generalizes a recent construction by Lunardon et. al. [7] (case $m = 3$). Another application yields a generalization of the Budaghyan-Helleseth family and also greatly simplifies the construction.

[1] A.A. Albert: *On nonassociative division algebras,* Transactions of the American Mathematical Society **72** (1952), 296-309.

[2] J. Bierbrauer: *New commutative semifields from projection mappings,* submitted for publication in Designs, Codes and Cryptography.

[3] J. Bierbrauer: *New semifields, PN and APN functions,* Designs, Codes and Cryptography 2009, DOI: 10.1007/s10623-009-9318-7. Published online August 04, 2009.

[4] J. Bierbrauer: *New commutative semifields and their nuclei,*
Proceedings of AAECC-18 (Tarragona, Spain), M. Bras-Amorós and T. Høholdt (Eds),
Lecture Notes in Computer Science **5527** (2009), 179-185.

[5] L. Budaghyan and T. Helleseth: *New commutative semifields defined by PN multinomials,* manuscript.

[6] L.E. Dickson: *On commutative linear algebras in which division is always uniquely possible,* Transactions of the American Mathematical Society **7** (1906), 514-522.

[7] G. Lunardon, G. Marino, O. Polverino, R. Trombetti: *Symplectic spreads and quadric veroneseans,* manuscript.

[8] Z. Zha, G.M. Kyureghyan, X. Wang: *Perfect nonlinear binomials and their semifields,* Finite Fields and Their Applications **15** (2009), 125-133.

---

56 — Sektion IV — G03-214 — 13:30

Ehrhart polynomials and successive minima

MATTHIAS HENZE (Magdeburg)

In 1993, Betke, Henk & Wills conjectured a generalization of Minkowski's celebrated theorem on the successive minima $\lambda_i(K)$ of a centrally symmetric convex body K in terms of the lattice point enumerator $G(K) = \#(K \cap \mathbb{Z}^n)$. One approach for this problem is to relate the coefficients of the Ehrhart polynomial of lattice polytopes and their successive minima. The case of the lattice surface area (i.e. the second highest coefficient) was solved by Henk, Schürmann and Wills in 2005.
We are interested in extending their result to not necessarily centrally symmetric lattice polytopes. Here, we either can define the $\lambda_i(K)$'s via the difference body $DK = \frac{1}{2}(K - K)$ or with respect to the origin being the centroid of the body K. In the talk we will give a short introduction to the topic and discuss some first results.

This is joint ongoing work with Martin Henk.

Samstag, 14.11.2009 — Zeit: 14:00

---

57 — Sektion I — G02-111 — 14:00

Confluent Flows and a Solvable Case

DANIEL DRESSLER (Berlin)

A network flow is called confluent if at any node there is a unique direction into which all flow must go, except that no flow may leave a sink. Confluent flows have applications in evacuation problems, where they model emergency exit signs at each node, or in destination-based packet routing on the internet. However, maximizing confluent flows is NP-hard on general graphs and can still be weakly NP-hard on trees with multiple sinks. We will show some hardness results to point out the theoretical limits and then describe a polynomial-time algorithm for confluent flows on outer-planar graphs. (More precisely: for the maximum static confluent flow problem on outer-planar graphs with multilpe sources and a single sink.)

This is joint work with Martin Strehler, BTU Cottbus.

---

58 — Sektion II — G02-109 — 14:00

k-regular antichains on $[m]$ with $k \leq m$

MATTHIAS BÖHM (Rostock)

Let $\mathcal{B}$ be a subset of $2^{[m]}$, the power set of $[m] := \{1, 2, \ldots, m\}$. The size of $\mathcal{B}$ is $n := |\mathcal{B}|$. We call $\mathcal{B}$ an antichain if there are no two sets in $\mathcal{B}$ which are comparable under set inclusion. An antichain $\mathcal{B}$ is called k-regular ($k \in \mathbb{N}$), if for each $i \in [m]$ there are exactly k blocks $B_1, B_2, \ldots, B_k \in \mathcal{B}$ containing i. In this case we say that $\mathcal{B}$ is a (k, m, n)-antichain.
The problem is if for given parameters k, m, n with $k \leq m$ a (k, m, n)-antichain exists or not. We present necessary and sufficient conditions of existence and show constructions.

59 — Sektion III — G03-106 — 14:00

The Automorphism Groups of Linear Codes and Canonical Representatives of Their Semilinear Isometry Classes

THOMAS FEULNER (Bayreuth)

In most computer algebra systems, an automorphism group algorithm and test on equivalence is provided for linear codes over finite fields using a method of J. Leon. We present a new algorithm that has two major advantages: First of all, the algorithm is able to
calculate unique representatives within the equivalence classes of linear codes where the automorphism group and the test on equivalence is a byproduct. The second is that our notion of equivalence is more general since we take the automorphisms of the base field into account.
Like many other algorithms to solve combinatorial isomorphism problems (see for example B. McKay's famous program *nauty* for the canonical labeling of a graph), our method is also based on the partitioning and refinement idea. Starting with a generator matrix of the code as the root node of a search tree, the nodes on level i are iteratively generated by prescribing the preimages $\pi^{-1}(i)$ of the coordinates $i \in \{0, \ldots, n-1\}$. The remaining part of the acting group is then applied to minimize the column i without changing the previously fixed ones. We will show that this part of the algorithm is easy and that we still can give strong invariants to prune huge parts of the search tree.

---

60 — Sektion IV — G03-214 — 14:00

Normal surfaces as combinatorial slicings

JONATHAN SPREER (Stuttgart)

If we color the vertices of a combinatorial 3-manifold M with two colors then the equilibrium set between the two parts is a piecewise linear surface consisting of triangles and quadrilaterals, called a 2-dimensional slicing which is also a normal surface of M. A connection is presented between the number of quadrilaterals and the topology of slicings in the case of 2-neighborly 3-manifolds

Samstag, 14.11.2009 — Zeit: 14:30

---

61 — Sektion I — G02-111 — 14:30

Development of an Approximation Method for Multiple-Objective Optimization Problem

MAHMUDUL HUQ (Halle)

Location and approximation problems play an important role in optimization theory. Many practical problems can be described as location and approximation problems. Besides problems with one objective function, several authors have investigated vector-valued (multi-citeria, multiple-objective) location and approximation problems. In this research paper we will outine a proposal of an efficient algorithm for the solution of multiple-objective approximation problem.

---

62 — Sektion II — G02-109 — 14:30

On the linear extension diameter of distributive lattices

MAREIKE MASSOW (Berlin)

The linear extension diameter of a poset P is the maximum distance between a pair of linear extensions of P, where the distance between two linear extensions is the number of pairs of elements of P appearing in different orders in the two linear extensions.
We prove a formula for the linear extension diameter of Boolean lattices and characterize all pairs of linear extensions attaining the maximum distance. The characterization can be extended to downset lattices of 2-dimensional posets.
The proof for Boolean lattices uses only basic combinatorial arguments. I will give an outline of it in my talk. The main open question asks for the linear extension diameter of arbitrary distributive lattices.

63 — Sektion III — G03-106 — 14:30

Latin Squares, Homologies and Euler's Conjecture

CHRISTOPH HERING (Tübingen)

We construct pairs of orthogonal Latin Squares of order n by means of suitable orthomorphisms of the cyclic group of order $n-1$. These pairs always have $n-3$ confluent common transversals. They lead to partial planes of order n with $5n-2$ lines and 5 complete points. For order 10 we find, e.g., a pair of orthogonal Latin squares with 34 common transversals and a pure partial plane with 5 complete points and 48 lines. A similar partial plane can be constructed from an involution square. Thus we find a symmetric order 10 Latin square with an orthogonal mate. Also, we outline an easy construction of counter examples to Euler's conjecture.

This is joint work with Dr. Andreas Krebs (Tübingen).

---

64 — Sektion IV — G03-214 — 14:30

How to differenciate quermassintegrals. Solving a problem by Hadwiger

EUGENÍA SAORÍN GÓMEZ (Magdeburg)

In 1955, H. Hadwiger studied a problem related with the differentiability of the classical functionals volume V, surface area S and integral mean curvature M. Given a convex body K, he considered the family of inner parallel bodies $K_\lambda = \left\{x \in \mathbb{R}^n : |\lambda| B^n + x \subset K\right\}$ for $-\mathrm{r}(K) \leq \lambda \leq 0$; where B^n is the unit ball and $\mathrm{r}(K)$ denotes the inradius of K. Since all convex bodies satisfy $'\mathrm{V}(\lambda) = \mathrm{V}'(\lambda) = \mathrm{S}(\lambda)$, $'\mathrm{S}(\lambda) \geq \mathrm{S}'(\lambda) \geq 2\mathrm{M}(\lambda)$ and $'\mathrm{M}(\lambda) \geq \mathrm{M}'(\lambda) \geq 4\pi$, for $-\mathrm{r}(K) \leq \lambda \leq 0$, the problem consisted on giving a characterization of the convex bodies satisfying the equality cases $'\mathrm{S}(\lambda) = \mathrm{S}'(\lambda) = 2\mathrm{M}(\lambda)$ and $'\mathrm{M}(\lambda) = \mathrm{M}'(\lambda) = 4\pi$ or just the first one for the range $-\mathrm{r}(K) \leq \lambda \leq 0$. The analogous problem can be stated in the n-dimensional space where now $n-1$ relations appear. The problem, even in dimension 3, has been opened since then. We have given a complete answer in arbitrary dimension to the cases in which all the quermassintegrals play a role and also to the one in which $n-1$ equalities appear. This closes the original problem by Hadwiger in dimension 3.

This is joint work with M. A. Hernández Cifre

Teilnehmerinnen und Teilnehmer

Mais Alkahateeb
Institut für Diskrete Mathematik und Algebra
TU Bergakademie Freiberg
Prüferstraße 1
09596 Freiberg
alkhatee@math.tu-freiberg.de

Bruno Benedetti
Bismarckstraße 30
10625 Berlin
benedetti@math.TU-Berlin.de

Jürgen Bierbrauer
Dept. of Math. Sciences
Michigan Technological University
Houghton, MI 49931, **USA**
jbierbra@mtu.edu

Andreas Bley
TU Berlin
Straße des 17. Juni 136
10623 Berlin
bley@math.TU-Berlin.de

Jens-P. Bode
Diskrete Mathematik
TU Braunschweig
38023 Braunschweig
jp.bode@tu-bs.de

Matthias Böhm
Universität Rostock
Institut für Mathematik
Ulmenstraße 69, Haus 3
18057 Rostock
matthias.boehm2@uni-rostock.de

Paul Bonsma
Humboldt Universität zu Berlin
Institut für Informatik
Unter den Linden 6
10099 Berlin
bonsma@informatik.hu-berlin.de

Roman Čada
Department of Mathematics
University of West Bohemia
Czech Republic
cadar@kma.zcu.cz

Cornelia Dangelmayr
Driesener Straße 19
10439 Berlin
dangel@zedat.fu-berlin.de

Klaus Dohmen
Hochschule Mittweida
Fachgruppe Mathematik
Technikumplatz 17
09648 Mittweida
dohmen@hs-mittweida.de

Daniel Dressler
Institut für Mathematik, Sekr. MA 5-2
Technische Universität Berlin
10623 Berlin
dressler@math.tu-berlin.de

Felix Effenberger
Universität Stuttgart
70555 Stuttgart
Effenberger@Mathematik.Uni-Stuttgart.de

Stefan Felsner
TU Berlin
Institut für Mathematik, MA 6-1
Straße des 17. Juni 136
10623 Berlin
felsner@math.tu-berlin.de

Thomas Feulner
University of Bayreuth
95440 Bayreuth
thomas.feulner@uni-bayreuth.de

Ferenc Fodor
Bolyai Institute
University of Szeged
H-6720 Szeged, **Hungary**
fodorf@math.u-szeged.hu

Dirk Frettloeh
Fakultät für Mathematik
Universität Bielefeld
Postfach 100131
33501 Bielefeld
dirk.frettloeh@math.uni-bielefeld.de

Tobias Friedrich
Max-Plack-Institut für Informatik
Universität Saarbrücken
66123 Saarbrücken
tobias.friedrich@mpi-inf.mpg.de

Jan Goedgebeur
Applied Mathematics and Computer Science
Ghent University
Krijgslaan 281 - S9
Ghen, **Belgium**
Jan.Goedgebeur@UGent.be

Faruk Göloğlu
Claude Shannon Institute
University College Dublin
8 Belfield Office Park
Dublin, **Ireland**
faruk.goeloglu@student.uni-magdeburg.de

Eugenía Saorín Gómez
Otto-von-Guericke-Universität Magdeburg
Fakultät für Mathematik
Institut für Algebra und Geometrie
Universitätsplatz 2
39106 Magdeburg
eugenia.saorin@ovgu.de

Gerrit Grenzebach
Lindenstraße 64
27711 Osterholz-Scharmbeck
ggrenze@math.uni-bremen.de

Hans-Dietrich Gronau
Universität Rostock
Institut für Mathematik
18051 Rostock
gronau@uni-rostock.de

Martin Grüttmüller
Hochschule f. Technik, Wirtschaft u.Kultur
Postfach 301166
04251 Leipzig

Heiko Harborth
Diskrete Mathematik
Technische Universität Braunschweig
38023 Braunschweig
h.harborth@tu-bs.de

Egbert Harzheim
Pallenbergstrasse 23
50737 Köln
e.harzheim@t-online.de

Daniel Heldt
TU Berlin
Institut für Mathematik
Straße des 17. Juni 136
10623 Berlin
daniel.heldt@gmx.de

Martin Henk
Otto-von-Guericke-Universität Magdeburg
Institut für Algebra und Geometrie
Fakultät für Mathematik
Postfach 4120
39016 Magdeburg
martin.henk@ovgu.de

Matthias Henze
Otto-von-Guericke-Universität Magdeburg
Fakultät für Mathematik
Institut für Algebra und Geometrie
Universitätsplatz 2
39106 Magdeburg
matthias.henze@ovgu.de

Christoph Hering
Mathematisches Institut
Universität Tübingen
Auf der Morgenstelle 10
72076 Tübingen
christoph.hering@uni-tuebingen.de

Franz Hering
Kohlenbankweg 3c
44227 Dortmund
fehering@web.de

Katrin Herr
Technische Universität Darmstadt
Schlossgartenstraße 7
64289 Darmstadt
herr@mathematik.tu-darmstadt.de

Sven Herrmann
Technische Universität Darmstadt
Schlossgartenstr. 7
64289 Darmstadt
sherrmann@mathematik.tu-darmstadt.de

Anna Huber
Max-Planck-Institut für Informatik
Department 1: Algorithms and Complexity
66123 Saarbrücken
ahuber@mpi-inf.mpg.de

Mahmudul Huq
University of Halle-Wittenberg
Department of Mathematics
06099 Halle
smhprakash@yahoo.com

Jonathan Jedwab
Department of Mathematics
Simon Fraser University
8888 University Drive
Burnaby, BC, **Canada**
jed@sfu.ca

Stanislav Jendrol
Faculty of Sciences
P. J. Safarik University Kosice
Jesenna 5
04154 Kosice, **Slovakia**
stanislav.jendrol@upjs.sk

Daniel Johannsen
Max-Planck-Institut für Informatik
66123 Saarbrücken
johannse@mpi-inf.mpg.de

Christoph Josten
Langobardenweg 24
65929 Frankfurt
josmos@T-Online.de

Thomas Kalinowski
Universität Rostock
Institut für Mathematik
Universitätsplatz 1
18051 Rostock
thomas.kalinowski@uni-rostock.de

Arnfried Kemnitz
TU Braunschweig
Comutational Mathamtics
39106 Braunschweig
a.kemnitz@tu-bs.de

Michael Kiermaier
Universität Bayreuth
95440 Bayreuth
michael.kiermaier@uni-bayreuth.de

Maria Koch
TU Bergakademie Freiberg
Institut für Diskrete Mathematik und Algebra
09596 Freiberg
maria.koch@math.tu-freiberg.de

Matthias Koch
Universität Bayreuth
Universitätsstraße 30
95447 Bayreuth
matthias.koch@uni-bayreuth.de

Martin Kochol
MÚ SAV, Štefánikova 49
814 73 Bratislava 1, **Slovakia**
kochol@savba.sk

Anja Kohl
Institut für Angewandte Analysis
Technische Universität Bergakademie Freiberg
Prüferstraße 1
09596 Freiberg
kohl@math.tu-freiberg.de

Axel Kohnert
Universität Bayreuth
95440 Bayreuth
kohnert@uni-bayreuth.de

Matjaz Kovse
LaBRI - Université Bordeaux 1
351, cours de la Libération
33405 Talence cedex
France
matjaz.kovse@gmail.com

Mathhias Kriesell
Department of Mathematics and Computer Science
Universtity of Southern Denmark
DK-5230 Odense, **Denmark**
kriesell@imada.sdu.dk

Sascha Kurz
Lehrstuhl für Wirtschaftsmathematik
Universität Bayreuth
95440 Bayreuth
sascha.kurz@uni-bayreuth.de

Gohar Kyureghyan
Otto-von-Guericke-Universität Magdeburg
Institut für Algebra und Geometrie
Fakultät für Mathematik
Postfach 4120
39016 Magdeburg
gohar.kyureghyan@ovgu.de

Ivan Landjev
New Bulgarian University
Department Informatics
21 Montevideo str.
1618 Sofia, **Bulgaria**
ivan@math.bas.bg

Carsten Lange
FU Berlin
FB für Mathematik und Informatik
Arnimallee 6
14195 Berlin
lange@math.Tu-Berlin.DE

Raymond R. Lapus
Fakulttät Mathematik, Physik, Informatik
Hochschule Mittweida (FH)
University of Applied Sciences
Technikumplatz 17
09648 Mittweida
jrrlapus24@yahoo.co.nz

Eva Linke
Otto-von-Guericke-Universität Magdeburg
Fakultät für Mathematik
Institut für Algebra und Geometrie
Universitätsplatz 2
39106 Magdeburg
eva.linke@ovgu.de

Frank Lutz
Technische Universität Berlin
Institut für Mathematik
Straße des 17. Juni 136
10623 Berlin
lutz@math.TU-Berlin.de

Massimiliano Marangio
TU Braunschweig
Discrete Mathematics
Pockelsstraße 14
38106 Braunschweig
m.marangio@tu-bs.de

Maren Martens
Zuse Institute Berlin
Takustraße 7
14195 Berlin
martens@zib.de

Mareike Massow
TU Berlin
Straße des 17. Juni 136
10623 Berlin
massow@math.tu-berlin.de

Jannik Matuschke
Danziger Straße 8
10435 Berlin
matuschke@math.tu-berlin.de

Nicole Megow
Max-Planck-Institut für Informatik
66123 Saarbrücken
nmegow@mpi-inf.mpg.de

Angela Mestre
Institut de Mineralogie et de Physique des Milieux Condenses
CNRS UMR 7590, Universites Paris 6 et 7, IPGP
140 rue de Lourmel
75015 Paris, **France**
mestre@langite.impmc.jussieu.fr

Vahan Mkrtchyan
Paderborn Institute for Advanced Studies
Warburger Str. 100
33098 Paderborn
vahanmkrtchyan2002@yahoo.com

Silke Möser
Technische Universität Darmstadt
Schlossgartenstraße 7
64289 Darmstadt
silke.moeser@gmx.de

Ibrahim Nasrabadi
TU Berlin
Straße des 17. Juni 136
10623 Berlin
Nasrabadi@math.TU-Berlin.de

Jaroslav Nešetřil
Department of Applied Mathematics
Charles University
11800 Praha 1, **Czech Republik**
nesetril@kam.mff.cuni.cz

Patric R. J. Östergård
Dept. of Communications and Networking
Helsinki University of Technology
02015 TKK, **Finland**
Patric.Ostergard@tkk.fi

Ferruh Özbudak
Middle East Technical University
Department of Mathematics
06531 Ankara, **Turkey**
ozbudak@metu.edu.tr

Andreas Paffenholz
Fachbereich Mathematik und Physik
Freie Universität Berlin Arnimallee 3
14195 Berlin
paffenholz@mi.fu-berlin.de

Florian Pfender
Universität Rostock
Institut für Mathematik
18051 Rostock
Florian.Pfender@uni-rostock.de

Alexander Pott
Otto-von-Guericke-Universität Magdeburg
Institut für Algebra und Geometrie
Fakultät für Mathematik
Postfach 4120
39016 Magdeburg
alexander.pott@ovgu.de

Ulrike Püschmann
Bayreuther Straße 9
01187 Dresden
ulrike.pueschmann@tu-dresden.de

Christian Reiher
Universität Rostock
Institut für Mathematik
18051 Rostock
Christian.Reiher@uni-rostock.de

Ingo Schiermeyer
Technische Universität Bergakademie Freiberg
Institut für Diskrete Mathematik und Algebra
09596 Freiberg
schierme@math.tu-freiberg.de

Kai-Uwe Schmidt
Department of Mathematics
Simon Fraser University
8888 University Drive
Burnaby, BC, **Canada**
kuschmidt@sfu.ca

Moritz Schmitt
Institut für Mathematik
TU Berlin
Straße des 17. Juni 136
10623 Berlin
schmitt@math.tu-berlin.de

Anika Schwarz
Universität Hildesheim
Samelsonplatz
31141 Hildesheim
Anika.Schwarz@gmx.net

Pascal Schweitzer
Max-Planck-Institut für Informatik
66123 Saarbrücken
pascal@mpi-inf.mpg.de

Daria Schymura
FU Berlin
Institut für Informatik
Takustraße 9
14195 Berlin
schymura@mi.fu-berlin.de

Frank Simon
Hochschule Mittweida (FH)
Uiversity of Applied Sciences
Fakultät Mathematik, Physik, Informatik
Technikumplatz 17
09648 Mittweida
frank100880@googlemail.com

Martin Skutella
TU Berlin
Straße des 17. Juni 136
10623 Berlin
skutella@math.tu-berlin.de

Martin Sonntag
Fakultät für Mathematik und Informatik
Technische Universität Bergakademie Freiberg
Prüferstraße 1
09596 Freiberg
sonntag@tu-freiberg.de

Roman Sotak
Faculty of Sciences
P. J. Safarik University Kosice
Jesenna 5
04154 Kosice, **Slovakia**
roman.sotak@upjs.sk

Jonathan Spreer
Universität Stuttgart
Pfaffenwaldring 57 70550 Stuttgart
jonathan.spreer
@mathematik.uni-stuttgart.de

Eckhard Steffen
Universität Paderborn
Paderborn Institute for Adv. Studies
in Computer Science and Engineering
Warburger Str. 100
33098 Paderborn
es@upb.de

Ulrich Tamm
Marmara Universität
Deutschsprachige Abteilung für Wirtschaftsinformatik
34722 Kadiköy Istanbul, **Turkey**
ulrich.tamm@yahoo.com

Hanns-Martin Teichert
Universität zu Lübeck
Institut für Mathematik
Wallstraße 40
23560 Lübeck
teichert@math.uni-luebeck.de

Peter Tittmann
Hochschule Mittweida
Fakultät Mathematik, Physik, Informatik
Technikumplatz 17
09648 Mittweida
peter@htwm.de

Martin Trinks
Hochschule Mittweida
Fakultät Mathematik, Physik, Informatik
Technikumplatz 17
09648 Mittweida
trinks@hs-mittweida.de

Torsten Ueckerdt
TU Berlin
Straße des 17. Juni 135
10623 Berlin
ueckerdt@math.tu-berlin.de

Nico Van Cleemput
Applied Mathematics and Computer Science
Ghent University
Krijgslaan 281 - S9
B-9000 Ghent, **Belgium**
nicolas.vancleemput@ugent.be

Viktor Vigh
Bolyai Institute
University of Szeged
H-6720 Szeged, **Hungary**
vigvik@math.u-szeged.hu

Christian Wagner
Otto-von-Guericke-Universität Magdeburg
Institut für Mathematische Optimierung
Fakultät für Mathematik
Postfach 4120
39016 Magdeburg
wagner@mail.math.uni-magdeburg.de

Yue Zhou
Otto-von-Guericke-Universität Magdeburg
Institut für Algebra und Geometrie
Fakultät für Mathematik
Postfach 4120
39016 Magdeburg
gabelozhou@gmail.com

Johannes Zwanzger
Universität Bayreuth
Universitätsstraße 30
95447 Bayreuth
johannes.zwanzger@gmx.de

Vortragende