Monday, December 12

9:30 - 10:30 Paul Seymour, “Disjoint paths in tournaments”

10:30 - 11:00 Coffee Break

11:00 - 11:20 Tony Huynh, “Explicit bounds for graph minors”

11:25 - 11:45 Isolde Adler, “Tight bounds for linkages in planar graphs”

11:50 - 12:10 Michal Pilipczuk, “Jungles, bundles and fixed parameter tractability”

12:10 - 3:30 Lunch and discussion

3:30 - 3:50 Pierre Charbit, “LexBFS, structure and algorithms”

3:55 - 4:15 Nicholas Trotignon, “Optimizing in Berge trigraphs”

4:20 - 4:40 Marcin Kamiǹski, “Finding an induced path of given parity in planar graphs in polynomial time”

4:45 - 5:15 Coffee Break

5:15 - 5:35 Dimitrios Thilikos, “Immersion exclusion of Kuratowski graphs”

5:40 - 6:00 Robin Christian, “Generating ideals of trees”

Tuesday, December 13

9:30 - 10:30 Reinhard Diestel, “Tree-decompositions distinguishing the highly connected parts of a graph”

10:30 - 11:00 Coffee Break

11:00 - 11:20 Fabian Hundertmark, “Distinguishing k-blocks and tangles by canonical tree-decompositions in graphs or matroids”

11:25 - 11:45 Zdenek Dvorak, “Classes of graphs with small rank decompositions are χ-bounded”

11:50 - 12:10 Michael Elberfeld, “Logspace algorithms for tree-like graphs”

12:10 - 3:30 Lunch and discussion

3:30 - 3:50 Pavol Hell, “Finite obstructions to graph partitions”

3:55 - 4:15 Adrian Bondy, “Induced decompositions of graphs”

4:20 - 4:40 Andrew Treglown, “Embedding spanning bipartite graphs of small bandwidth”

4:45 - 5:15 Coffee Break

5:15 - Problem session

Wednesday, December 14

9:30 - 9:50 Louis Esperet, “Distance-two colorings”

9:55 - 10:15 Kenta Ozeki, “On the hamiltonicity of graphs on surfaces”

10:20 - 10:40 Sang-il Oum, “Rank-width and well-quasi-ordering of skew-symmetric or symmetric matrices”

10:45 - 11:15 Coffee Break

11:15 - 11:35 Johannes Carmesin, “Infinite matroid union”

11:40 - 12:00 Eli Berger, “On the relation between the Erdős-Menger Theorem and the Edmonds-Nash-Williams Conjecture”

12:00 - Lunch and excursion to Urbino

Thursday, December 15

9:30 - 10:30 Stephan Kreutzer, “Classes of directed and undirected graphs beyond excluded minors”

10:30 - 11:00 Coffee Break

11:00 - 11:20 Dàniel Marx, “Structure theorem and isomorphism test for graphs with excluded topological subgraphs”

11:25 - 11:45 Bruce Reed, “Faster algorithms for tree decompositions from excluding clique minors”

11:50 - 12:10 Fedor Fomin, “Subexponential parameterized algorithm for minimum fill in”

12:10 - 3:30 Lunch and discussion

3:30 - 3:50 Matthieu Plummettaz, “The structure of claw-free perfect graphs”

3:55 - 4:15 Marko Radovanovic, “Graphs that do not contain a cycle with a node that has at least two neighbors on it”

4:20 - 4:40 Krzysztof Choromanski, “The Erdős-Hajnal Conjecture for a new infinite class of tournaments”

4:45 - 5:15 Coffee Break

5:15 - 5:35 Frédérick Maffray, “Stability in 3-colorable P_5-free graphs”

5:40 - 6:00 Andrew King, “ISRs, stable sets, and large cliques”

Friday, December 16

9:30 - 10:30 Jim Geelen, “Matroid minors”

10:30 - 11:00 Coffee Break

11:00 - 11:20 Irene Pivotto, “Displaying blocking pairs in signed graphs”

11:25 - 11:45 Bert Gerards, “Characterizing graphic matroids by a system of linear equations”

11:50 - 12:10 Dan Kral, “Deciding first order logic properties of matroids”

12:00 - Lunch and departure

Tight bounds for linkages in planar graphs

Isolde Adler, Goethe University Frankfurt

The famous Disjoint Paths Problem asks, given a graph G and a set of pairs of terminals $(s_1, t_1), ..., (s_k, t_k)$, whether there is a collection of k pairwise vertex-disjoint paths linking s_i and t_i, for $i = 1, ..., k$. In their $f(k)n^3$ algorithm for this problem, Robertson and Seymour introduced the "irrelevant vertex technique", according to which in every instance of treewidth greater than $g(k)$ there is an "irrelevant" vertex whose removal creates an equivalent instance of the problem. This fact is based on the celebrated Unique Linkage Theorem, whose – very technical – proof gives a function $g(k)$ that is responsible for an immense parameter dependence in the running time of the algorithm. We give a new proof of this result for planar graphs, achieving $g(k) = 2^{O(k)}$, which is tight. As a corollary, we obtain a running time of $2^{2^{O(k)}} n^{O(1)}$ for the planar Disjoint Paths Problem.

This is joint work with Stavros Kolliopoulos, Philipp Krause, Daniel Lokshtanov, Saket Saurabh and Dimitrios Thilikos.

On the relation between the Erdős-Menger Theorem and the Edmonds-Nash-Williams Conjecture

Eli Berger, Haifa University

A conjecture of Nash-Williams states that Edmonds' Theorem holds for infinite matroids, i.e., for every two infinite matroids M, N on the same ground set E, there exists two disjoint sets X and Y with $X \cup Y \in M \cap N$ and $sp_M(X) \cup sp_N(Y) = E$. Recently Aigner-Horev, Carmesin and Fröhlich proved that the truth of this conjecture, even for finitary matroids, would yield a new proof for the Erdős-Menger Theorem. This suggests one might go the reverse way and try to use the known proof of the Erdős-Menger Theorem in order to prove the Edmonds-Nash-Williams Conjecture. In this talk I will describe several notions and idea from the proof of the Erdős-Menger Theorem and explain how they translate to the language of matroid. I will describe the challenges needed to be faced in order to prove the Edmonds-Nash-Williams Conjecture

Induced decompositions of graphs

J.A. Bondy, Université Lyon 1 and Université Paris 6

We consider those graphs G which admit decompositions into copies of a fixed graph F, each copy being an induced subgraph of G. We are interested in finding the extremal graphs with this property, that is, those graphs G on n vertices with the maximum possible number of edges. We report on joint work with Jayme Szwarcfiter giving exact answers to this question in certain special cases, and outline the general asymptotic solution obtained recently by Nathann Cohen and Zsolt Tuza.

Infinite matroid union

Johannes Carmesin, University of Hamburg

We prove that the union of two finitary matroids is a matroid, and in fact finitary. On the other hand we show that the union of a finitary matroid with an arbitrary matroid need not be a matroid.

Using this, we establish that the infinite matroid intersection conjecture of Nash-Williams is true whenever the first matroid is finitary and the second is the dual of a finitary matroid.

From this we derive an alternative matroidal proof of the infinite Menger theorem for locally finite graphs. In addition, we show that the infinite matroid intersection conjecture for finitary implies the general infinite Menger theorem which was conjectured by Erdős, and proved only recently by Aharoni and Berger.

We extend the well-known base packing theorem for finite matroids to co-finitary matroids, implying the tree-packing results in infinite graphs of Tutte and of Diestel.

This is joint work with: Elad Aigner-Horev, Jan-Oliver Fröhlich.

LexBFS, structure and algorithms

Pierre Charbit, Paris 7

LexBFS is an algorithm due to Rose Tarjan and Luecker that computes in linear(i.e. $O(m+n)$) time an ordering of the vertices of an input graph. Using a simple characterization of such orderings, we reprove a theorem of Bordat and Berry saying that the last vertex of such an ordering is contained in a moplex, which is defined as a set of vertices which is a clique, a homogeneous set, and whose neighbourhood is a minimal separator. We take advantage of this result to speed up known algorithms for maximum clique in even-hole free graphs, square-3PC(.,.) Berge graphs and wheel-free graphs.

This is joint work with Pierre Aboulker, Maria Chudnovsky, Nicolas Trotignon and Kristina Vuskovic.

The Erdős-Hajnal Conjecture for a new infinite class of tournaments

Krzysztof Choromanski, Columbia University

The Erdős-Hajnal Conjecture states that for every given graph H there exists a constant $c(H) > 0$ such that every graph G that does not contain H as an induced subgraph contains a clique or a stable set of size at least $|G|^{c(H)}$. The conjecture is still open. However some time ago its directed version was proven to be equivalent to the original one. In the directed version graphs are replaced by tournaments, and cliques and stable sets by transitive subtournaments. Both the directed and the undirected versions of the conjecture are known to be true for small graphs (or tournaments), and there are operations allowing to build bigger graphs (or tournaments) for which the conjecture holds. We were able to prove the conjecture for an infinite class of tournaments that is not obtained in the way described above. To the best of our knowledge, this is the first result of this kind.

The only 5-vertex tournament for which the conjecture is open is the tournament $C5$ (it has 5 vertices: $1, 2, 3, 4, 5$, and two directed cycles: $1 \to 2 \to 3 \to 4 \to 5 \to 1$ and $1 \to 3 \to 5 \to 2 \to 4 \to 1$). Although we will not prove the Conjecture for $C5$, we will show that the conjecture is true if we exclude both $C5$ and any fixed tournament from the family we call "pseudo-$C5$-tournaments".

This is a joint work with Eli Berger and Maria Chudnovsky.

Generating ideals of trees

Robin Christian, University of Hamburg

We define a class $\mathcal{G}$ of trees with labels in a fixed finite alphabet, which we call generators, and a function τ from generators to sets of finite trees (we say that G generates the set $\tau(G)$). We show that, if J is an ideal in the topological minor order on finite trees, there is a generator G_J such that $\tau(G_J) = J$. By exhibiting an appropriate well-quasi order on the generators, we obtain a direct proof (i.e. one that does not use better-quasi ordering) that these ideals are well-quasi ordered by containment.

We hope that this is the first step towards proving that ideals of finite graphs (in the minor order) are well-quasi ordered by containment. As a first step, we can extend the method to Q-labelled trees.

This talk is about joint work with Bruce Richter and Gelasio Salazar.

Tree-decompositions distinguishing the highly connected parts of a graph

Reinhard Diestel, Hamburg University

We show that, for any fixed integer k, every finite graph G has a tree-decomposition of adhesion at most k that distinguishes all its k-blocks, its maximal sets of vertices that pairwise cannot be separated (in G) by at most k other vertices. Under weak (and necessary) additional assumptions about these (k-) blocks, these decompositions can be combined into one overall tree-decomposition that distinguishes, for every integer s, every two blocks (of any 'order' k) that are separated in G by a separator of size at most s by an adhesion set of size at most s. In particular, they distinguish all the k-blocks of G, for all k simultaneously.

All these tree-decompositions are canonical in that they depend only on structural properties of G. In particular, the automorphisms of G also act on the decomposition tree in the natural way.

The theory that underlies the construction of these decompositions can be generalized so as to apply not only to k-blocks but also to tangles, in either graphs or matroids. This will be the subject of Fabian Hundertmark's talk, which continues this talk.

Classes of graphs with small rank decompositions are χ-bounded

Zdenek Dvorak, Charles University

A class of graphs $\mathcal{G}$ is χ-bounded if the chromatic number of graphs in $\mathcal{G}$ is bounded by a function of the clique number. We show that if a class $\mathcal{G}$ is χ-bounded, then every class of graphs admitting a decomposition along cuts of small rank to graphs from $\mathcal{G}$ is χ-bounded. As a corollary, we obtain that every class of graphs with bounded rank-width (or equivalently, clique-width) is χ-bounded.

This is joint work with Dan Kral.

Logspace algorithms for tree-like graphs

Michael Elberfeld, Lübeck University

Similar to the P versus NP problem, the L versus NL problem asks whether deterministic and nondeterministic logarithmic space-bounded (logspace) computations have the same power. Reachability queries in directed graphs are at the core of this problem: deterministic logspace computations can be modeled by testing whether a target vertex is reachable from some source vertex in directed forests, the modeling of nondeterministic logspace computations leads directed graphs that are far from being trees. To compare the power of L and NL it is natural to investigate two basic research directions: The *lower bound direction* tries to show that the reachability problem is NL-hard for *ever smaller classes* of graphs, the *upper bound direction* tries to advance the toolbox of algorithmic techniques for L and solve the directed reachability problem for *ever larger classes* of graphs. In my talk I will focus on the later direction: I will (1) review the research on L algorithms for problems on trees and series-parallel graphs, (2) have a close look at recent results and techniques that lead to logspace approaches for problems on graphs of bounded tree width, and (3) discuss future challenges for the design of logspace algorithms on more general tree-like classes of graphs.

The talk's content is based on joint work with Andreas Jakoby and Till Tantau.

Distance-two colorings

Louis Esperet, CNRS Grenoble

We study graph classes having a nice behaviour with respect to distance-two colorings, i.e. classes for which what happens at distance two only depends on very local conditions.

Subexponential parameterized algorithm for minimum fill-in

Fedor Fomin, University of Bergen

The Minimum Fill-in problem is to decide if a graph can be triangulated (turned into a chordal graph) by adding at most k edges. We discuss a subexponential parameterized algorithm solving Minimum Fill-in. The algorithm is based on a combinatorial result estimating the maximum number of specific subgraphs, vital potential maximal cliques, in a graph. This is a joint work with Yngve Villanger.

Matroid minors

Jim Geelen, University of Waterloo

In joint work with Bert Gerards and Geoff Whittle, we have been trying to extend the graph minors project of Paul Seymour and Neil Robertson to matroids represented over any fixed finite field. I will give an overview of the project, focusing on the structure of matroids in minor-closed classes.

Characterizing graphic matroids by a system of linear equations

Bert Gerards, CWI Amsterdam

Given a rank-r binary matroid we construct a system of $O(r^3)$ linear equations in $O(r^2)$ variables that has a solution over $GF(2)$ if and only if the matroid is graphic. This is joint work with Jim Geelen.

Finite obstructions to graph partitions

Pavol Hell, Simon Fraser University

Consider graph partitions with possible restrictions on the parts, and on the connections between the parts: the restrictions can be that there are no edges, or that all possible edges are present. Many partitions arising in the study of perfect graphs have this flavour. In some cases the existence of such a partition is characterized by the absence of finitely many forbidden induced subgraphs. We ask when this is the case, and give some general answers, and some answers for special graph classes, such as chordal graphs. These include joint results with T. Feder, S. Nekooei Rizi, W. Xie, and others.

Distinguishing k-blocks and tangles by canonical tree-decompositions in graphs or matroids

Fabian Hundertmark, Hamburg University

We develop a common generalization of k-blocks and tangles in graphs, which we call profiles.

We show that for any set of profiles of given order there exists a canonical tree-decomposition that distinguishes them all. In particular, we extend our decomposition results for k-blocks [see RD's talk] to tangles, indeed to any combination of k-blocks and tangles. Our results also apply to matroids.

Explicit bounds for graph minors

Tony Huynh, KAIST

Let $\mathcal{L}$ be a linkage in a surface Σ, and P be a non-separating curve in Σ. We prove that we can alter $\mathcal{L}$ so that it still connects up the same points, but only meets P a few times. We then use this theorem to reprove a result from the graph minors project of Robertson and Seymour. That is, for a graph embedded on a surface, we give sufficient conditions for when a vertex can be deleted without destroying a linkage. The important thing to stress is that all bounds that we obtain are explicit, thereby making all of the algorithms from Graph Minors XIII constructive.

This is joint work with Jim Geelen and Bruce Richter.

Finding an induced path of given parity in planar graphs in polynomial time

Marcin Kamiński, Universitè Libre de Bruxelles

The problem of deciding, given a graph G and two vertices s and t, whether there exists an induced path of given parity between s and t in G is known to be NP-complete. We show how to solve the problem in $O(|V(G)|^7)$ time, when the input graph is planar. We use techniques from the theory of graph minors as well as the theory of perfect graphs.

ISRs, stable sets, and large cliques

Andrew King, Simon Fraser University

When colouring a graph, it is often useful to find a stable set hitting every maximum, (or even near-maximum) clique. I will present a fairly simple proof that a graph contains a stable set hitting every maximum clique whenever the clique number is greater than $(2/3)(\triangle + 1)$. I will then discuss some related extensions, applications, and open problems.

Deciding first order logic properties of matroids

Dan Kral, Charles University

Frick and Grohe [J. ACM 48 (2006), 1184–1206] established that every first order logic property can be decided in almost linear time in a class of graphs with locally bounded tree-width. Hlineny [J. Combin. Theory Ser. B 96 (2006), 325–351] provided an analogue of the celebrated theorem of Courcelle in the realm of matroids: every monadic second order logic property can be decided in cubic time for matroids with bounded branch-width representable over a fixed finite field. We provide a common combination of the two results; we introduce a notion of matroids with locally bounded branch-width and we show that every first order logic property can be decided in a fixed parameter way in every class of regular matroids with locally bounded branch-width.

This is joint work with Tomas Gavenciak and Sang-il Oum.

Classes of directed and undirected graphs beyond excluded minors

Stephan Kreutzer, Technical University of Berlin

Much work in algorithmic graph theory has gone into identifying properties of graphs and graph classes that can be used in the design of tractable algorithms for generally hard computational problems.

Among the properties studied in this area are classes of graphs of bounded tree-width, the class of planar graphs or graphs embeddable into a fixed surface. Much more general than these are classes of graphs excluding a fixed minor and a wide range of algorithmic tools have been developed for showing that certain problems can be solved efficiently on classes of graphs excluding a minor.

More recently, even more general concepts of graph classes have been introduced, such as classes of graphs locally excluding minors, classes of bounded expansion or nowhere dense classes of graphs.

In this talk, we review these more general concepts and present various algorithmic techniques that can be used to solve problems on such classes of graphs.

The graph properties discussed so far all apply in particular to undirected graphs. A corresponding structure theory for directed graphs has so far not been developed to a similar depth as the structure theory for undirected graphs. In the second part of the talk we will review some proposals for directed tree-width and new digraph classes defined by directed minors and give algorithmic results for these classes.

Stability in 3-colorable P_5-free graphs

Frèdèrick Maffray, CNRS Grenoble

The complexity status of the maximum stable set problem is still unknown in the class of P_5-free graphs. We show here how to solve it in linear time for 3-colorable P_5-free graphs. The result is based on a study of the structure of such graphs.

This is joint work with Grégory Morel.

Structure theorem and isomorphism test for graphs with excluded topological subgraphs

Dàniel Marx, Humboldt University

We generalize the structure theorem of Robertson and Seymour for graphs excluding a fixed graph H as a minor to graphs excluding H as a topological subgraph. We prove that for a fixed H, every graph excluding H as a topological subgraph has a tree decomposition where each part is either "almost embeddable" to a fixed surface or has bounded degree with the exception of a bounded number of vertices. Furthermore, we prove that such a decomposition is computable by an algorithm that is fixed-parameter tractable with parameter $|H|$.

We show that on graphs excluding H as a topological subgraph, Graph Isomorphism can be solved in time $n^{f(H)}$. This result unifies and generalizes two previously known important polynomial-time solvable cases of Graph Isomorphism: bounded-degree graphs and H-minor free graph. The proof of this result needs a generalization of our structure theorem to the context of invariant treelike decomposition.

Rank-width and well-quasi-ordering of skew-symmetric or symmetric matrices

Sang-il Oum, KAIST

We prove that every infinite sequence of skew-symmetric or symmetric matrices M_1, M_2, ... over a fixed finite field must have a pair M_i, M_j $(i < j)$ such that M_i is isomorphic to a principal submatrix of the Schur complement of a nonsingular principal submatrix in M_j, if those matrices have bounded rank-width. This generalizes three theorems on well-quasi-ordering of graphs or matroids admitting good tree-like decompositions; (1) Robertson and Seymour's theorem for graphs of bounded tree-width, (2) Geelen, Gerards, and Whittle's theorem for matroids representable over a fixed finite field having bounded branch-width, and (3) Oum's theorem for graphs of bounded rank-width with respect to pivot-minors.

On the hamiltonicity of graphs on surfaces

Kenta Ozeki, National Institute of Informatics, Japan

In this talk, we will show some results on the hamiltonicity of graphs on surfaces. Tutte [6] proved that every 4-connected plane graph has a hamiltonian cycle. Extending Tutte's technique, Thomassen [5] proved that every 4-connected plane graph is in fact hamiltonian-connected, i.e., there is a hamiltonian path connecting any two prescribed vertices.

Beginning with these results, many researchers have considered the hamiltonicity of graphs on non-spherical surfaces. With some additional techniques to the above results and new ideas, Thomas and Yu [4] proved that every edge in a 4-connected projective-planar graph is contained in a hamiltonian cycle. In this talk, we show the following result, which gives a positive answer to a conjecture by Dean [1]. Note that Theorem 1 extends the result due to Thomas and Yu.

Theorem 1 *Every 4-connected graph embedded on the projective plane is hamiltonian-connected.*

For graphs on the torus, we have a famous conjecture by Grünbaum [2] and Nash-Williams [3]; every 4-connected graph on the torus has a hamiltonian cycle. In this talk, we will also mention recent results around this conjecture.

These are joint works with K. Kawarabayashi (National Institute of Informatics, Japan).

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[3] C.St.J.A. Nash-Williams, Unexplored and semi-explored territories in graph theory, in *"New directions in the theory of graphs"* 149–186, Academic Press, New York, 1973.

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Jungles, bundles and fixed parameter tractability

Michal Pilipczuk, University of Bergen

In their recent work, Fradkin and Seymour present a polynomial-time algorithm that, given a semi-complete digraph T, outputs either a path decomposition of T of width at most $O(p^2)$ or an obstacle for admitting decomposition of width at most p, for fixed constant p. This result is the first step in showing that checking topological containment of a fixed digraph H in a semi-complete digraph T admits a polynomial time algorithm. Unfortunately, the exponents of the polynomials highly depend on p and the size of H, respectively. During the talk I will sketch results of a recent joint work with Fedor V. Fomin, which treat of enhancing the approach of Fradkin and Seymour. We are able to obtain a fixed-parameter tractable approximation algorithm computing the pathwidth of a semi-complete graph. Based on this, we prove that topological containment in semi-complete graphs can be tested in $f(|H|)|V(T)|^4$ time for some elementary function f and thus the problem is fixed parameter tractable. By further usage of irrelevant vertex technique, we are able to show a $f(H)|V(T)|^4$ algorithm that checks whether a fixed digraph H is a (rooted) immersion of a semi-complete digraph T. The technique is considerably simpler than the previous approach via cutwidth of Fradkin and Seymour.

Displaying blocking pairs in signed graphs

Irene Pivotto, Simon Fraser University

In this talk we characterize when the blocking pairs of a signed graph can be represented as 2-cuts in an auxiliary graph. We discuss the relevance of this result to the problem of characterizing signed graphs with no odd-K_5 and to the problem of recognizing even cycle matroids. This is joint work with Bertrand Guenin and Paul Wollan.

The structure of claw-free perfect graphs

Matthieu Plumettaz, Columbia University

In 1988, Chvátal and Sbihi proved a decomposition theorem for claw-free perfect graphs. They showed that claw-free perfect graphs either have a clique-cutset or come from two basic classes of graphs called elementary and peculiar graphs. In 1999, Maffray and Reed successfully described how elementary graphs can be built using line-graphs of bipartite graphs using local augmentation. However gluing two claw-free perfect graphs on a clique does not necessarily produce claw-free graphs. In this talk, I will present a complete structural description of claw-free perfect graphs. I will also give a construction for all perfect circular interval graphs.

Faster algorithms for tree decompositions from excluding clique minors

Bruce Reed, McGill University

This is joint work with Ken-ichi Kawarabayashi and Zhentao Li.

Disjoint paths in tournaments

Paul Seymour, Princeton

Given k pairs of vertices of a tournament, how can we test in polynomial time (for fixed k) whether there are k directed paths joining the pairs, pairwise vertex-disjoint? For $k = 2$ there is an algorithm of Bang-Jensen and Thomassen, and in 2010 we found an algorithm for all fixed k; but in this talk we report on a new, much simpler algorithm.

This is joint work with Maria Chudnovsky and Alex Scott.

Immersion exclusion of Kuratowski graphs

Dimitrios Thilikos, University of Athens

A graph G contains H as an immersion if H can be obtained by some subgraph of G after a sequence of edges lifts. We give a structural characterization of graphs that do not contain any of the Kuratowski graphs $K_5, K_{3,3}$ as an immersion. In particular, we define a gluing operation between graphs, called k-edge-sum, and we prove that each $K_5, K_{3,3}$-immersion free loop-less multigraph can be obtained by applying 3-edge-sums to graphs that either are planar with maximum degree 3 or have treewidth bounded by some universal constant.

This is joint work with Marcin Kamiński.

Embedding spanning bipartite graphs of small bandwidth

Andrew Treglown, Charles University

A graph H on n vertices is said to have bandwidth at most b, if there exists a labelling of the vertices of H by the numbers $1, \ldots, n$ such that for every edge $ij \in E(G)$ we have $|i - j| \leq b$. Böttcher, Schacht and Taraz gave a condition on the minimum degree of a graph G on n vertices that ensures G contains every r-chromatic graph H on n vertices of bounded degree and of bandwidth $o(n)$, thereby proving a conjecture of Bollobás and Komlós. We strengthen this result in the case when H is bipartite. Indeed, we give an essentially best-possible condition on the degree sequence of a graph G on n vertices that forces G to contain every bipartite graph H on n vertices of bounded degree and of bandwidth $o(n)$. This also implies an Ore-type result. In fact, we prove a much stronger result where the condition on G is relaxed to a certain robust expansion property. Our result also confirms the bipartite case of a conjecture of Balogh, Kostochka and Treglown concerning the degree sequence of a graph which forces a perfect H-packing. This is joint work with Fiachra Knox.

Optimizing in Berge trigraphs

Nicolas Trotignon, CNRS, LIP, ENS Lyon

No combinatorial algorithm that colors every Berge graph in polynomial time is known. We give such an algorithm for the particular case of Berge graphs with no balanced skew partition. This algorithm relies on a decomposition theorem for Berge trigraphs (a trigraph is a graph some edges of which are optional).

This is joint work with: Maria Chudnovsky, Nicolas Trotignon, Thèophile Trunck and Kristina Vuskovic.

Graphs that do not contain a cycle with a node that has at least two neighbors on it

Marko Radovanovic, Leeds University

We recall several known results about minimally 2-connected graphs, and show that they all follow from a decomposition theorem. Starting from an analogy with critically 2-connected graphs, we give structural characterizations of the classes of graphs that do not contain as a subgraph and as an induced subgraph, a cycle with a node that has at least two neighbors on the cycle. From these characterizations we get polynomial time recognition algorithms for these classes, as well as polynomial time algorithms for vertex-coloring and edge-coloring.

This is joint work with: Pierre Aboulker, Kristina Vuskovic, and Nicolas Trotignon

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