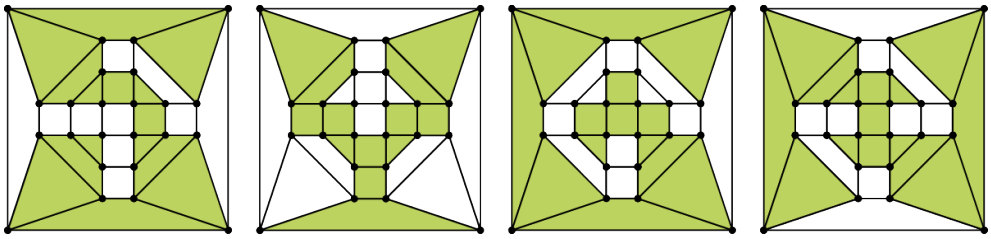
2nd International Workshop on

Symmetries of Graphs and Networks



August 1 – August 6, 2010, Rogla, Slovenia

Book of Abstracts

UP FAMNIT & UP PINT
Koper, 2010

The 2nd International Workshop on

Symmetries of Graphs and Networks

August 1 - August 6, 2010, Rogla, Slovenia

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UP FAMNIT & UP PINT, 2010

WELCOME TO SYGN 2010

Dear Colleagues.

We have gathered here in order to pursue the line of research started at the 1st SYGN Workshop in Banff, Canada, in 2008. In contrast with other conferences, much of our time will be devoted to discussion and work on open problems. Hopefully, our work will inspire new generations of algebraic combinatorialists. You are kindly invited to submit papers related to this workshop to the special issue of Ars Mathematica Contemporanea.

The organization of this meeting comes as a combined effort of the Primorska Institute for Natural Sciences and Technology (UP PINT) and the Faculty of Mathematics, Natural Sciences and Information Technologies (UP FAMNIT), two members of the University of Primorska, and is in line with our goal to create an international research center in algebraic combinatorics in this part of the world.

We wish you a pleasant and mathematically fruitful week at Rogla.

Dragan Marušič, Dean UP FAMNIT

Štefko Miklavič, Director UP PINT

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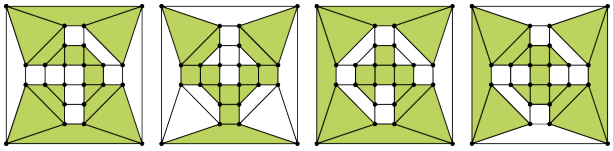
BASIC INFORMATION

2nd International Workshop on
Symmetries of Graphs and Networks



AUGUST 1 - AUGUST 6, 2010, ROGLA, SLOVENIA

ORGANIZED BY

Primorska Institute for Natural Science and Technology, University of Primorska (UP PINT),

and

Faculty of Mathematics, Natural Sciences and Information Technologies, University of Primorska (UP FAMNIT)

SCIENTIFIC COMMITTEE

Aleksander Malnič, Dragan Marušič, Štefko Miklavič, Joy Morris, Cheryl E. Praeger

ORGANIZING COMMITTEE

Klavdija Kutnar, Boštjan Kuzman, Primož Šparl

CONFERENCE VENUE

Hotel Planja, Rogla, Slovenia

CONFERENCE WEBSITE

www.famnit.upr.si/sl/konference/sygn/

CONFERENCE INFORMATION

E-mail to `sygn@upr.si`

FINANCIAL SUPPORT

Faculty of Mathematics, Natural Sciences and Information Technologies, University of Primorska (UP FAMNIT)

Primorska Institute for Natural Sciences and Technology, University of Primorska (UP PINT)

and

Slovenian Research Agency (ARRS)

KEYNOTE TALKS

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Majorana Theory
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Finite edge-transitive graphs
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The classification of tridiagonal pairs
Paul Terwilliger, *University of Wisconsin – Madison, USA.*

CONFERENCE LOGO

The letters of the logo are inspired by the question of Lovász from 1969 on the existence of Hamiltonian paths in vertex-transitive graphs. For a certain planar representation of the Cayley graph Cay(S_4, {(123), (132), (1234), (1432)}) each letter of the logo represents a tree of faces whose boudary yields a Hamiltonian cycle.

ACADEMIC PROGRAM

All talks will be held in Hotel Planja, Rogla.

Sunday, August 1
15.00 – 18.00 *Registration*
18.00 – 20.30 DINNER

Monday, August 2
07.30 – 09.30 BREAKFAST
09.30 – 09.50 *Opening remarks*

09.55 – 10.35 **E. Dobson:** *Normal Cayley graphs*

10.40 – 11.00 **J. Morris:** *Structure of strongly regular vertex- and edge-transitive graphs*
11.00 – 11.30 COFFEE BREAK
11.30 – 11.50 **Z. P. Lu** *On edge transitive Cayley graphs of square-free order*
11.55 – 12.15 **X. Wang:** 4*-valent* $\frac{1}{2}$*-edge-transitive graphs and non-normal Cayley graphs*
12.20 – 12.40 **C. Amarra:** *Symmetric graphs of diameter* 2 *with complete normal quotients*
12.45 – 14.00 LUNCH
15.00 – 18.00 *Discussion / Afternoon activities*
18.00 – 20.30 DINNER

Tuesday, August 3
07.30 – 09.30 BREAKFAST

09.30 – 10.10 **A. A. Ivanov:** *Majorana Theory*

10.15 – 11.00 **M. Klin:** *Strongly regular graphs with no triangles*

11.00 – 11.30 COFFEE BREAK
11.30 – 11.50 **M. Muzychuk:** *On isomorphism problem for cyclic codes*
11.55 – 12.15 **A. Malnič:** *Crosscovers*
12.20 – 12.40 **B. Kuzman:** *Arc-transitive elementary abelian covers of graphs*
12.45 – 14.00 LUNCH
15.00 – 18.00 *Discussion / Afternoon activities*
18.00 – 20.30 DINNER

Wednesday, August 4
07.30 – 09.30 BREAKFAST

09.30 – 10.10 **P. Terwilliger:** *The classification of tridiagonal pairs*

10.15 – 10.35 **I. Ponomarenko:** *The schurity problem for quasi-thin association schemes*
10.40 – 11.00 **J. Lauri:** *Two-fold orbital graphs: I*
11.00 – 11.30 COFFEE BREAK
11.30 – 11.50 **R. Scapellato:** *Two-fold orbital graphs: II*
11.55 – 12.15 **G. Pretel:** *A-like elements for a tridiagonal pair*
12.20 – 12.40 **H. Zhang:** *On finite* 2*-path-transitive graphs*
12.45 – 14.00 LUNCH
15.00 – 18.00 *Discussion / Afternoon activities*
18.00 – 20.30 DINNER

Thursday, August 5
07.30 – 09.30 BREAKFAST

09.30 – 10.10 **M. Conder:** *Regular (flag-transitive) polytopes with few flags*

10.15 – 10.35 **Q. Xiang:** *Cyclotomic Strongly Regular Graphs*
10.40 – 11.00 **L. M. Fernández:** *Semiregular actions in combinatorial structures*
11.00 – 11.30 COFFEE BREAK
11.30 – 11.50 **R. Nedela:** *Map enumeration*
11.55 – 12.15 **G. Brown:** *Leonard triples associated with hypercubes*
12.20 – 12.40 **I. Kovács:** *On regular Cayley maps on dihedral groups*
12.45 – 14.00 LUNCH
15.00 – 18.00 *Discussion / Afternoon activities*
18.00 – 20.30 DINNER

Friday, August 6
07.30 – 09.30 BREAKFAST

09.30 – 10.10 **C. H. Li:** *Finite edge-transitive graphs*

10.15 – 10.35 **M. Giudici:** *Locally distance transitive graphs*
10.40 – 11.00 **J. Pan:** *Finite vertex-quasiprimitive edge-transitive metacirculants*
11.00 – 11.30 COFFEE BREAK
11.30 – 11.50 **C. Sarti:** *Wilson's graph operations on Wada dessins*
11.55 – 12.15 **E. Hanson:** *A characterization of Leonard pairs using the notion of a tail*
12.20 – 12.40 **C. Zhang:** *Tetravalent one-regular graphs of order* $4p^2$
12.45 – 14.00 LUNCH

ABSTRACTS

Symmetric graphs of diameter 2 with complete normal quotients

Carmen Amarra
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A graph has *diameter* 2 if it is not a complete graph and if every pair of nonadjacent vertices is joined by a path of length 2. Our general problem is to examine the overall structure of graphs which are both arc-transitive and of diameter 2 using normal quotients. We identify the basic graphs in the class of arc-transitive diameter 2 graphs to be those Γ which satisfy one of the following (relative to some group G of automorphisms of Γ): (i) Γ does not have a nontrivial G-normal quotient, or (ii) all nontrivial G-normal quotients of Γ are complete graphs. In this talk we discuss basic graphs which are of type (ii), in particular the case where there are at least 3 nontrivial normal quotients. For this case we can identify all the graphs that arise, using the classification of the transitive finite linear groups.

Leonard triples associated with hypercubes and their antipodal quotients

George Brown
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Let $\mathcal{A}$ be the unital associative algebra over $\mathbb{C}$ with generators x, y, z and relations $xy + yx = 2z$, $yz + zy = 2x$ and $zx + xz = 2y$. We find the finite-dimensional irreducible $\mathcal{A}$-modules and show that x, y, z act on these modules as bipartite or almost bipartite Leonard triples. We define an operator s on finite-dimensional $\mathfrak{sl}_2$-modules that gives them an $\mathcal{A}$-structure.

Let d denote a nonnegative integer and let Q_d denote the graph of the d-dimensional hypercube. It is known that the Terwilliger algebra of Q_d has an $\mathfrak{sl}_2$-module structure. When d is even, we show that applying s to the Terwilliger algebra of Q_d produces the Terwilliger algebra of the alternate Q-polynomial structure of Q_d. When d is odd, we show that applying s to the Terwilliger algebra of Q_d produces the Terwilliger algebra of the antipodal quotient of Q_d.

Regular (flag-transitive) polytopes with few flags

Marston Conder
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An abstract n-polytope is a partially-ordered set endowed with a rank function (plus a unique minimum and unique maximum element), such that all maximal chains have length $n+2$. Elements of ranks 0, 1, 2 and $n-1$ are the vertices, edges, 2-faces and facets. The polytope is called regular if its automorphism group has a single orbit on flags. In that case, the automorphism group is a smooth quotient of a Coxeter group $[p_1, p_2, \ldots, p_n]$ where p_1 is the valency of each vertex, and so on. In this talk I will report on very recent work on finding for each n the regular n-polytopes with the smallest numbers of flags, under the assumption that all $p_i > 2$. Somewhat surprisingly, for $n > 3$ the smallest instances are not the regular n-simplices (of type $[3,3,\ldots,3]$).

Normal Cayley Graphs

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A Cayley graph Γ of a group G is a *normal Cayley graph of* G if G_L, the left-regular representation of G, is normal in $\mathrm{Aut}(\Gamma)$, the full automorphism group of Γ. Such graphs were first defined and studied by Ming-Yao Xu in 1998, and are natural generalizations of the notion of a GRR or *graphical regular representation* of a group G, which is a graph whose automorphism group is permutation isomorphic to G_L. Indeed, normal Cayley graphs that are not GRR's can be thought of as graphs that are not GRR's but whose automorphism group has as simple a structure as possible, (in fact such graphs have automorphism group a subgroup of $\mathrm{Aut}(G) \cdot G_L$). In this talk we will, at least from one point of view, discuss the main problems regarding normal Cayley graphs, survey known results on normal Cayley graphs, discuss possible future directions for additional research, and discuss related problems not only in graph theory, but in permutation group theory as well.

Locally distance transitive graphs

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A graph is called locally s-distance transitive if for each vertex v and positive integer $i \leq s$, the vertex stabiliser G_v acts transitively on the set of vertices at distance i from v. This is a generalisation of locally s-arc-transitive graphs and also distance transitive graphs. In this talk I will outline recent work with Alice Devillers, Cai Heng Li and Cheryl Praeger that initiates the study of such graphs.

A characterization of Leonard pairs using the notion of a tail

Edward Hanson
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Let V denote a vector space with finite positive dimension. We consider an ordered pair of linear transformations $A : V \to V$ and $A^* : V \to V$ that satisfy (i) and (ii) below:

(i) There exists a basis for V with respect to which the matrix representing A is irreducible tridiagonal and the matrix representing A^* is diagonal.

(ii) There exists a basis for V with respect to which the matrix representing A^* is irreducible tridiagonal and the matrix representing A is diagonal.

We call such a pair a *Leonard pair* on V. In this talk, we characterize the Leonard pairs using the notion of a tail. This notion is borrowed from algebraic graph theory.

Majorana Theory

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The Monster group M, which is the largest among the 26 sporadic simple groups is the automorphism group of 196 884-dimensional Conway–Griess–Norton algebra (simply called the Monster algebra). There is a remarkable correspondance between the so-called $2A$-involutions in M and certain idempotents in the Monster algebra (we refer to these idempotents as Majorana axes). The isomorphism types of the subalgebras in the Monster algebra generated by pairs of Majorana axes were calculated by S. Norton a while ago (there are precisely nine isomorphism types). More recently these nine algebras were characterized by S. Sakuma in the context of Vertex Operator Algebras, relying on earlier work by M. Miyamoto. The properties of Monster algebras used in the proof of Sakuma's theorem are rather elementary and they have been axiomatized under the name of Majorana representations. In this terminology Sakuma's theorem amounts to classification of the Majorana representations of the dihedral groups together with a remark that all the representations are based on embeddings into the Monster. In the present paper it is shown that the alternating group A_5 of degree 5 possesses precisely two Majorana representations, both based on embeddings into the Monster. The dimensions of the representations are 20 and 26; the scalar squares of the identities are 10 and $\frac{72}{7}$, respectively (in the Vertex Operator Algebra context these numbers are doubled central charges).

Strongly regular graphs with no triangles

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A strongly regular graph (briefly SRG) Γ is called primitive if both Γ and its complementary graph are connected. Only primitive SRGs are considered. The most famous SRG with no triangles has parameters (100, 22, 0, 6), it was described in the paper by Higman and Sims in 1968 in the course of discovery of a new sporadic simple group HS. Currently only 7 SRGs with no triangles are known, those on 5, 10, 16, 50, 56, 77 and 100 vertices. All them appear as induced subgraphs of the (unique) SRG with no triangles on 100 vertices.

This survey talk is influenced by our recent careful investigation (jointly with A. Woldar and M. Ziv-Av) of two texts by Dale Marsh Mesner (1923-2009) dated by 1956 and 1964. It turns out that the SRG with the parameters (100, 22, 0, 6) was discovered by Mesner as early as in his thesis (1956), while in 1964 the proof of the uniqueness of the graph, denoted $NL_2(10)$ by Mesner, was presented in his notes. Moreover, in framework of his investigation of the graph $NL_2(10)$ the elements of a general theory of SRGs with no triangles were developed, with a special emphasis to SRGs of negative Latin square type with no triangles.

The goal of the suggested survey talk is to bring together diverse facts from the theory of SRGs with no triangles in order to promote fruitful discussions of the participants of the workshop. Special attention will be payed to ideas which stem from Mesner, as well as from N. Biggs, P. Cameron, G. Higman, M. Macaj and J. Siran and other authors.

On regular Cayley maps on dihedral groups

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In the talk we give a classification of regular Cayley maps on dihedral groups D_{2n} of order $2n$ such that n is an odd number. This is a joint work with D. Marušič and M. E. Muzychuk.

Arc-transitive elementary abelian covers of graphs

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Investigating the automorphism lifting problem in the context of elementary abelian covers, Malnič, Marušič and Potočnik derived a criterion describing α-admissible covers in terms of $[\alpha]$-invariant subspaces for a certain matrix representation $[\alpha]$ of $\alpha \in \mathrm{Aut}(X)$. Their results have been succesfully applied in order to classify elementary abelian covers with specific symmetric properties for a number of small cubic or tetravalent graphs. In this talk, I will present recent classification results for arc-transitive elementary abelian covers of K_5 and $K_{4,4}$.

Two-fold orbital graphs: I

Josef Lauri
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The idea of orbital graphs is perhaps the most fruitful way of associating a graph to a permutation. In this paper I shall describe some of the properties of what we call two-fold orbital graphs/digraphs and which are defined as follows. Let $V = \{1, 2, \ldots, n\}$ and let α, β be two permutations of V. A two-fold orbital graph (TOG) or digraph (TOD) is the orbit of an ordered pair (i, j), $i, j \in V$ under the action which takes (i, j) to $(\alpha(i), \beta(j))$. Extending this idea, given two graphs G and H on V we say that they are two-fold isomorphic if there is a pair (α, β) of permutations of V such that (i, j) is an arc of G if and only if $(\alpha(i), \alpha(j))$ is an arc of H. Also, the two-fold automorphism group of G is the group of pairs (α, β) of permutations of V such that (i, j) is an arc of G if and only if $(\alpha(i), \beta(j))$ is also an arc.

In this talk we shall give exact definitions and a few results with the idea of showing that two-fold orbital graphs and digraphs are interesting objects worthy of investigation. In the second paper, Scapellato will delve more deeply into some of these results.

(mainly, the relationship with canonical double covers, about the structure of disconnected TOGs and non-trivial two-fold orbitals of of graphs with trivial automorphism group) This is joint work with our PhD student Russell Mizzi.

Finite edge-transitive graphs

Cai Heng Li
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I will introduce the typical methods in the study of edge-transitive graphs, namely, global-action analysis and local-action analysis. Then some important applications will be discussed.

On edge transitive Cayley graphs of square-free order

Zai Ping Lu
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A characterization is given of connected edge transitive Cayley graphs of square-free order. It is then applied to characterize locally primitive Cayley graphs of square-free order, and to classify 2-arc transitive Cayley graphs of square-free order. A complete classification is given of connected edge transitive tetravalent Cayley graphs of square-free order. The classification involves new constructions of edge transitive graphs, and shows that, with a few of exceptions,a connected edge transitive tetravalent Cayley graphs of square-free order is arc or edge regular.

Crosscovers

Aleksander Malnič
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To each unoriented edge e of a connected graph X assign an element ζ_e from a given abelian group Γ. The graph $X(\Gamma,\zeta)$ with $V(X)\times\Gamma$ as the vertex set, where (u,g) and (v,h) are adjacent whenever there is an edge $e=uv$ in X and $g+h=\zeta_e$, is called a crosscover. Crosscovers, an obvious generalization of Cayley sum graphs, are a special kind of covers. Some basic facts like regularity/irregularity, connectedness, and lifting automorphisms will be discussed.

This is joint work with Steve Wilson.

Semiregular actions in combinatorial structures

Luis Martínez Fernández
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We review some results showing the important role of the existence of groups of automorphisms acting semiregularly on the elements of certain combinatoric structures. More specifically, we concentrate on the case of graphs and digraphs and also in designs and in uniform multiplicative designs.

Structure of strongly regular vertex- and edge-transitive graphs

Joy Morris
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I will discuss the use of normal quotient reduction to analyse families of vertex-transitive, edge-transitive graphs. This method has been used extensively by Cheryl Praeger and others. In this talk, we apply the method to strongly regular graphs that are vertex- and edge-transitive.

In this talk, I will present some analysis of graphs in this family whose normal quotient is a complete graph, and the result that irreducible graphs in this family have quasiprimitive groups of automorphisms. Our main result is that no graph in this family can have a holomorphic simple group of automorphisms.

This is joint work with Cheryl Praeger and Pablo Spiga.

On isomorphism problem for cyclic codes

Mikhail Muzychuk
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A cyclic code of length n is a subspace C of $\mathbb{F}_q^n$ which is invariant under a cyclic shift of coordinates. Two cyclic codes are called equivalent (isomorphic) if there exists a permutation of coordinates which moves one code to another. In the talk we'll discuss an approach which allows to find whether two given cyclic codes are equivalent or not,

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Map enumeration

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History of map enumeration goes back to Tutte's results in years 1961-1963 when he derived a formula for the number of rooted planar maps with a given number of edges as well as for several other distinguished classes of maps. Since then there were more than 100 contribution to the theory of map enumeration, however, most of them counting rooted maps. Except the results of Liskovets and Wormald - they derived the formula for the number of isoclasses of spherical maps, there were no results on the number of isomorphism classes of maps. In 2006 we have published a paper in J. Comb. Theory B, where a new approach to the enumeration problem is proposed. As a result we derived formulae for the number of isoclasses of maps of genera up to 4. The new geometric approach turned to be useful also in solving other problems in topological graph theory, coverings of manifolds and combinatorics. In our talk we first explain the new approach and secondly, show how it can be used to solve several different problems in combinatorics, number theory, topology...

Joint work with A. Mednykh.

Finite vertex-quasiprimitive edge-transitive metacirculants

Jiangmin Pan
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A classification is given of finite vertex-quasiprimitive edge-transitive metacirculants.

The schurity problem for quasi-thin association schemes

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An association scheme is called quasi-thin if the valency of each its basis relation is one or two. It is known that not each quasi-thin scheme is Schurian, i.e. one the basis relations of which are the 2-orbits of its automorphism group. Our main result gives a strong restriction for the structure of a non-schurian quasi-thin scheme.

A-like elements for a tridiagonal pair

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Given a tridiagonal pair (A, A^*) on a vector space V, we say that an element of $\mathrm{End}(V)$ is A-like if it commutes with A and acts tridiagonally on the eigenspaces of A^*. We give a classification of the A-like elements, in the case where (A, A^*) is of Krawtchouk type with shape $(1,2,1)$.

Wilson's graph operations on Wada dessins

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Dessins d'enfants may be defined as bipartite graphs embedded in Riemann's surfaces. They determine in a unique way the conformal and algebraic structure of the surface of the embedding. Knowing the combinatorial properties of the embedded dessin may help describing the surface e.g. in term of defining equations. This task is easier if the embedded dessin has a 'large' automorphism group. In this talk, we present new results concerning the construction of dessins for which the underlying graph illustrates the incidence structure of points and hyperplanes of projective spaces over finite fields. In particular, we concentrate on a special type of dessins so-called Wada dessins which under some conditions have a 'large' orientation-preserving automorphism group. We show that applying to them algebraic operations we call 'mock' Wilson operations we may obtain new dessins. We consider the automorphism group of the new dessins and we explain how they are topologically related to the dessins we started with.

Two-fold orbital graphs: II

Raffaele Scapellato
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The idea of orbital graphs is perhaps the most fruitful way of associating a graph to a permutation. In the first talk, Lauri has described some of the properties of what we call two-fold orbital graphs/digraphs and which are defined as follows. Let $V = \{1,2,\ldots,n\}$ and let α,β be two permutations of V. A two-fold orbital graph (TOG) or digraph (TOD) is the orbit of an ordered pair (i,j), $i,j \in V$ under the action which takes (i,j) to $(\alpha(i),\beta(j))$. Extending this idea, given two graphs G and H on V we say that they are two-fold isomorphic if there is a pair (α,β) of permutations of V such that (i,j) is an arc of G if and only if $(\alpha(i),\alpha(j))$ is an arc of H. Also, the two-fold automorphism group of G is the group of pairs (α,β) of permutations of V such that (i,j) is an arc of G if and only if $(\alpha(i),\beta(j))$ is also an arc.

In this talk I will delve more deeply into some of these results. (mainly, the relationship with canonical double covers, about the structure of disconnected TOGs and non-trivial two-fold orbitals of of graphs with trivial automorphism group.

This is joint work with our PhD students Russell Mizzi.

The classification of tridiagonal pairs

Paul Terwilliger
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Let F denote a field and let V denote a vector space over F with finite positive dimension. We consider a pair of linear transformations $A : V \to V$ and $A^* : V \to V$ that satisfy the following conditions:

(i) each of A, A^* is diagonalizable;

(ii) there exists an ordering $\{V_i\}_{i=0}^d$ of the eigenspaces of A such that $A^*V_i \subseteq V_{i-1} + V_i + V_{i+1}$ for $0 \leq i \leq d$, where $V_{-1} = 0$ and $V_{d+1} = 0$;

(iii) there exists an ordering $\{V_i^*\}_{i=0}^\delta$ of the eigenspaces of A^* such that $AV_i^* \subseteq V_{i-1}^* + V_i^* + V_{i+1}^*$ for $0 \leq i \leq \delta$, where $V_{-1}^* = 0$ and $V_{\delta+1}^* = 0$;

(iv) there is no subspace W of V such that $AW \subseteq W$, $A^*W \subseteq W$, $W \neq 0$, $W \neq V$.

We call such a pair a *tridiagonal pair* on V. We classify up to isomorphism the tridiagonal pairs over an algebraically closed field. We discuss the connection to Q-polynomial distance-regular graphs and the orthogonal polynomials from the terminating branch of the Askey-scheme. This is joint work with Tatsuro Ito and Kazumasa Nomura.

Tetravalent half-edge-transitive graphs and non-normal Cayley graphs

Xiuyun Wang
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A vertex-transitive graph X is called half-edge-transitive if its automorphism group Aut(X) has two orbits of same length on the arc-set and two orbits on the edge-set of X. We show that connected tetravalent half-edge-transitive graphs can have arbitrary large stabilizers.

We give a sufficient condition for non-normal Cayley graphs and by using the condition, infinitely many connected tetravalent non-normal Cayley graphs on non-abelian simple groups are constructed. As an application, all connected tetravalent non-normal Cayley graphs on the alternating group A_6 are determined.

Cyclotomic Strongly Regular Graphs

Qing Xiang
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We will talk about cyclotomic strongly regular graphs Cay(F_q, D) in a broad sense (that is, D is a union of cosets of a subgroup of the multiplicative group F_q^* of F_q, not just a single coset of a subgroup of F_q^*). Several new infinite classes of strongly regular graphs are obtained. This is a joint work with Tao Feng.

Tetravalent one-regular graphs of order $4p^2$

Cui Zhang
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A graph is one-regular if its automorphism group acts regularly on the set of its arcs. In this talk I will present a recent complete classification of tetravalent one-regular graphs of order $4p^2$, where p is a prime.

This is a joint work with Yan-Quan Feng, Klavdija Kutnar and Dragan Marušič.

On finite 2-path-transitive graphs

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Let $\Gamma = (V, E)$ be a graph with vertex set V and edge set E. A 2-*arc* is a triple of distinct vertices (a, b, g) such that b is adjacent to both a and g. Identifying the two 2-arcs (a, b, g) and (g, b, a), we obtain a 2-*path*, denoted by $[a, b, g]$. Let $G \leq \mathrm{Aut}\Gamma$. Then Γ is called $(G, 2)$-*path-transitive* if G acts transitively on the set of 2-paths of Γ.The class of 2-path-transitive graphs is slightly larger than the class of 2-arc-transitive graphs. In this talk we present a classification of vertex-primitive and vertex-biprimitive 2-path-transitive graphs which are not 2-arc-transitive. This leads to new constructions of half-transitive graphs.

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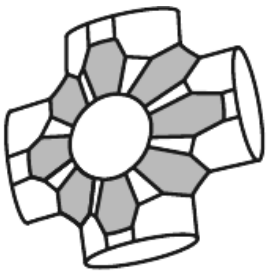

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Lake Bled, Slovenia, June 19 – 24, 2011

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