

The 36th PNU-PMI Algebraic Combinatorics Seminar

Organized by M.Hirasaka and J.Koolen

December 9, 2009

Place

C32-313, Department of Mathematics in Pusan National University

Program (December 9, 2009)

15:00–15:50, Alexander A. Ivanov(Imperial College London)
Majorana Representations of Groups

16:10–17:00, Elena Konstantinova (Sobolev Institute of Mathematics)
Coloring of the pancake graphs and some related problems

17:20–18:10, Hyun Ju Yu (POSTECH)
An inequality involving the second largest and smallest eigenvalue of a
distance-regular graph

18:30–20:30, Banquet

Speaker: Alexander A. Ivanov(Imperial College London)

Title: Majorana Representations of Groups

Abstract: 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. I will giscuss the proof of Sakuma’s theorem and the current status of its generalization project for other groups.

Speaker: Elena Konstantinova (Sobolev Institute of Mathematics)

Title: Coloring of the pancake graphs and some related problems

Abstract: In this talk we will consider some solved and unsolved problems on the pancake graphs (coloring, pancake problem, sorting by prefix-reversals, hamiltonicity, cycles embedding). Some application in computer science and molecular biology will be also shown.

Speaker: Hyun Ju Yu (POSTECH)

Title: An inequality involving the second largest and smallest eigenvalue of a distance-regular graph

Abstract: For a distance-regular graph with second largest eigenvalue (resp. smallest eigenvalue) θ_1 (resp. θ_D) we show that $(\theta_1 + 1)(\theta_D + 1) \leq -b_1$ holds, where equality only holds when the diameter equals two. Using this inequality we study distance-regular graphs with fixed second largest eigenvalue.