Moonshiney Conference in Kashiwa

The conference on Moonshine will be organized by Institute for the Physics and Mathematics of the Universe (IPMU) under the support of the Graduate School of Mathematical Sciences, the University of Tokyo.

IPMU Principal Investigator Kyoji Saito

Date:	May 22nd (Thu) $9:30 - 24$ th (Sat) 17:00, 2008				
Place:	Media Ha	all, Kashiwa Library, Kashiwa Campus, the University of Tokyo			
Host Institution:		Institute for the Physics and Mathematics of the Universe (IPMU) http://www.ipmu.jp/			
Supporting Institution:		Graduate School of Mathematical Sciences, the University of Toky			
Organizing Committee:		Kyoji Saito (IPMU), Atsushi Matsuo (University of Tokyo), Masahiko Miyamoto (University of Tsukuba), Hiromichi Yamada (Hitotsubashi University)			
Registration: May 22nd 9:30 – 10:00 A fee of JPY 1,000 will be collected at the desk.					

Contact: info@ipmu.jp

Information for Visitors: http://www.ipmu.jp/access/index.html

Scientific Program:

Thursday, May 22

9:30 - 10:00	Registration and coffee
10:00 - 10:10	Opening Remarks
10:15 - 11:30	John McKay (RIMS) New approaches to the Monster Part I
11:30 - 13:30	— lunch — (Group photo before lunch)
13:30 - 15:00	John F. Duncan (Harvard) Dynkin diagrams and arithmetic groups
15:00 - 15:30	— break —
15:30 - 17:00	John H. Conway (Princeton) The 26 Node Theorem revisited
18:00 - 19:30	Reception

Friday, May 23

9:30 - 10:00	— coffee —
10:00 - 11:30	John McKay (RIMS) New approaches to the Monster Part II
11:30 - 13:30	— lunch —
13:30 - 15:00	T. Basak (Chicago) A complex hyperbolic reflection group and the bimonster
15:00 - 15:30	— break —
15:30 - 17:00	Robert L. Griess, Jr (Michigan) Those Darn Dihedral Groups
18:00 - 19:30	Dinner

Saturday, May 24

9:30 - 10:00	— coffee —
10:00 - 11:30	John McKay (RIMS) New approaches to the Monster Part III
11:30 - 12:30	John F. Duncan (Harvard)
12:30 - 13:30 12:20 - 15:00	— lunch — C. H. Lem (Teiwen National Chang Kung University)
15:50 - 15:00	On McKay's E6, E7 and E8 observations
15:00 - 15:30	— break —
15:30 - 17:00	John H. Conway (Princeton) The Trilingual Monster

	Thursday May 22	Friday May 23	Saturday May 24
9:30 - 10:00	Registration (coffee)	(coffee)	(coffee)
10:00 - 11:30	Opening McKay	McKay	McKay
11:30 - 12:30	(Group Photo)	(lunch)	Duncan
12:30 - 13:30	(lunch)	(lunch)	(lunch)
13:30 - 15:00	Duncan	Basak	Lam
15:00 - 15:30	(break)	(break)	(break)
15:30 - 17:00	Conway	Griess	Conway
18:00 - 19:30	Reception	Dinner	

Titles and Abstracts:

John McKay (RIMS) New approaches to the Monster.

John H. Conway (Princeton)

The first talk: The 26 Node Theorem revisited. The second talk: The Trilingual Monster.

Reference: John H. Conway: 26 Implies the Bimonster, Journal of Algebra **235**, 805-814 (2001).

Robert L. Griess, Jr. (Michigan) Those Darn Dihedral Groups.

In any group, a pair of involutions generates a dihedral group.

Associated to a sublattice S of an integral lattice L is an involution (defined to be -1 on S and 1 on the annihilator of S). This involution leaves L invariant if Ssatisfies the RSSD condition (2L is in $S + \operatorname{ann}(S)$). If $2S^*$ is contained in S, this holds trivially. For example, this holds when S is isometric to $\sqrt{2}U$, where U is integral and unimodular.

A pair of RSSD sublattices gives a dihedral group in the isometry group of L.

In joint work, Ching Hung Lam and I have classified pairs M, N of lattices isometric to $\sqrt{2}E_8$ such that M + N is integral and rootless, and such that the dihedral group associated to them has order at most 12. Most of these pairs may be embedded in the Leech lattice. I shall discuss our classification in the lecture.

Our motive is to study the Glauberman-Norton theory about pairs of 2A involutions in the monster and the extended Dynkin diagram. We shall analyze the Glauberman-Norton subgroups of the monster by pairs of $\sqrt{2}E_8$ sublattices of the Leech lattice and their associated subVOAs in the Moonshine VOA. One interesting point is that the Glauberman-Norton groups have 'Levi factors' which look like index 2 subgroups of direct products of Weyl groups (mod centers). We hope to explain this in our VOA context.

Ching-Hung Lam (Taiwan National Cheng Kung University) On McKay's E_6 , E_7 and E_8 observations.

John F. Duncan (Harvard) Dynkin diagrams and arithmetic groups.

We will describe an interpretation of McKay's observation relating the exceptional affine Dynkin diagrams to conjugacy classes in sporadic simple groups in terms of arithmetic subgroups of the group of orientation preserving isometries of the hyperbolic plane.

Tathagata Basak (Chicago)

A complex hyperbolic reflection group and the bimonster.

Let R be the reflection group of the complex leech lattice plus a hyperbolic cell. Let D be the incidence graph of the projective plane over the finite field with 3 elements. Let A(D) be the Artin group of D: generators of A(D) correspond to vertices of D.

Two generators braid if there is an edge between them, otherwise they commute. It is surprising that both the bimonster and the reflection group R are quotients of A(D)when the generators are mapped to elements of order 2 and 3 respectively. A conjecture by Daniel Allcock seeks to explain this connection between R and the bimonster. We shall try to explain some of the evidences for the conjecture so far. We shall see that D behaves like the Coxeter-Dynkin diagram for the reflection group R. This imprecise analogy with Weyl groups actually makes our proofs work. There is a parallel story for a quaternionic hyperbolic reflection group where the analogies repeat.