Groups and Algebras in M-Theory

Summer Workshop

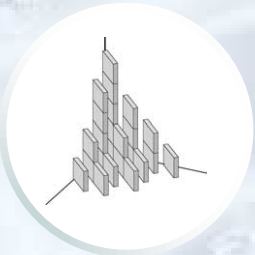
Tuesday, May 31 – Saturday, June 4, 2005

Location: Hill Center 705, Busch Campus, Rutgers University

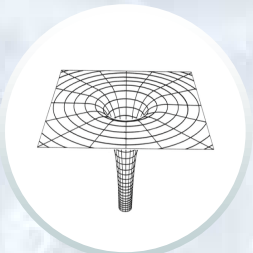
Organized by Lisa Carbone
http://www.math.rutgers.edu/~carbonel
carbonel@math.rutgers.edu

Sponsored by:
National Science Foundation
THE STATE UNIVERSITY OF NEW JERSEY RUTGERS Department of Mathematics Rutgers University

TOPICS

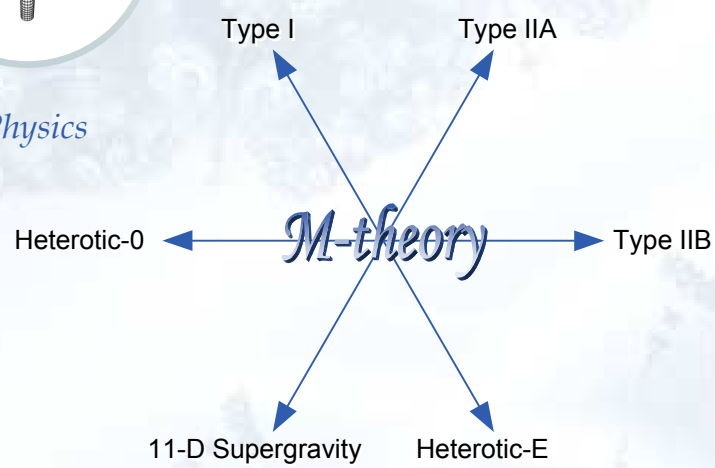


Algebras in string theory
Conformal field theory
E_8, E_10 and E_11 in M-theory
Generalized Kac-Moody algebras
Lorentzian Kac-Moody algebras
Representation theory
String theory, M-theory and dualities
Supergravity theories and dimension reduction
Vertex operator algebras



SPEAKERS

- **L. Carbone** *Rutgers University*
- **S. Chaudhuri** *Kavli Inst. of Theoretical Physics*
- **Y. Huang** *Rutgers University*
- **G. Moore** *Rutgers University*
- **E. Jurisich** *College of Charleston*
- **G. Ritter** *Harvard University*
- **M. Roitman** *University of Illinois*
- **H. Sati** *University of Adelaide*
- **P. West** *King's College*
- **P. Woit** *Columbia University*



Groups and Algebras in M-Theory *Summer Workshop*

Room 705, Hill Center, Frelinghuysen Rd (opposite the golf course), Busch Campus
Rutgers University, Piscataway NJ

Schedule

Tuesday May 31, 2005

8.30 - 9.15am Breakfast
9.15 - 9.45 am Introductory notions, Lisa Carbone, Rutgers University
9.45 - 10.45 am Supergravity theories and their symmetries on dimension reduction, Peter West, King's College
10.45 - 11.15am Coffee
11.15 - 1pm Lie algebras, BPS states and string duality, Greg Moore, Rutgers University
1 - 2.15pm Lunch
2.15 - 3.15pm Overview of string theory, M-theory and dualities, Hisham Sati, University of Adelaide
3.30 - 4.30pm Affine algebras, loop groups, conformal field theory and the Freed-Hopkins-Teleman theorem, Peter Woit, Columbia University
4.45 - 5.45pm A fundamental theory of emergent local geometry: The string/M duality web and matrix theory, Shyamoli Chaudhuri, Kavli Inst of Theoretical Physics, UCSB
Tea will be served all afternoon

Wednesday June 1, 2005

8.30 - 9am Breakfast
9 - 10am Lorentzian Kac-Moody theory over finite fields, actions on locally compact spaces, Lisa Carbone, Rutgers University
10 - 11am Very extended algebras and properties of E_11, Peter West, King's College
11 - 11.30am Coffee
11.30 - 12.30pm General comments on algebras in string theory, Jim Lepowsky, Rutgers University
12.30 - 2pm Lunch
2 - 3pm Generalized Kac-Moody Lie algebras, Elizabeth Jurisich, College of Charleston
3.15 - 4.15pm A review of vertex operator algebras I, Misha Roitman, University of Illinois
4.30 - 5.10pm Principal subspaces of affine Lie algebras and vertex operator algebras, Corina Calinescu, Rutgers University
Tea will be served all afternoon

Thursday June 2, 2005

8.30 - 9am Breakfast
9 - 10am Maximal supergravity theories as non-linear realizations, Peter West, King's College
10 - 11am Kaluza-Klein theory, topological E8 and LE8 bundles in M-theory, Hisham Sati, University of Adelaide
11 - 11.30am Coffee
11.30 - 12.30pm Quantum field theory, curved space time and dimension reduction, Gordon Ritter, Harvard University
12.30 - 2pm Lunch
2 - 3pm Construction of genus-zero full conformal field theories, Yi-Zhi Huang, Rutgers University
3.20 - 4pm Open-closed conformal field algebras, Liang Kong, Rutgers University
4 - 4.30pm Break
4.30 - 5.30pm Discussion topic: Beyond the standard model, led by Peter Woit, Columbia University
Tea will be served all afternoon
6.30pm Dinner: Makeda Ethiopian Restaurant

Friday June 3, 2005

8.30 - 9am Breakfast
9 - 10am Evidence for Kac-Moody symmetries in M-theory, Peter West, King's College
10 - 11am Equivariant K-theory and Quantization, Peter Woit, Columbia University
11 - 11.30am Coffee
11.30 - 12.30pm Representation theory and quantum information theory, Gordon Ritter, Harvard University
12.30 - 2pm Lunch
2 - 3pm Construction of the monster and fake monster Lie algebras using vertex operator algebras, Elizabeth Jurisich, College of Charleston
3.15 - 4.15pm A review of vertex operator algebras II, Misha Roitman, University of Illinois
4.30 - 5.10pm Aspects of the worldsheet supergeometry of superconformal field theory and vertex operator superalgebras, Katrina Barron, University of Notre Dame
Tea will be served all afternoon

Saturday June 4, 2005

8.30 - 9am Breakfast
9 - 9.50am The M-theory/Type II partition functions and elliptic cohomology, Hisham Sati, University of Adelaide
10 - 10.50am E_11 Weyl transformations and U-dualities, Peter West, King's College
11 - 11.50pm Twisted sectors and modular forms, Gordon Ritter, Harvard University
12 - 12.50pm Hidden symmetry unmasked: electric-magnetic duality, D-branes and E_11, Shyamoli Chaudhuri, Kavli Inst of Theoretical Physics, UCSB
1pm Closing remarks

Evening: Dinner and a show in New York City

Driving directions:
http://www.math.rutgers.edu/~sontag/driving-directions-hill.html

By taxi or bus: Exit at the bus stop on Frelinghuysen Rd opposite the golf course, go up the stairs to your right, through the courtyard, through the glass doors at the end of the courtyard. You are in the Hill Center for Math Sciences. Take the elevator to the 7th floor.

Lisa Carbone's office is 212. Math Dept offices on 3rd floor.

NOTE: Parking arrangements for Busch campus must be made in advance.