2012 MIT-PRIMES CONFERENCE

Program for Research In Mathematics, Engineering, and Science
for High School Students

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Saturday, May 19

Section I. Mathematics

9:00 am: Welcoming remarks
Prof. Michael Sipser, Head of the MIT Mathematics Department
Prof. Pavel Etingof, PRIMES Chief Research Advisor
Dr. Slava Gerovitch, PRIMES Program Director

9:15 am: Session 1. Discrete Mathematics I
Christina Chen, *Apollonian equilateral triangles* (mentor Nan Li)
Rohil Prasad and Jonathan Tidor, *Staged self-assembly* (mentor Jesse Geneson)
Dai Yang, *Halving lines and underlying graphs* (mentor Dr. Tanya Khovanova)

10:45 am: Session 2. Discrete Mathematics II
Ravi Jagadeesan and Nihal Gowravaram, *Beyond alternating permutations: Pattern avoidance in Young diagrams and tableaux* (mentor Joel Lewis)
William Kuszmaul and Ziling Zhou, *Equivalence classes of permutations generated by replacement sets* (mentors Darij Grinberg and Sergei Bernstein)

11:50 am: Session 3. Discrete Mathematics III
Aaron Klein, *Enumeration of graded poset structures on graphs* (mentor Yan Zhang)
Alan Zhou, *Degrees of regularity of colorings of the integers* (mentor Dr. Tanya Khovanova)

1:30 pm: Session 4. Number Theory
Dhroova Aiylam, *Modified Farey sequences* (mentor Dr. Tanya Khovanova)
Saarik Kalia and Michael Zanger-Tishler, *Schmidt games and a family of anormal numbers* (mentor Tue Ly)

2:30 pm: Session 5. Representation Theory
Sheela Devadas, *Modular representations of Cherednik algebras* (mentor Steven Sam)
Fengning (David) Ding, *Infinitesimal Cherednik algebras* (mentor Sasha Tsymbaliuk)

Sunday, May 20

Section II. Computer Science

9:00 am: Welcoming remarks
Prof. Srini Devadas, MIT Department of Electrical Engineering and Computer Science
Dr. Slava Gerovitch, PRIMES Program Director

9:15 am: Session 6. Algorithms and Complexity
Steven Homberg and Eli Sadovnik, *Improving the efficiency of fault-tolerant distributed shared-memory algorithms* (mentor Dr. Peter Musial)
Ziv Scully, *Efficient calculation of determinants of symbolic matrices with many variables* (mentor Dr. Tanya Khovanova)
Surya Bhupatiraju, *On the complexity of the marginal satisfiability problem* (mentor Alex Arkhipov)

10:35 am: Session 7. Programming Languages and Robotics
Jesse Klimov and Patrick Long, *Jeeves* (mentor Jean Yang)
Chris Kaffine, *Comparing NARF and SIFT keypoint extraction algorithms* (mentor Jon Brookshire)
Alexander Sekula, *Natural language processing for spoken dialog* (mentor William Li)

12:40 pm: Session 8. Computational Medicine
Dr. Gil Alterovitz, Division of Health Sciences and Technology, Introductory remarks
Andrew Xia, *Integrated gene expression probabilistic models for cancer staging* (mentors Dr. Gil Alterovitz and Dr. Jeremy Warner)
Skanda Koppula, *Prediction-based Bayesian network analysis of gene sets for genome-wide association and expression studies* (mentors Dr. Gil Alterovitz and Dr. Amin Zollanvari)
Peijin Zhang, *Identifying Clostridium difficile in the ICU using Bayesian networks* (mentors Dr. Gil Alterovitz and Dr. Jeremy Warner)

Section III. Computational and Physical Biology

2:00 pm: Session 9.
Prof. Leonid Mirny, Division of Health Sciences and Technology and Physics Department, Introductory remarks
Hao Shen, *Star polymers provide insight on Rabl-like chromosome conformations* (mentors Geoffrey Fudenberg and Maxim Imakaev)
Ashwin Murali, *Global positioning of interphase chromosomes mediated by local chromatin interactions* (mentors Geoffrey Fudenberg and Maxim Imakaev)
Boryana Doyle and Carolyn Lu, *Local structure of the chromatin fiber arbitrates 3D chromosomal interactions* (mentors Geoffrey Fudenberg and Maxim Imakaev)

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