2013 MIT-PRIMES CONFERENCE

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

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Saturday, May 18

Section I. Mathematics

9:00 am <u>Welcoming remarks</u>
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 <u>Session 1</u>
Kavish Gandhi and Noah Golowich, *Inequalities and partition regularity of linear homogenous equations* (mentor Laszlo Lovasz)
Jonathan Tidor, *Extremal functions of pattern avoidance in matrices* (mentor Jesse Geneson)
Rohil Prasad, *Investigating GCD in Euclidean domains* (mentor Dr. Tanya Khovanova)

10:35 am <u>Session 2</u>
Jin-Woo Bryan Oh, *Towards generalizing thrackles to arbitrary graphs* (mentor Rik Sengupta)
Raj Raina, *Minimal Ramsey graphs* (mentor Andrey Grinshpun)
Junho Won, *Highly non-convex graph crossing sequences* (mentor Chiheon Kim)

11:50 am <u>Session 3</u>
Leigh Marie Braswell, *The Cookie Monster Problem* (mentor Dr. Tanya Khovanova)
Saarik Kalia and Michael Zanger-Tishler, *Good functions and multivariate polynomials* (mentor Tue Ly)

2:00 pm <u>Session 4</u>
Ying Gao, *Depths of posets ordered by refinement* (mentor Sergei Bernstein)
Vahid Fazel-Rezai, *Equivalence classes of length-changing replacements of size-3 patterns* (mentor Dr. Tanya Khovanova)
William Kuszmaul, *On q-enumeration of modular statistics* (mentor Darij Grinberg)

3:15 pm <u>Session 5</u>
Gabriella Studt, *Higher Bruhat order on Weyl groups of Type B* (mentor Daniel Thompson)
Ravi Jagadeesan, *Belyi functions with prescribed monodromy* (mentor Akhil Mathew)
Ritesh Ragavender, *q-analogues of symmetric polynomials and nilHecke algebras* (mentor Alex Ellis)

4:30 pm <u>Session 6</u>
Jeffrey Cai, *Orbits of the symplectic group on partial flag varieties of type A* (mentor Vinoth Nandakumar)
Isaac Xia, *Quotients of lower central series over Z with multiple relations* (mentor Yael Fregier)

Sunday, May 19

Section II. Computer Science

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

9:15 am <u>Session 7</u>
William Wu and Nicolaas Kaashoek, *How to teach a class to grade itself* (mentors Christos Tzamos and Matt Weinberg)
Anish Athalye and Patrick Long, *Performance analysis and optimization of skip lists for modern multi-core architectures* (mentors Austin Clements and Stephen Tu)
Ajay Saini, *Modeling the opinion dynamics of a social network* (mentor Dr. Natasha Markuzon)

10:40 am <u>Session 8</u>
Istvan Chung and Nathan Wolfe, *A collaborative editor in Ur/Web* (mentor Benjamin Barenblat)
Alex Sekula and Oron Propp, *Automating interactive theorem-proving with Coq and Ltac* (mentor Drew Haven)
Nihal Gowravaram, *Avoidance in (2+2)-free posets* (mentor Wuttisak Trongsiriwat)

12:05 pm <u>Session 9</u>
Steven Homberg, *Finding enrichments of functional annotations for disease-associated single-nucleotide polymorphisms* (mentor Dr. Luke Ward)
John Long, *Evidence of purifying selection in humans* (mentor Angela Yen)

2:00 pm <u>Session 10</u>
Dr. Gil Alterovitz, Division of Health Sciences and Technology, Introductory remarks
Ben Zheng, *Removing disorder in drug resistance-related proteins in tuberculosis through hill-climbing algorithms* (mentor Dr. Gil Alterovitz)
Peijin Zhang, *Leveraging disordered-ordered interactions to yield new targets and drugs for tuberculosis* (mentor Dr. Gil Alterovitz)

3:00 pm <u>Session 11</u>
Jonathan Patsenker, *Finding the binding sites of MoRFs on a partner protein* (mentor Dr. Gil Alterovitz)
Yishen Chen, *SMART Genomics API* (mentor Dr. Gil Alterovitz)

Section III. Computational and Physical Biology

3:50 pm <u>Session 12</u>
Prof. Leonid Mirny, Division of Health Sciences and Technology and Physics Department, Introductory remarks
Boryana Doyle, *Chromatin organization: from polymer loops to topological domains* (mentors Geoffrey Fudenberg and Maxim Imakaev)
Carolyn Lu, *Dynamic folding of chromatin domains by active SMC-mediated loops* (mentors Geoffrey Fudenberg and Maxim Imakaev)

4:50 pm <u>Session 13</u>
Ashwin Murali, *Lineage-dependent properties of 16S ribosomal RNA nucleotide composition* (mentors Geoffrey Fudenberg and Maxim Imakaev)
Hao Shen, *The impact of gene order on evolution* (mentor Anton Goloborodko)

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