2016 MIT PRIMES CONFERENCE
Program for Research In Mathematics, Engineering, and Science for High School Students

Saturday, May 21: Mathematics

8:20 am Welcoming remarks
Prof. Tomasz Mrowka, Head of the MIT Mathematics Department
Prof. Pavel Etingof, PRIMES Chief Research Advisor
Dr. Slava Gerovitch, PRIMES Program Director

8:50 am Session 1
Nicholas Guo, Rational hyperplane arrangements and counting independent sets of symmetric graphs (mentor David Corwin)
Nikhil Marda, On point separation by arrangements of lines (mentor Borys Kadets)
Zachary Chroman, Rational embeddings of convex polyhedra (mentor Sheela Devadas, Stanford University)

10:00 am Session 2
Kai-Siang Ang, On the geometry oficosahedral viruses (mentor Prof. Laura Schaposnik, University of Illinois at Chicago)
Nikhil Marda, On point separation by arrangements of lines (mentor Boris Kadets)
Zachary Chroman, Rational embeddings of convex polyhedra (mentor Sheela Devadas, Stanford University)

11:10 am Session 3
Ria Das, Investigations of mixed reinforcement-memory models for random walks (mentor Andrew Rzeznik)
PRIMES STEP students. Who is guilty? (mentor Dr. Tanya Khovanova)
PRIMES STEP students. Alternator coins (mentor Dr. Tanya Khovanova)

1:10 pm Session 4
Felix Wang, Ramification of solutions of functional equations (mentor Prof. Michael Zieve, University of Michigan)
Nathan Smith, Square-primitive gaps (mentor Xiaoyu He, Harvard University)
Meena Jagadeesan and Karthik Karnik, The Outer Autonomorphism of $S_n$ (mentor Akhil Mathew)

2:25 pm Session 5
Nina Ankava, Applications of ergodic theory to continued fractions on the Heisenberg group (mentor Prof. Jayadev Athreya, University of Washington)
Rafael Saavedra, Discrete coin weighings and the Frobenius problem (mentor Dr. Tanya Khovanova)
Harish Vembu, Tiling-harmonic conjugate functions (mentor Prof. Sergiy Merenkov, CCNY – CUNY)

3:30 pm Session 6
Nelson (Shaheng) Xu, Extensions of classic combinatorial games (mentor Dr. Tanya Khovanova)
Kevin Chang, Ordered Ramsey numbers of small graphs (mentor William Kuszmaul, Stanford University)
Louis Golowich and Richard Zhou, Maximum number of pairwise G-different permutations (mentor Chihsein Kim)

4:40 pm Session 7
Eric Nie and Alok Puranik. Invariants of knots (mentor Zhenkun Li)
Albert Yue, Knot diagram invariants and bounds for the number of Reidemeister moves needed for unknotting (mentor Piotr Szwarc)
Alec Leng, Independence of the Miller-Rabin and Lucas probable prime tests (mentor David Corwin)

6:15 pm Session 8
Maya Sanikar, The dimensions of partially directed nil-Temperley-Lieb algebras (mentor Dr. Tanya Khovanova)
Laura Pierson, Signatures of stable multiplicity spaces in symmetric group restrictions (mentor Siddharth Venkatesh)
Dhruv Rohatgi, A connection between vector bundles over smooth projective curves and representations of quivers (mentor Vishal Arul)

7:20 pm Session 9
Alec Sun, Wall crossing bijections and representations of rational Cherednik algebras (mentor Seth Shelley-Abrahamsen)
Matt Lommel, Representations of Cherednik algebras (mentor Gus Lerner)
Matthew Hase-Liu, Counting points on curves of the form $y^m = z^n + c_1 z^n + c_2 z^n + c_3 z^n + c_4 z^n$ (mentor Nicholas Trantiatilou)

Sunday, May 22: Computer Science and Computational Biology

8:45 am Welcoming remarks
Prof. Srini Devadas, MIT EECS Department
Dr. Slava Gerovitch, PRIMES Program Director

9:00 am Session 10: Computer Science
Hanshal Sheth, Aashish Welling, and Nihar Sheth, Read-copy update in a garbage collected environment (mentor Cody Cutler)
Vivek Bhupatiraju, John Kuszmaul, and Vinjai Vale, Exploring proof of space with hard-to-pebble graphs (mentors Ling Ren and Albert Kwon)
Leo Alcock, Private publishing using Bitcoin (mentor Ling Ren)

10:30 am Session 11: Computer Science
Cristian Gatu, SelfPass: A secure password manager (mentor Albert Kwon)
Henry Liu, Justin Kaashoek, and Siye Zhu, Scalable logging algorithm for in-memory database systems (mentor Xiangyao Yu)
Yaharth Agarwal and Vishnu Murale, Moving in next door: network flooding as a side channel in cloud environments (mentors Dr. Jason Hennessey, Kyle Hogan, and Dr. Mayank Varia, Boston University)

11:55 am Session 12: Computational and Physical Biology
Prof. Leonid Mirny, Introductory remarks
Laura Braverman, Protein determinants of chromosome domains (mentor Nezar Abdennur)
Betsy Pu, Chromatin states at boundary elements (mentor Nezar Abdennur)
Krishna Suresh, Emergent chromosome organization in interphase from loop extrusion (mentor Dr. Geoffrey Fudenberg)

2:00 pm Session 13: Computational Neuroscience
Prof. Ed Boyden, Introductory remarks
Albert Gerovitch, Metrics for comparing 3D neuron segmentations in expansion microscopy connectomics (mentor Dr. Adam Marblestone)
Zachary Steinberg, Automatic segmentation of punctate 3D super-resolution microscopy data (mentor Daniel Goodwin)

3:00 pm Session 14: Medical Informatics
Prof. Gil Alterovitz, Introductory remarks
Daniel Lu, Study of various synergistic drug mechanisms in disordered protein-related diseases (mentor Prof. Gil Alterovitz)
Kara Lu, Computational modeling identifies biosynthetic modifications to improve drug inhibition against Klebsiella pneumoniae (mentor Prof. Gil Alterovitz)
Arun Prasad, Targeting viral envelope proteins: an application to the Zika virus (mentor Prof. Gil Alterovitz)

4:15 pm Session 15: Medical Informatics
Andrew Gritsevsky and Adithya Vellai, Compression and integration of human genomic variants into smart EHR systems (mentor Prof. Gil Alterovitz)
John Flahive, Providing clinical decision support to medical providers through interpretation of gene-drug interactions (mentor Prof. Gil Alterovitz)
James Jusufi, Exploring the effects of CTCF binding site mutations on transcriptional regulation (mentor Dr. Mahmoud Ghandi, Broad Institute)

Room 4-270, MIT
web.mit.edu/primes

Installation Chord by Antony Garmley
(2015) at the entrance to MIT’s Math Department.
Photo by Slava Gerovitch.