

2022 SPRING-TERM PRIMES CONFERENCE

Program for **R**esearch In **M**athematics, **E**ngineering, and **S**cience
for High School Students



May 21 at 3:40 pm

Auction of Tanya Khovanova's beautiful mathematical crochets in the colors of Ukrainian flag – in support of Yulia's Dream, a new PRIMES section for students from Ukraine



Photo: Slava Gerovitch

Room 2-190, MIT
web.mit.edu/primes

MIT
MATHEMATICS



Saturday, May 21

Mathematics

10:00 am Welcoming remarks

Prof. Michel Goemans, Head of MIT Mathematics Department
Prof. Pavel Etingof, PRIMES Chief Research Advisor
Dr. Slava Gerovitch, PRIMES Program Director

10:15 am Session 1. PRIMES Circle

Crystal Egbunike & Wintana Tewolde, "Graph Theory and Its Applications" (mentor Victor Chu)
Pete Olhava & Alexander Gil Osorio, "An Introduction to Knot Theory" (mentor Preston Cranford)
Sebastian Cuervo & Ben Stokes, "Triangles in Various Geometries" (mentor Paige Dote)

11:25 am Session 2. PRIMES Circle

Ling (Esther) Fu & Sarah Pan, "The Busy Beaver Problem" (mentor Alexandra Hoey)
Jessica Guo & Audrey Wei, "NP-Completeness" (mentor Kerri Lu)
Zoe Awa & Ankita Varigonda, "Game Theory" (mentor Yuyuan Luo)
Elena Baskakova & Alice He, "Probability Theory: Why You Are Falsely Convicted, Lonely, and in Debt" (mentor Jeremy Smithline)

1:45 pm Session 3. PRIMES Circle

Maya Koreth & Dania Rustom, "Number Theory and Divisibility Issues" (mentor Ariana Park)
Sophia Hou & Jaeyi Song, "Group Theory" (mentor Merrick Cai)
Gracie Sheng & Evelyn Zhu, "Symmetry and Simplicity in Finite Group Theory" (mentor Gabrielle Kaili-May Liu)

3:00 pm Session 4. PRIMES STEP

Hwiseo Choi, Shreyas Ekanathan, Aidan Gao, Sylvia Zia Lee, Rajarshi Mandal, Vaibhav Rastogi, Daniel Sheffield, Michael Yang, Angela Zhao, and Corey Zhao (PRIMES STEP Junior group), "The Struggles of Chessland" (mentor Dr. Tanya Khovanova)
Eric Chen, Adam Ge, Andrew Kalashnikov, Ella Kim, Evin Liang, Mira Lubashev, Matthew Qian, Rohith Raghavan, Benjamin Taycher, Samuel Wang (PRIMES STEP Senior group), "Disarray in the Tribarray: A Tribsploration" (mentor Dr. Tanya Khovanova)

4:00 pm Session 5. Math Reading Groups

Anuj Sakarda and Jerry Tan, "The Probabilistic Method" (mentor YounHun Kim)
Yi (Alex) Liang, "Representation Theory and Quantum Systems" (mentor Sanjay Raman)
Ilaria Seidel, Nathan Xiong, and William Yue, "Dynkin Quivers and Their Representations" (mentor Dr. Aleksandra Utralova)

Sunday, May 22

Mathematics

10:00 am Welcoming remarks

Prof. Pavel Etingof, PRIMES Chief Research Advisor
Dr. Slava Gerovitch, PRIMES Program Director

10:10 am Session 6. Math Reading Groups

Joshua Guo, Andrew Lee, and Karthik Seetharaman, "Galois Theory and the Insolvability of the Quintic" (mentor Chun Hong Lo)
Kevin Zhao, "Lie Matrices" (mentor Sanjay Raman)

10:55 am Session 7. PRIMES Circle

Leisha Fortunat, "A Simple Introduction to Graph Theory" (mentor Rachana Madhukara)
Daniela Yablon & Ayelet Yablon, "Introduction to Cryptography" (mentor Aparna Gupte)
Zoe Siegelnickel & Palak Yadav, "Algorithm Analysis" (mentor John Shackleton)

Computer Science and Computational Biology

1:00 pm Welcoming remarks

Prof. Srinivas Devadas, PRIMES Computer Science Section Coordinator

1:05 pm Session 8. Computer Science

Rachel Chen, "Uotchi: A Hardware Platform to Create and Exchange Non Fungible Objects" (mentor Jules Drean)
Abigail Thomas, "The Implementation of Model Pruning to Optimize zk-SNARKs in Machine Learning" (mentor Yu Xia)
Tanisha Saxena, "A Systematic Study on the Difference and Conversion Between Synchronous and Asynchronous Protocols" (mentor Jun Wan)
Zifan (Carl) Guo, "Understanding High-Level Properties of Low-Level Programs through Transformers" (mentor William Moses)

2:15 pm Session 9. Computer Science and Computational Biology

Kevin Edward Zhao, "Life after BERT: What Do Other Muppets Understand about Language?" (mentors Prof. Anna Rumshisky and Vladislav Lialin, UMass Lowell)
Neil Chowdhury, "A Mechanism of Formation for a Unique Compartment in the Silkworm Genome" (mentor Sameer Abraham)