Representation Theory, Geometry & Combinatorics Seminar

Organizer: M. Haiman and N. Reshetikhin

Wednesday, 4:00–6:00pm, 939 Evans

Nov. 18 **Gregg Musiker**, MIT

Linear Systems on Tropical Curves

A tropical curve is a metric graph with possibly unbounded edges, and tropical rational functions are continuous piecewise linear functions with integer slopes. We define the complete linear system $|D|$ of a divisor D on a tropical curve analogously to the classical counterpart. Due to work of Baker and Norine, there is a rank function $r(D)$ on such linear systems, as well a canonical divisor K. Completely analogous to the classical case, this rank function satisfies Riemann-Roch and analogues of Riemann-Hurwitz.

After an introduction to these tropical analogues, this talk will describe joint work with Josephine Yu and Christian Haase investigating the structure of $|D|$ as a cell complex. We show that linear systems are quotients of tropical modules, finitely generated by vertices of the cell complex. Using a finite set of generators, $|D|$ defines a map from the tropical curve to a tropical projective space, and the image can be extended to a parameterized tropical curve of degree equal to $\deg(D)$. The tropical convex hull of the image realizes the linear system $|D|$ as an embedded polyhedral complex. We also show that curves for which the canonical divisor is not very ample are hyperelliptic.