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Linear Systems on Tropical Curves

A tropical curve Γ 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 Γ analogously to the classical counterpart. Due to work of Matt Baker and Serguei 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.

This talk will describe joint work with Josephine Yu and Christian Haase investigating the structure of $|D|$ as a cell complex. We show that such linear systems are quotients of tropical modules and finitely generated by the vertices of the associated cell complex. Using a finite set of generators, $|D|$ defines a map from Γ to a tropical projective space, and the tropical convex hull of the image realizes the linear system $|D|$ as a polyhedral complex.