Matroids

(Org: **Peter Nelson** (Waterloo))

JOE BONIN, George Washington University

Minor-Closed Classes of Polymatroids

A polymatroid is a function $\rho : 2^E \to \mathbb{Z}$ that has all of the properties of a matroid rank function except that $\rho(X)$ may exceed $|X|$. Some polymatroids can be obtained by adding the rank functions of several matroids on E. We consider minor-closed classes of polymatroids that are obtained by imposing various conditions on the matroids whose rank functions are added. In some cases, we obtain excluded-minor characterizations of these classes; in others we give infinitely many excluded minors, thereby suggesting that excluded-minor characterizations are likely to be very difficult to obtain. This is joint work with Carolyn Chun and Deborah Chun.

RONG CHEN, Fuzhou University

Infinitly many excluded minors for frame matroids and for lifted-graphic matroids

In the talk, I will present infinite sequences of excluded minors for both the class of lifted-graphic matroids and the class of frame matroids.This is joint work with Jim Geelen.

JIM GEELEN, University of Waterloo

Toward computable bounds for Rota's Conjecture

For each finite field $\mathbb{F}$ there are only finitely many excluded minors for the class of $\mathbb{F}$-representable matroids. Our proof of this theorem does not give a computable bound for the size of the excluded minors in terms $|\mathbb{F}|$. In this talk we sketch ideas that bring us closer to obtaining such a bound. This is joint work with Bert Gerards and Geoff Whittle.

TONY HUYNH, Université Libre de Bruxelles

Extension Complexity of Matroid Polytopes

The *extension complexity* of a polytope P is the minimum number of facets over all polytopes Q that affinely project to P. Note that if Q has far fewer facets than P, then it is more efficient to do linear programming over Q instead of P.

Given a matroid M, we can think of M as a polytope via its base polytope (the convex hull of its bases). Therefore, extension complexity is also a measure of how complicated a matroid is. In this talk, I will give a crash course on extension complexity, with particular emphasis on matroid polytopes.

MIKE NEWMAN, University of Ottawa

Matroid classes with many excluded minor

Much of matroid theory has been concerned with effectively describing minor-closed classes, and one major approach has been through describing the excluded minors. As the number of excluded minors grows, this becomes less practical. How bad can this get?

We consider classes of matroids that have more excluded minors than members, dubbed "fractal classes". Specifically, the ratio of the number of excluded minors of size n to the number of members of size n goes to zero. It turns out that there are some surprisingly straightforward examples, and the above-mentioned ratio can in fact achieve any value whatsoever