



## Department of Mathematics and Statistics

### COLLOQUIUM

Tuesday, April 1, 2014

Matt Macauley  
Clemson University

## Cyclic reducibility and conjugacy in Coxeter groups

Abstract: Loosely speaking, a Coxeter group is a generalized reflection group. Reduced words give rise to natural labeled posets called heaps. Conjugating a word by an initial or terminal generator cyclically shifts it, which puts an equivalence on the underlying posets, generated by converting minimal into maximal elements. We call the resulting equivalence classes "toric posets," and they correspond to regions of graphic toric hyperplane arrangements, just as ordinary partial orders correspond to regions of graphic hyperplane arrangements. There are natural toric analogues of many standard features of ordinary partial orders, such as chains, antichains, intervals, transitivity, Hasse diagrams, extensions, total orders, morphisms, and order ideals. This leads to a notion of a toric heap, which is a labeled toric poset. Classic problems on reducibility in Coxeter groups turn into new problems on cyclic reducibility and conjugacy. This talk should be accessible to anyone who knows what a group is.

4:00 – 5:00 pm

Adel Mathematics Bldg., Room 164

(refreshments at 3:45)

#### ACGT Seminar:

Tuesday, April 1, 11:20 – 12:20 pm, AMB 221. Speaker: Matt Macauley (Clemson), Title: Toric partial orders.

Abstract: Every finite poset can be viewed as an acyclic orientation of a graph, or as a chamber of its graphic hyperplane arrangement. Converting minimal elements (sources) into maximal elements (sinks) generates an equivalence relation on posets, and the resulting equivalence classes are in bijection with chambers of the toric graphic hyperplane arrangement. We call these classes "toric posets", and only when one views them geometrically do natural toric analogues of standard poset features appear. Examples include chains, antichains, intervals, transitivity, Hasse diagrams, extensions, total orders, morphisms, and order ideals. After introducing these objects, I will discuss some current and future work. Since toric posets are brand new and so simple to define, they provide an abundance of interesting research problems, which I will outline as time allows. In my later talk, I will provide a connection to Coxeter groups.

#### Applied Math Seminar (AMS)

Thursday, April 3, 12:45 – 1:35 pm, AMB 224. Speakers: TBA, Title: TBA

#### Friday Afternoon Undergraduate Mathematics Seminar (FAMUS):

Friday, April 4, 3:00 – 4:00 pm, AMB 164

Speakers: TBA, Title: TBA, Faculty guest: TBA