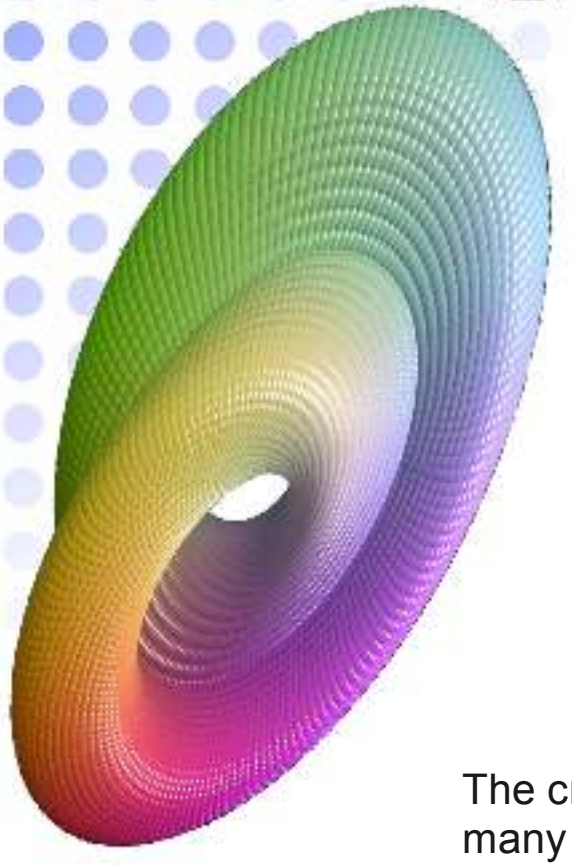
Michigan Math Club

Thursday at 4pm in the Nesbitt Room

Free Pizza and Pop



The Critical Group of a Graph

Jonathan Gerhard

Abstract for 5 October 2017

The critical group of a graph G is an algebraic invariant that can be defined in many ways. The viewpoint that we will (mostly) be sticking with for this talk will be very combinatorial. A *configuration* on G is an assignment of integers to each vertex of G. We think of the integer assigned to each vertex as the number of chips that vertex holds, and we can fire a vertex *v* by sending one chip to each vertex adjacent to *v*. We consider two configurations equivalent if one can be obtained by the other through a series of chip-firing. Taking (the torsion part of) the group of configurations modulo this equivalence gives us the critical group. In this talk, we will explore various examples of critical groups and briefly discuss their many connections to other fields of mathematics, including an appearance of an interesting poset, a beautiful analogue of the Riemann-Roch theorem, and a clever connection to rational points on an elliptic curve.