## Graphs in surfaces, their one-face subgraphs, and the critical group

Wednesday, 21 August 2024 10:10 (25 minutes)

Critical groups are groups associated with graphs. They are well-established in combinatorics; closely related to the graph Laplacian and arising in several contexts such as chip firing and parking functions. The critical group of a graph is finite and Abelian, and its order is the number of spanning trees in the graph, a fact equivalent to Kirchhoff's Matrix–Tree Theorem.

What happens if we want to define critical groups for graphs embedded in surfaces, rather than for graphs in the abstract?

In this talk I'll offer an answer to this question. I'll describe an analogue of the critical group for an embedded graph. We'll see how it relates to the classical critical groups, as well as to Chumtov's partial-duals, Bouchet's delta-matroids, and a Matrix-quasi-Tree Theorem of Macris and Pule.

This is joint work with Criel Merino and Steven D. Noble.

**Primary author:** MOFFATT, Iain (Royal Holloway University of London)

**Co-authors:** MERINO, Criel (National Autonomous University of Mexico); NOBLE, Steven (Birkbeck, University of London)

Presenter: MOFFATT, Iain (Royal Holloway University of London)