Unimodular representations of ribbon graphs

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(This talk is based on joint work with Changxin Ding.)

We extend the notion of unimodular representations from orientable ribbon graphs to a larger class, which we call *pseudo-orientable* ribbon graphs. Such ribbon graphs are obtained from orientable ribbon graphs by applying basic operations—the partial Petrial, partial dual, and deletion in that order—at a single edge. We also study the relation between orientable and pseudo-orientable ribbon graphs from the perspective of delta-matroids and matrices. Finally, we note that a unimodular representation of a pseudo-orientable ribbon graph yields ultra-log-concavity for the numbers of quasi-trees of sizes $\{2i, 2i+1\}$, and we ask whether a weaker log-concavity property still holds for general ribbon graphs.