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Fourorientations and the Tutte Polynomial

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A fourorientation of a graph is a choice for each edge whether to orient that edge one way or another, to leave it unoriented, or to bidirect it. In joint work with Spencer Backman we produce a list of 64 classes of fourorientations defined by cuts and cycles that are enumerated by generalized Tutte polynomial evaluations. Our result unifies and extends results due to many authors starting with Stanley's celebrated theorem that the number of acyclic orientations of a graph is $T(2,0)$.

I will explain how I entered into this project via the study of the bigraphical hyperplane arrangement. Time permitting, I may also discuss connections to graphic Lawrence ideals, monomizations of power ideals and zonotopal algebras, or combinatorial Riemann-Roch theory. At the end I will also mention future work involving "fourorientation activities."

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