

## **Linear Algebra on Hyperfields and Bands via Matroid Theory**

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Methods of linear algebra are ubiquitous throughout mathematics. Over combinatorialised versions of fields, for instance, bands and hyperfields, defining methods that mimic standard processes in linear algebra is significantly more challenging. However, defining such methods would be important for many aspects of tropical geometry and general matroid theory - for instance, it would enable more rigorous tropical representation theory and would help uncovering the mysteries of tropical vector bundles.

In this talk, I discuss a framework to perform linear algebra on matroids. We discuss which combinatorial analogues of fields are amenable to linear algebra, and which have structural obstructions. Further, we construct combinatorial analogues of matrices and discuss their multiplication, and the properties of the arising monoids. Joint work in progress with Yifan Guo.