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Complex Matroids: Phirotopes and Their Realizations in Rank 2

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In this talk I will discuss a portion of a paper by Alexander Below, Vanessa Krummeck and Jürgen Richter-Gebert, titled *Complex matroids: Phirotopes and their realizations in rank 2.* The approach Below, Krummeck, and Richter-Gebert use to define a complex analog to oriented matroids is appealing because it includes chirotopes as a special case. That is, if a vector configuration in $\mathbf{C}^n$ is actually in $\mathbf{R}^n$, then we get a chirotope.

The cross ratio of 4 complex vectors in $\mathbf{C}^2$ (or in $\mathbf{CP}^1$) has interesting geometric properties. Fortunately, they have an obvious analog for rank 2 phirotopes.

I will focus on properties of the abstract cross ratio which lead to rigidity results for phirotopes which have no analog for chirotopes. This rigidity leads us to believe there is not a *topological* representation theorem for complex matroids.
