On the Existence of an Enveloping Matroid of a Delta-matroid

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In this talk, we report a result on delta-matroids in the context of enveloping matroids. Matroid theory was independently established by Hassler Whitney and Takeo Nakasawa. The motivation was to provide an abstraction of "independence" which is common to both graphs and matrices. Delta-matroids are a generalisation of matroids. Delta-matroids were introduced by André Bouchet to study combinatorial objects for which the greedy algorithm returns an optimal solution. They were later applied to study many other problems, including Eulerian tours in graphs and graph embeddings. A recent development has shed new light on their connection in geometry. Through the lens of covering of set systems or polytopes, it is natural to investigate whether a delta-matroid admits an enveloping matroid. However, given a delta-matroid it is not unknown whether it admits an enveloping matroid. In the literature, there was only one counterexample hidden in the context of multimatroid. We obtain an infinite family of delta-matroids which do not admit an enveloping matroid. This is a joint work with Relinde Jurrius, Dmitry Mineev and Lauren Nowak.