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Steiner Trees and Convex Geometries

Let V be a finite set and $\mathcal{M}$ a collection of subsets of V. Then $\mathcal{M}$ is an alignment of V if and only if $\mathcal{M}$ is closed under taking intersections and contains both V and the empty set. If $\mathcal{M}$ is an alignment of V, then the elements of $\mathcal{M}$ are called convex sets and the pair $(V, \mathcal{M})$ is called an aligned space. If $S \subseteq V$, then the convex hull of S is the smallest convex set that contains S. Suppose $X \in \mathcal{M}$. Then $x \in X$ is an extreme point for X if $X \setminus \{x\} \in \mathcal{M}$. A convex geometry on a finite set is an aligned space with the additional property that every convex set is the convex hull of its extreme points. Let G be a connected graph. We define several graph convexities using Steiner distances and trees and characterize those classes of graphs for which these graph convexities are convex geometries.

Joint work with M. Nielsen.