

Abstract

**Eigenvalues of oppositeness graphs and
Erdős-Ko-Rado for flags**

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Over the last few years, Erdős-Ko-Rado theorems have been found in many different geometrical contexts including for example sets of subspaces in projective or polar spaces. A recurring theme throughout these theorems is that one can find sharp upper bounds by applying the Delsarte-Hoffman coclique bound to a matrix belonging to the relevant association scheme. In the aforementioned cases, the association schemes turn out to be commutative, greatly simplifying the matter. However, when we do not consider subspaces of a certain dimension but more general flags, we lose this property. In this talk, we will explain how to overcome this problem, using a result originally due to Brouwer. This result, which has seemingly been flying under the radar so far, allows us to find eigenvalues of oppositeness graphs and derive sharp upper bounds for EKR-sets of certain flags in projective spaces and general flags in polar spaces and exceptional geometries. We will show how Chevalley groups, buildings, Iwahori-Hecke algebras and representation theory tie into this story and discuss their connections to the theory of non-commutative association schemes.

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