KAREN MEAGHER, University of Regina

Applications of eigenvalues of graphs for Erdos-Ko-Rado type results

My research is centred on results related to the famous Erdős-Ko-Rado (EKR) Theorem. My favourite proof method for this theorem is to define a graph with the property that intersecting sets are exactly the independent sets/cocliques in the graph and to use algebraic methods to understand the structure of this graph. This graph is typically called a derangement graph. It is often very symmetric, so tools from linear algebra and algebraic graph theory can be surprisingly effective. For example, the highly structured nature of theses derangement graphs allow us to determine its eigenvalues, which can be used to prove the different EKR theorems. A family of variations of the EKR theorems are known as stability results, these demonstrate in different ways how robust version of EKR theorem can be. One type of stability result is to ask at what probability can edges can be randomly removed from some derangement graph without creating a subgraph that has, with a high probability, larger cocliques. The maximum value of this probability could be seen as measure of the robustness of the EKR theorem. I will show one way this probability can be determined using eigenvalues.