

# Eventowns for multiple intersections

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A family  $A$  of subsets of an  $n$ -element set is called an eventown (resp. oddtown) if all its sets have even (resp. odd) size and all pairwise intersections have even size. Using tools from linear algebra, it was shown by Berlekamp and Graver that the maximum size of an eventown is  $2^{n/2}$ . On the other hand (somewhat surprisingly), it turns out that oddtowns have size at most  $n$ . Over the last four decades, many extensions of this even/oddtown problem have been studied. In this talk we will discuss the extension of this problem to multiple intersections. Extending a result of Vu, we'll show that a  $k$ -wise eventown (i.e., intersections of  $k$  sets are even) has for  $k \geq 3$  a unique extremal configuration. In addition, we'll show that a stability result holds for this problem, meaning that all "nearly extremal" families have a very specific structure. Joint work with Benny Sudakov.