

# COLLOQUIUM

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## Cameron–Liebler Sets in Permutation Groups

The logo for Mathematics and Statistics features a large orange circle in the center, containing the text "Mathematics and Statistics" in a bold, black, sans-serif font. This circle is set against a background of four blue squares, one in each corner, which together form a larger square shape.

Mathematics  
and  
Statistics

Date: Friday February 3, 2023

Time: 3:30 PM

Room: RI 208

**Abstract:** Let  $G \leq S_n$  be a transitive permutation group. Given  $i, j \in [n] = \{1, \dots, n\}$ , denote by  $x_{i \rightarrow j}$  the characteristic function of the set

$$\{g \in G : g(i) = j\}.$$

A Cameron–Liebler set (CL set) in  $G$  is a set which is represented by a Boolean function in the linear span of  $\{x_{i \rightarrow j} : (i, j) \in [n]^2\}$ . These are analogous to Boolean degree 1 functions on the hypercube and to Cameron–Liebler line classes in  $PG(3, q)$ . Sets of the form  $\{g : g(i) \in X\}$  and  $\{g : i \in g(X)\}$  (for  $i \in [n]$  and  $X \subset [n]$ ) are canonically occurring examples of CL sets. A result of Ellis et al. shows that all CL sets in  $S_n$  are canonical.

In this talk, we will demonstrate many examples with “exotic” CL sets. Of special interest is an exotic CL set in  $PSL(2, q)$  with  $q \equiv 3 \pmod{4}$ , a 2-transitive group, just like  $S_n$ . The talk is based on ongoing joint work with Jozefien D’haeseleer and Karen Meagher.