The Hong Kong University of Science and Technology  
Department of Mathematics  
Seminar on Pure Mathematics  

Characterization of Intersecting Families of Maximum Size in $PSL(2, q)$  

By  

**Prof. Qing Xiang**  
University of Delaware  
*(Joint work with Ling Long, Rafael Plaza, and Peter Sin)*  

**Abstract**  

The Erdős-Ko-Rado (EKR) theorem is a classical result in extremal set theory. It states that when $k < n/2$, any family of $k$-subsets of an $n$-set $X$, with the property that any two subsets in the family have nonempty intersection, has size at most $\binom{n-1}{k-1}$; equality holds if and only if the family consists of all $k$-subsets of $X$ containing a fixed point.

Here we consider EKR type problems for permutation groups. In particular, we focus on the action of the 2-dimensional projective special linear group $PSL(2, q)$ on the projective line $PG(1, q)$ over the finite field $\mathbb{F}_q$, where $q$ is an odd prime power. A subset $S$ of $PSL(2, q)$ is said to be an intersecting family if for any $g_1, g_2 \in S$, there exists an element $x \in PG(1, q)$ such that $x^{g_1} = x^{g_2}$. It is known that the maximum size of an intersecting family in $PSL(2, q)$ is $q(q - 1)/2$. We prove that all intersecting families of maximum size are cosets of point stabilizers for all odd prime powers $q > 3$.

**Date:** Wednesday, 11 April 2018  
**Time:** 5:00p.m. - 6:00p.m.  
**Venue:** Room 5510, Academic Building  
(near Lifts 25 & 26), HKUST  
*All are welcome!*