



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON PURE MATHEMATICS

**Partial Difference Sets: Broadening the
Scope of the Denniston Family**

by

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Abstract

In 1969, Denniston introduced a family of maximal arcs in Desarguesian planes of even order, a construction that gave rise to a classical family of partial difference sets with deep connections to finite geometry. These partial difference sets, later named after him, are defined within the additive group of a finite field of characteristic 2.

This naturally raises the question: Do Denniston partial difference sets exist in fields of odd characteristic? For over five decades, no progress was made on this problem--until recent breakthroughs by multiple research groups established the construction of Denniston partial difference sets in elementary abelian groups.

Building on this momentum, we extend Denniston partial difference sets to a significantly broader class of elementary abelian groups. Our construction employs character theory and relies critically on meticulous manipulation of Gauss sums over finite fields.

This is joint work with James Davis (University of Richmond), Sophie Huczynska (University of St Andrews), Laura Johnson (University of Bristol), and John Polhill (Commonwealth University of Pennsylvania).

Date : 3 June 2026 (Wednesday)

Time : 10:00-10:50 (Hong Kong Time)

Zoom Link :

<https://hkust.zoom.us/j/92042830673?pwd=99wYPrmsasupPHMT0X9ArhwauKX2fg.1>

Meeting ID: 920 4283 0673

Passcode: 585603

All are Welcome!