Galois Geometries and Applications I
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(Chair/Président: **Jan De Beule** (Ghent University)
Org: **Jan De Beule** (Ghent University) and/et **Petr Lisonek** (Simon Fraser University))

KATHRYN HAYMAKER, University of Nebraska - Lincoln
Write once memory codes from finite geometries

Abstract: A binary write once memory code is a rewriting scheme in which a sequence of codewords representing different messages must be nondecreasing in each coordinate. In this talk we will revisit a 1986 construction of WOM codes from finite projective geometries by Merkx and present some new constructions of rewriting codes from finite geometries.

PETR LISONEK, Simon Fraser University
Quantum codes from generalized quadrangles

Entanglement-assisted quantum error correcting code (EAQECC) utilizes e copies of maximally entangled states (the code requires e ebits). The EAQECC model removes the self-orthogonality requirement imposed on stabilizer quantum codes. The number of ebits should be small. For an LDPC EAQECC that uses one ebit, Fujiwara and Tonchev showed recently that the girth of its Tanner graph is at most six. We study the LDPC EAQECC that arises from the symplectic generalized quadrangle $W(q)$ where q is even. The girth of the Tanner graph is eight and we prove that the proportion of ebits tends to zero as q grows.

BRETT STEVENS, Carleton University
Linear feedback shift registers and covering arrays

The set of fixed length subintervals of a linear feedback shift register form a linear code. A very nice theorem of Bose from 1961 proves that these codewords form the rows of an orthogonal array of (maximum) strength t if and only if the dual linear code has minimum weight $t+1$. Additionally the only strength $t+1$-coverage which is missing from the OA corresponds to multiples of the generating polynomial of the LFSR. We use this and results on difference sets over finite fields to construct a new family of strength 3 covering arrays from these orthogonal arrays.

PETER SZIKLAI, Eötvös L. University, Budapest
The direction problem: old and new results

We will consider variants of the direction problem. Let $U \subset AG(n,q)$ be a pointset, then a point d at infinity is *determined* by U if there exist two points $a, b \in U$ such that a, b, d are collinear; the set of determined points (directions) is D. The typical problems ask about the connection between the structure of U and the properties of D. This theory was born in the 1970's and it is still growing; it has many connections to other topics. Here a most efficient method is the application of polynomials, we will see new results and old ones revisited.

QING XIANG, University of Delaware/the NSF
Constructions of difference sets and strongly regular graphs using cyclotomic classes

We will give a survey of recent advances in constructions of difference sets and strongly regular Cayley graphs by using cyclotomic classes.