

The 9th International Coding Theory Seminar (9th ICTS)

S. Korea (online)

December 19, 2025

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Local organizing committee

Jon-Lark Kim (Sogang University)
Whan-Hyuk Choi (Kangwon National University)
Boran Kim (Kyungpook National University)

Program

All times listed are in Korea Time (GMT+9).

Date: December 19, 2025

ZOOM ID: 275 839 8498

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Time	Activities	
13:00–13:50	Committee Discussion (Committee Members Only)	
13:50–14:00	Jon-Lark Kim Sogang University	Opening Remarks
14:00–14:45	Sunghyu Han Korea University of Technology and Education	On the existence and construction of MDS self-dual codes over finite fields
14:45–15:00	Discussion	
15:00–15:45	Jihye Jeong Ewha Womans University	Construction of optimal few-weight binary and quaternary linear codes using multivariable functions
15:45–16:00	Discussion	
16:00–16:10	Break	
16:10–16:55	Junmin An Sogang University	Shortest Self-Orthogonal Embeddings of Binary Linear Codes
16:55–17:10	Discussion	

On the existence and construction of MDS self-dual codes over finite fields

Sunghyu Han

School of Liberal Arts, Korea University of Technology and Education

Let q be an odd prime power, $\mathbb{F}_q$ be the finite field of q elements, and $A = \{a_1, a_2, \dots, a_n\} \subseteq \mathbb{F}_q$. Define

$$h_A(a_i) = \prod_{1 \leq j \leq n, j \neq i} (a_i - a_j).$$

The following is known. For even n , if $h_A(a_i)$ is square for all $1 \leq i \leq n$, then there exists an MDS self-dual code of length n . For odd n , if $-h_A(a_i)$ is square for all $1 \leq i \leq n$, then there exist an MDS self-dual code of length $n + 1$. In this paper, we present results regarding the existence and nonexistence of such sets A .

(This paper has been published in Journal of Applied and Pure Mathematics, July 2025.)

Construction of optimal few-weight binary and quaternary linear codes using multivariable functions

Jihye Jeong

Department of Mathematics, Ewha Womans University

In this talk, we discuss how to find infinite families of few weight (near-) optimal linear codes over $\mathbb{F}_2$ and $\mathbb{Z}_4$. Our construction methods mainly employ the shortening method and certain multivariable functions. Using our construction methods, new infinite families of (near-) optimal few-weight linear codes over $\mathbb{F}_2$ and $\mathbb{Z}_4$ are obtained. As an application of our binary linear codes, we produce support t -designs ($t = 2$ or 3) which cannot be determined by the Assmus- Mattson Theorem. Additionally, we derive many (near-) optimal quantum codes from the dual codes of our binary code families using the CSS construction. (This is a joint work with Y. Lee (Ewha Womans University) and J. Y. Hyun (Kunkuk University))

On the recent results on self-orthogonal embeddings of binary linear codes

Junmin An

Department of Mathematics, Sogang University

Self-orthogonal codes have been a key subject of study in coding theory due to their wide range of applications, and various methods have been developed for their construction. As one such method, we introduce self-orthogonal embedding, which constructs a self-orthogonal code by adding a certain number of columns to the generator matrix of a binary linear code. While the minimal number of columns needed for the self-orthogonal embedding of a general binary linear code was previously an open problem, in this presentation, we resolve this question by determining the minimal number using the hull of the code. In addition, we introduce algorithms to find optimal self-orthogonal codes via SO embeddings, which enabled us to discover several new optimal codes. This is a joint work with Nathan Kaplan, Jon-Lark Kim, Jinqun Luo and Guodong Wang.

