

# Colloquium on Combinatorial Designs

**2022.3.26 8:30-11:30**

**Morning:** <https://meeting.tencent.com/dm/17crltkLYZSE>

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## Invited Speakers

**Hongwei Liu** Construction of MDS twisted Reed-Solomon codes

**Xiaonan Lu** Circulant almost orthogonal arrays: statistical optimality and related combinatorial structures

**Zilong Wang** Periodic and aperiodic correlation of sequences

**Organisers:** Tao Feng, Xiande Zhang, Yue Zhou

# Colloquium on Combinatorial Designs

Organized by Tao Feng, Xiande Zhang and Yue Zhou

March 26, 2022



# Information

Our 7th colloquium will be held via Tencent Voov meeting on 26th March 2022 from 08:30 to 12:00. It consists of three invited talks, each of which will take around 1 hour. There will be a 5-minutes break between every two talks.

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# Contents

<b>Information</b>	<b>iii</b>
<b>Abstracts</b>	<b>1</b>
Construction of MDS twisted Reed-Solomon codes ( <i>Hongwei Liu</i> ) . . . . .	1
Circulant almost orthogonal arrays: statistical optimality and related combinatorial structures ( <i>Xiaonan Lu</i> ) . . . . .	1
Periodic and aperiodic correlation of sequences ( <i>Zilong Wang</i> ) . . . . .	2



# Abstracts

## **Construction of MDS twisted Reed-Solomon codes**

26 March  
8:30am

Hongwei Liu

Central China Normal University, China

Maximum distance separable (MDS) codes are optimal in the sense that the minimum distance cannot be improved for a given length and code size. Inspired by twisted Gabidulin codes, twisted Reed-Solomon (TRS) codes were firstly introduced in coding as a generalization of RS codes. MDS codes can be constructed from TRS codes, and most of them are not equivalent to RS codes. In this talk, we give two explicit constructions of MDS TRS codes. In some cases, our constructions can obtain longer MDS codes than that of previous works. Some other results will also be given in this talk. This is joint work with Shengwei Liu.

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## **Circulant almost orthogonal arrays: statistical optimality and related combinatorial structures**

26 March  
9:30am

Xiaonan Lu

University of Yamanashi, Japan

Circulant almost orthogonal arrays (CAOAs) are a class of circulant arrays introduced by Y.-L. Lin, et al. (2017) for designs of fMRI experiments. In this talk, I will focus on two-level CAOAs with strength 2. After a brief review on the background on fMRI experiments, statistical models concerning CAOAs, and the statistical optimality, I will introduce the relationship between a special type of CAOAs and combinatorial designs, as well as binary sequences. If time permits, I will talk about some algebraic and/or computational approaches on finding such CAOAs. This talk is partially based on joint work with Miwako Mishima, Nobuko Miyamoto, and Masakazu Jimbo.

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26 March  
10:30am

## Periodic and aperiodic correlation of sequences

Zilong Wang

Xidian University, China

Constructions of sequences with desired periodic and aperiodic correlation of sequences are two completely separate fields in the literature for more than seven decades. In this talk, we first investigate the paraunitary-matrix-based method to construct (aperiodic) complementary sequence sets and complete complementary codes by Butson-type Hadamard matrices. Then we discover an extremely fascinating hidden connection between the sequences in (aperiodic) complementary sequence sets and complete complementary codes and the sequences with (periodic) ideal 2-level autocorrelation, through the trace function and permutation polynomials over finite fields.

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