



*Institute of Mathematical Research  
Department of Mathematics*

# PROBABILITY AND INFORMATION THEORY SEMINAR

## Three Coding Problems

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### Abstract

In recent years, coding theory is widely used in various areas. This talk consists of three topics that cover three application fields of coding theory, i.e., coding for storage systems, coding for complexity theory, and network error-correcting codes, respectively.

The first topic is “Systematic encoding for Low-rate Blaum-Roth Codes”, which presents systematic encoding algorithms from the perspectives of both parity-check and generator matrices. I will talk about the design principle rather than the implementation details. Later, an instance about using combinatorial methods to design good codes for complexity theory is discussed. We propose an elementary construction of bounded family of matching vectors with larger size, improving the construction presented by Dvir, Gopalan and Yekhanin in FOCS 2010. This yields a matching vector code with higher rate. The last topic, “Subspace-Metric-Dominant Codes: A Generalization of Constant Dimension Codes”, is about network error-correcting codes. We classify the projective space codes into two categories: subspace-metric-dominant and non-subspace-metric-dominant, according to whether their behaviors under both subspace metric and injection metric minimum distance decoder are the same. Furthermore, we present a necessary and sufficient condition to characterize Subspace-Metric-Dominant codes.

Date: March 6, 2013 (Wednesday)

Time: 4:00pm

Place: Room 206, Run Run Shaw Bldg., HKU

*All are welcome*