

Seminar

# Sum-Rank-Metric Codes for Distributed Data Storage

The sum-rank is a family of metrics which contains both Hamming and rank metric as special cases and in general can be

seen as a mix of the two. It was introduced as a suitable distance measure for multi-shot network coding in 2010. Recently, the codes have found an application in coding for distributed data storage [1,2].

The student should understand the following definitions:

- sum-rank metric [1,3]
- linearized Reed-Solomon (LRS) codes [1,3]
- maximally-recoverable locally repairable code (MR-LRC) [1,2], also known as partial MDS (PMDS) codes in other literature

Furthermore, the student should understand the constructions of MR-LRCs based on LRS codes in the two papers [1, Sections I-III] and [2], and compare their field sizes.

References:

[1] Umberto Martínez-Peñas and Frank R. Kschischang. "Universal and dynamic locally repairable codes with maximal recoverability via sum-rank codes." *IEEE Transactions on Information Theory* 65.12 (2019): 7790-7805.

[2] Han Cai et al. "A Construction of Maximally Recoverable Codes with Order-Optimal Field Size." *arXiv preprint arXiv:2011.13606* (2020).

[3] Umberto Martínez-Peñas. "Skew and linearized Reed–Solomon codes and maximum sum rank distance codes over any division ring." *Journal of Algebra* 504 (2018): 587-612.

## Prerequisites

- good knowledge in coding theory and linear algebra
- interest in coding for distributed data storage

## Advisors

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