

Weight spectra of Gabidulin rank-metric codes and Betti numbers

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Coding theory concerns the transmission and storage of data over noisy channels, where the data may be altered or lost. In 1978, Delsarte introduced rank-metric codes for purely combinatorial purposes. Later Roth applied these codes in crisscross error correction and rank based cryptosystems have been studied extensively following the GPT cryptosystem by Gabidulin et al. One of the main problems in the study of mathematical theory of codes is to determine the generalized weights of a linear code. To address this problem we consider q -matroids and their associated classical matroids derived from Gabidulin rank-metric codes. In this talk, I present how the generalized rank weights of a Gabidulin rank-metric code are expressed in terms of Betti numbers of the dual classical matroid associated to the q -matroid corresponding to the code. Also, I demonstrate how the weight distribution and higher weight spectra of such codes can be determined directly from the associated q -matroids by using Möbius functions of its lattice of q -flats.

This talk is based on a joint work with T. Johnsen and H. Verdure (arXiv: [2106.10993](https://arxiv.org/abs/2106.10993)).

Keywords: Gabidulin rank-metric codes, q -Matroids, Generalized rank weights, Weight spectra, Betti numbers, Möbius function.