

# Extremal codes with 2-transitive automorphism groups

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In the present talk we consider extremal self-dual codes. A self-dual code is called extremal if its minimum distance  $d$  attains the highest possible value. We concentrate on Type II codes (binary doubly-even codes), for which we have  $d \leq \lfloor \frac{n}{24} \rfloor + 4$ , and the code is extremal if the equality holds. Extremal Type II codes may theoretically exist for lengths  $n = 8k \leq 3928$ , but it is noteworthy that such codes have been actually constructed only for 13 lengths, 136 being the largest. Over the last decades the study of extremal codes became inseparable from the study of their automorphisms. For example, one of the few methods to construct a new “good” code  $C$  is to assume that  $C$  is invariant under a certain automorphism and to use the restrictions imposed by this fact.

We present a method to classify extremal Type II codes  $C$  with 2-transitive automorphism groups. Using this method we are able to show that  $C$  is either a quadratic residue code, a Reed-Muller code, or a putative code of length 1024. The classification was completed recently in [2], where the open case was excluded.

## References

- [1] A. Malevich and W. Willems, On the classification of the extremal self-dual codes over small fields with 2-transitive automorphism groups, *Des. Codes Cryptogr.* (to appear), 2013, DOI 10.1007/s10623-012-9655-9
- [2] N. Chigira, M. Harada, M. Kitazume, On the Classification of Extremal Doubly Even Self-Dual Codes with 2-Transitive Automorphism Group, 2013, arXiv:1302.1626

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