

# On Cameron-Liebler line classes with large parameter

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(Joint work with Jeroen Demeyer, Klaus Metsch, and Morgan Rodgers)

A *Cameron-Liebler* line class in  $\text{PG}(3, q)$  is a set  $\mathcal{L}$  of  $x(q^2 + q + 1)$  lines of  $\text{PG}(3, q)$  with the property that any spread of  $\text{PG}(3, q)$  shares exactly  $x$  lines with  $\mathcal{L}$ .

In the talk, which reports on joint work with Jeroen Demeyer, Klaus Metsch and Morgan Rodgers, we will overview some non-existence results of Cameron-Liebler line classes for relatively small parameter  $x$ . Then we continue with reporting on attempts to construct (several) infinite families of examples for parameter  $x \in \mathcal{O}(q^2)$ , for different values of  $q$ , based on the assumption that a group of order  $q^2 + q + 1$  acts as an automorphism group on the line class, using the initial information we got from [1, 2]. We will discuss how the representation of  $\text{AG}(3, q)$  as  $\mathbb{F}_{q^3}$  was used to geometrically understand the orbits of the points of  $\text{PG}(3, q)$  under the group, and we overview the state of the art of the currently known examples.

## References

- [1] M. Rodgers. Private communication.
- [2] M. Rodgers. Some new examples of cameron-liebler line classes in  $\text{PG}(3, q)$ . *Des. Codes Cryptogr.*, to appear, DOI: 10.1007/s10623-011-9581-2