

## Popular science summary of the PhD thesis

PhD student	<u>Jonathan Tilling Niemann</u>
Title of the PhD thesis	<u>Maximal and ordinary function fields over finite fields</u>
PhD school/Department	<u>DTU Compute</u>

### Science summary

Algebraic function fields over finite fields can be used to construct clever *error-correcting codes*. The idea is to *encode* information in a smart way, so that it is protected against errors that might occur when transmitting or storing the data. In general, *error-correcting codes* are widely used when dealing with satellite transmissions, cloud storage, and similar settings where noisy channels and other sources of errors are unavoidable.

Different situations require error-correcting codes with different properties. In some cases, this can be solved by finding a function field with just the right properties, e.g., many rational places or a large automorphism group. For this reason, and because it is natural from a purely theoretical perspective, it is interesting to study algebraic function fields over finite fields.

The main topic of this thesis is the study of *maximal* function fields, i.e., function fields which have the highest possible number of rational places (with respect to the Hasse-Weil bound). We consider the problem of constructing and classifying maximal function fields and try to understand properties of known maximal function fields better. Finally, we study another type of function fields, namely *ordinary* function fields with a large automorphism group.

The overall motivation for the project is that a better understanding of algebraic function fields and related abstract structures might eventually lead to improvements in areas such as digital communication and data storage, which are increasingly important for our everyday life.

Please submit the summary to the department PhD coordinator together with your thesis