

SEARCHING FOR SIMPLE LIE ALGEBRAS IN CHARACTERISTIC 2

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The simple Lie algebras are classified over all algebraically closed fields in characteristic 0 and in characteristic $p > 3$. The small characteristics 2 and 3 are still open. The available evidence suggests that the classification in characteristic 2 is very different from that in characteristic $p > 3$. The classification in characteristic 2 is an active and ongoing research project.

This talk shows how computational methods can be used to search for new simple Lie algebras over $GF(2)$. The computational methods exhibited in this talk have been used to find some new simple Lie algebras in dimension 16 and this seems to be the only dimension in the range of dimensions up to 20 that yields new simple Lie algebras.

This project is still ongoing and there is the aim to extend this search to larger dimensions. The talk will also discuss the main problems that need to be addressed for this purpose.

REFERENCES:

1. Bettina Eick, *Some new simple Lie algebras in characteristic 2*, Journal of Symbolic Computation **15** (2012), 943–951.
2. Michael Vaughan-Lee *Simple Lie algebras of low dimension over $GF(2)$* , LMS J. Computational Mathematics **9** (2006), 174–192.