

Neumaier graphs

Maarten De Boeck

Eindhoven University of Technology

A *Neumaier graph* is an edge-regular graph with a regular clique. A lot of strongly regular graphs (but clearly not all of them) are indeed Neumaier, but in [1] it was asked whether there are Neumaier graphs that are not strongly regular. This question was only solved very recently (see [2]), so now we know there are so-called *strictly* Neumaier graphs.

In this talk I will discuss several new results on Neumaier graphs, including bounds and (non)-existence results. I will focus on a new construction producing lots of new strictly Neumaier graphs. This construction uses basic number theory, and raises some not-so basic number theory questions. I will also address some results about the eigenvalues of strictly Neumaier graphs.

This is joint work with Aida Abiad, Wouter Castryck, Bart De Bruyn, Jack Koolen and Sjanne Zeijlemaker

References

- [1] A. Neumaier, Regular cliques in graphs and special $1\frac{1}{2}$ -designs. 1981.
- [2] G.R. Greaves and J.H. Koolen, Edge-regular graphs with regular cliques. *European J. Combin.*, 71, 194–201, 2018.