

Dr Pdraig Ó Catháin – Dublin City University

Title: The Hadamard maximal determinant problem

Abstract:

Hadamard's famous paper of 1893 discusses complex matrices which meet his bound with equality. Slightly less well known is the body of work on matrices with entries in $\{-1, 1\}$ with maximal determinant. These are typically not Hadamard, since the Hadamard bound cannot be achieved when the dimension is larger than 2 and not a multiple of 4. I will survey the main techniques, bounds and constructions to be found in the literature, highlighting recent progress.

While the analogous complex Hadamard matrices (particularly with k th roots as entries) have been well studied, much less is known about complex maximal determinant matrices (over a fixed finite extension of the rationals) when the bound is not attained. I will present some open questions and directions for future research.

This is joint work with Patrick Browne, Ronan Egan, Fintan Hegarty and Guillermo Nunez Ponasso. The talk will be accessible to a broad audience, assuming only passing familiarity with linear algebra.