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Tabulating Class Groups of Real Quadratic Fields

Class groups of real quadratic fields have been studied since the time of Gauss, and in modern times have been used in applications such as integer factorization and public-key cryptography. Tables of class groups are used to provide valuable numerical evidence in support of a number of unproven heuristics and conjectures, including those due to Cohen and Lenstra. In this talk, we discuss recent progress in our efforts to extend existing, unconditionally correct tables of real quadratic fields. This includes incorporating ideas of Sutherland for computing orders of elements in a group, as well as constructing a unconditional verification algorithm using the trace formula of Maass forms based on ideas of Booker.

This is joint work with C. Bian, A. Booker, A. Shallue, and A. Strömbergsson.