

**Speaker:** Alexander Dunn

**Title:** Bias in cubic Gauss sums: Patterson's conjecture

**Abstract:** We prove, in this joint work with Maksym Radziwill, a 1978 conjecture of S. Patterson (conditional on the Generalised Riemann hypothesis) concerning the bias of cubic Gauss sums. This explains a well-known numerical bias in the distribution of cubic Gauss sums first observed by Kummer in 1846.

One important byproduct of our proof is that we show Heath-Brown's cubic large sieve is sharp under GRH. This disproves the popular belief that the cubic large sieve can be improved.

An important ingredient in our proof is a dispersion estimate for cubic Gauss sums. It can be interpreted as a cubic large sieve with correction by a non-trivial asymptotic main term.