

*Department of Mathematics,
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Math 209 - Number Theory Seminar

Prof. Jeff Lagarias

University of Michigan

Complex Equiangular Lines and the Stark Conjectures

Abstract:

This talk is expository. It describes the history of an exciting connection made by physicists between an unsolved problem in combinatorial design theory- the existence of maximal sets of d^2 complex equiangular lines in \mathbb{C}^d - rephrased as a problem in quantum information theory, and topics in algebraic number theory involving class fields of real quadratic fields. Work of my former student Gene Kopp recently uncovered a surprising, deep (unproved!) connection with the Stark conjectures. For infinitely many dimensions d he predicts the existence of maximal equiangular sets, constructible by a specific recipe starting from suitable Stark units, in the rank one case. Numerically computing special values at $s = 0$ of suitable L-functions then permits recovering the units numerically to high precision, then reconstructing them exactly, then testing they satisfy suitable extra algebraic identities to yield a construction of the set of equiangular lines. It has been carried out for $d = 5, 11, 17$ and 23 .

Special Note:

Pre-talk at 1:20pm

Thursday, October 14, 2021

2:00 PM

APM 6402 and Zoom; see

<https://www.math.ucsd.edu/~nts/>
