1136-11-537 **Marcus Appleby***, University of Sydney, and **Tuan Chien**, **Steven Flammia** and **Shayne Waldron**. *A number-theoretic technique for constructing exact sets of complex equiangular lines.*

Sets of d^2 complex equiangular lines in a d-dimensional vector space are called SICs and are the subject of Zauner's conjecture. Recently several intriguing conjectures have been proposed connecting SICs and algebraic number theory (see S. Flammia's talk in this session). Testing and developing these conjectures requires that the SICs are expressed exactly, rather than as numerical approximations. While many exact solutions have been constructed using Groebner bases this method has probably been taken as far as is possible using current computer technology (except in special cases—see recent work by Grassl and Scott). In this talk it is shown how the same number theoretic considerations which create the demand for more exact solutions also provide the means for satisfying it. Specifically, it is shown how the conjectured Galois symmetries of a SIC can be used in conjunction with an integer relation algorithm to convert a high-precision numerical solution into an exact solution. Using this method 69 new exact solutions have been constructed.
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